CULTURAL AND DEMOGRAPHIC DIFFERENCES IN FINANCIAL RISK TOLERANCE

by

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DECLARATION

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LIST OF ABBREVIATIONS

Abbreviation	Meaning
ANOVA	one-way analysis of variance
AUS	Australia
EUT	expected utility theory
FRT	financial risk tolerance
PT	prospect theory
UK	United Kingdom
USA	United States of America
ZA	South Africa

ABSTRACT

CULTURAL AND DEMOGRAPHIC DIFFERENCES IN FINANCIAL RISK TOLERANCE

The relationship between an individual's financial risk tolerance (FRT) level and demographic factors has been widely researched because of the importance of determining an individual's risk profile. The process by which individuals assess risk to make financial decisions is an important part of the investment process and is an obligatory input for financial advisors in providing financial advice for the client. The assessment of financial risk tolerance is often subjective in nature, and with it comes limitations to quantify it in alignment with objective risk, such as asset allocation and portfolio constructions.

Given the importance of financial risk tolerance, both from a legislative as well as a fiduciary perspective, it is imperative that a better understanding of these relationships is obtained to assist financial planners, financial advisers and clients. The aim of the study was to determine the association between an individual's financial risk tolerance and selected demographics. Furthermore, the study aimed to determine whether there were differences in the levels of financial risk tolerance between South African respondents and those from Australia, the United States of America and the United Kingdom.

The study was a cross-cultural secondary data analysis of previously collected survey data. The survey data comprised of 6 828 respondents from all four countries who accessed the questionnaire.

The secondary data was collected from a survey which used a financial risk tolerance assessment measure, the FinaMetrica personal risk profiling system, which is a commercially provided computer-based risk tolerance measurement tool. Demographics included age, gender, marital status, level of education, income levels and net worth. The risk tolerance components of the questionnaire included questions about the respondent's attitude, values and financial experience.

Statistical techniques used for analysis included correlation analysis, t-tests, one-way analysis of variance (ANOVA) and logistic regression. The study revealed cultural differences in the levels of financial risk tolerance between respondents from South Africa, Australia, the United States of America and the United Kingdom, with South Africa having the highest mean financial risk tolerance score. The study revealed that FRT levels are positively related to education, income and combined income for all countries as well as for the total sample when these relationships were considered on a univariate case. These findings were in line with other literature measuring these relationships. For all countries except South Africa, financial risk tolerance scores were found to have a negative relationship with age, which was in line with literature findings. However, within a multivariate model context, age was a consistent predictor and negatively related to financial risk tolerance levels in all countries and for the total sample.

In the multivariate model, the total sample consisting of the data of all four countries revealed that higher financial risk tolerance levels were associated with being male, with a higher level of education attained, earning higher income, holding a higher accumulated net worth, being younger and being a South African.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

In finance it is assumed that a rational individual is willing to take risks because he/she expects that the added utility derived from the positive outcome will on average outweigh the reduced utility from a negative outcome (Finke & Huston, 2003). Important financial choices regarding investment products, asset allocation strategies and fund accumulation strategies have been attributed to risk tolerance (Grable & Lytton 1999a; Finke & Huston, 2003; Yao, Sharpe & Wang 2011). According to Harlow and Brown (1990), the most prudent approach to asset allocation of financial products requires a consideration of variables involving both capital market expectations and the investor's tolerance for risk.

Whether in the context of professional practice or empirical research, risk tolerance is acknowledged as an important factor in savings, investment choices, financial decisions and various household goals. Choices regarding investment products, asset allocation plans, and investment portfolios have been attributed to financial risk tolerance (FRT) (Sulaiman, 2012). Subjective financial risk tolerance could also be taken into account as part of insurance choices. An investor's attitude towards risk or handling of risks might be related to demographic factors such as age, gender, marital status and income, to name a few. Sung and Hanna (1996) state that an individual's knowledge of personal finance and economic expectations could play a role in shaping risk preferences. This provides support for further research into these relationships and therefore is one of the objectives of the study.

The above discussion highlights the importance of an individual's own ability or that of the financial advisor in conducting accurate risk tolerance assessments in order to avoid the potential problem of inaccurate or inadequate considerations in determining financial risk tolerance.

A duty of thoroughly determining the suitability of an investment choice (appropriate or right for the client's purpose and situation) is commonly referred to as the obligation to "Know Your Client" (Van Setten, 2009:19). This obligation is a common feature in most financial services regulatory frameworks, which stem from the desire to enhance client protection. The "Know Your Client" rule requires that all qualified financial services providers consider a client's personal circumstances, financial status, risk tolerance and their investment objectives when determining suitable financial investment for a client (Cooper, Kingyens, & Paradi, 2014).

In South Africa, there legislation is set out by the Financial Services Board (FSB) for compliance with the Financial Advisory and Intermediary Services (FAIS) Act (37/2002) (hereafter referred to as the FAIS Act). Section 8 (1)(c) of the FAIS Act's General Code of Conduct for Authorised Financial Services Providers and Representatives, states as follows: "A provider must, prior to providing a client with advice … identify the financial product or products that will be appropriate to the client's risk profile …" Although this Act does not explicitly require financial advisors to assess the client's risk tolerance, it does require due diligence on the part of the advisor to obtain as much insight into the client's risk profile as possible.

1.2 PROBLEM STATEMENT

Studies investigating the relationship between certain demographic factors and individual risk tolerance are widespread (e.g. Grable & Lytton, 1999a; Grable, 2000; Finke & Huston, 2003; Hallahan, Faff & McKenzie, 2003). In the South African context however, it appears that financial risk tolerance has received very little focus. To date there has been no published research in South Africa on the subject of financial risk tolerance. However a few theses and dissertations on this literature are available in South Africa. Thus further research on the subject of financial risk tolerance is necessary to improve the knowledge and understanding of the subject.

With the obligation to meet legal compliance as described in Section 8(1) of the FAIS Act's General Code of Conduct, it is likely that financial services providers would rely on some form of risk profiling questionnaire.

The problem that emerges is that little if any research has been conducted in South Africa regarding the association between financial risk tolerance and demographic factors. Given the importance of financial risk tolerance, both from a legislative as well as a fiduciary perspective, a better understanding of these relationships is necessary to assist financial planners, financial advisers and clients. This offers an opportunity to research the subject of financial risk tolerance further to grow the existing literature on the relationship between financial risk tolerance and demographic factors in a South African context.

1.3 RESEARCH OBJECTIVES

The aim of the study is to determine the association between an individual's financial risk tolerance and selected demographics:

- The first research objective is to examine whether there is a relationship between certain demographic factors of an individual and his/her financial risk tolerance. The variables to be tested are age, gender, income and financial net worth, marital status, level of education, number of dependents and culture (nationality).
- The second objective is to determine whether there are significant demographic differences in levels of financial risk tolerance between South African (ZA) respondents and those from Australia (AUS), the United Kingdom (UK) and the United States of America (USA).

1.4 IMPORTANCE AND BENEFITS OF THE PROPOSED STUDY

Financial risk tolerance is presumably one of the fundamental issues that underlie most financial decisions made by individuals. One of the important fiduciary obligations of financial advisors when providing appropriate investment advice is that they must be aware of the circumstances and preferences of their clients (Roszkowski & Grable, 2005). With research on financial risk tolerance being scarce in South Africa, as well as a present fiduciary obligation on financial advisors, there are benefits in researching and providing insight into this topic.

In a South African context, further research aimed at growing the current literature available on financial risk tolerance could create a better understanding for both the client and financial services providers.

1.5 DELIMITATIONS

The literature review will focus on both South African studies and international sources while the empirical part of the study will analyse data consisting of participants from South Africa, Australia, the United Kingdom and the United States of America. The study will investigate the relationship that exists between certain demographic factors (age, gender, income and combined income, net worth, education, marital status, number of dependents and nationality) and the level of financial risk tolerance, noting that there are other demographic factors which were not captured by the demographic section of the questionnaire and therefore are excluded from this study.

1.6 LIMITATIONS

The study makes use of previously collected data which was obtained from AUS, UK and USA samples, which consists primarily of respondents who consulted with financial advisors and completed the questionnaire. For the South African data, this was previously collected from an online survey of readers of an Afrikaans business newspaper, Sake Rapport, who had access to the internet. The results are therefore limited from being generalised to the broader populations of each respective country.

1.7 OUTLINE OF REMAINDER OF DISSERTATION

Chapter 2 contains the literature review. The literature review discusses the literature consulted throughout the study, critically analysing the literature and related works. The chapter concludes with a summary of literature findings on relationships between demographic factors and financial risk tolerance and cultural differences.

Chapter 3 presents the research design and methods used in the study. This chapter discusses the research design, risk tolerance assessment methods and appropriate measures of risk tolerance and the statistical tests appropriate for the data analysis.

Chapter 4 follows with a detailed analysis of the data for each country as well as the total sample. The chapter includes all information regarding the sample characteristics, descriptive statistics and presentation of the statistical test results with reference graphs, tables and figures included.

Chapter 5 reviews and interprets the previously analysed results by discussing and interpreting the results of the hypotheses tested.

Chapter 6 is the final chapter, which includes the conclusion of the study, integrating the findings and previous literature. Gaps or limitations of the data as well as the relevance, significance and value of the study are discussed. Final recommendations for future studies are provided.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Firstly Chapter 2 presents an overview of previous research on the concept of *risk* and provides accepted definitions of *financial risk* and *financial risk tolerance*. This serves as a means to provide background to and understanding of the subject matter of the study. The chapter then highlights the importance of financial risk tolerance and its relevance in the financial decision-making process. Research on measures of financial risk tolerance is also discussed. Previous research on the relationship between financial risk tolerance and each of the selected demographic factors as well as the interrelationships between these demographic factors and the level of financial risk tolerance is discussed. The chapter concludes with a summary of relationships between demographic factors and financial risk tolerance considering cultural differences.

2.2 OVERVIEW OF RISK

When exploring the meaning of *risk*, Huang (2013) equates this to being similar to asking what a dragon is. A dragon was historically understood as a powerful totem which represented various qualities, emotions and traits. Huang (2013) explains that while some might recognise the oriental dragon as a symbol of fortune or as a messenger from God, others might view the western dragon as a symbol of the devil. It appears that risk is subjective and has different meanings for individuals with the same exposure or circumstances.

According to Bernstein (1995), *risk* has always been a matter of measurement and instinct, with the relationship between the two changing over time to reflect the development of the basic philosophical underpinnings of society. As the unknown is always present, historically, it was found that as long as people sensed a lack of control over their futures, chance explained the entire outcome. He further states that oracles and especially priests were the preferred forecasters for individuals, given that during that particular period of time, the belief was that they held a direct line to the powers that controlled the elements. However, the random track records and obscure methods by the seers created little confidence in their predictions of uncertain outcomes. Consequently the Renaissance, a collection of ideas, freed people to experiment and explore, demonstrating that choice is a valid human activity and that facing risk is expected (Bernstein, 1995).

While some people consider risk negatively, others might think that risk means opportunity. In fact, different cultures have different risk perceptions (Huang, 2013 Levinson & Peng, 2007; Statman & Weng, 2010). Whether in the realms of professional practice, education or in a social context, it appears that risk, as well as how we perceive risk, is an important aspect in decision-making and in everyday life.

2.2.1 Risk perception

Risk perception forms an integral part of the decision-making process, because there is a degree of uncertainty associated with all decision outcomes (Williams & Noyes, 2007). Factors found to be influential in risk perception as proposed by Baird and Thomas (1985) are as follows: the presence of uncertainty particularly in the process of identifying risks as well as the decision consequences in the event of success or failure to meet a goal and information. Research by Slovic, Peters, Finucane and MacGregor (2005) also reinforces the idea that information provided to individuals could change their risk perception, which, in turn, could influence their judgement in making a decision.

Risk perception can be understood as an individual's assessment of risk. Understanding how individuals perceive risk is important because perception is reality (Finucane, 2002). When making a financial decision, individuals normally need to make some prediction about the future. That is, the decision-maker needs to form some view about the likely future outcome resulting from his/her decision. While decision-makers may attempt to produce an accurate prediction, the future is uncertain and therefore misjudgements will often occur.

Researchers in social sciences (Huang 2013; Huang & Ruan 2008; Slovic *et al.* 2005) argue that risk is inherently subjective and cannot be measured independently of the individual's logic and social traits. Finucane (2002) states that there are essentially two main qualitative dimensions that drive risk perception: unknown versus known risk and dread versus not dreaded risk. The unknown risk dimension relates to the extent to which a hazard is not known, unobservable, unfamiliar and has delayed consequences. The dread risk factor reflects the extent to which a hazard is dreaded, involuntary or uncontrollable and has catastrophic potential that is cannot easily be reduced.

In support of the view that risk perception has many dimensions, Slovic (2001) justifies the complexity and multidimensionality of risk and states that perceptions could result in conflict between risk policy decisions made by the public at large. His illustration, for example, questions whether risk from cancer (a dreaded disease) is worse than risk from a car accident (not dreaded). Furthermore, he similarly questions whether the risk imposed on a child is more serious than a known risk which has been accepted by an adult voluntarily. The difficult questions according to Slovic (2001) multiply when outcomes other than human health and safety are considered.

It is apparent that the perception of risk is significantly affected by subjectivity. The inference that can be made from the literature discussed above indicates that human subjectivity includes factors such as background, personal preference, demographic factors and past experience. It appears that risk perception is a subjective evaluation that an individual has about the characteristics of a certain risk. Consequently, it is important to explore the meaning and attributes of risk.

2.2.2 Definition of risk

In financial literature, there are many discussions of risk but there is no standard definition in all fields of risk literature. According to Holton (2004), a general definition should have two essential components, namely exposure and uncertainty. *Uncertainty* is commonly understood as a state of not knowing whether a proposition is true or false, whether the individual is aware of it or not. Like uncertainty, exposure is an individual condition although distinct from uncertainty. The degree to which one is uncertain of a proposition does not affect the degree to which one is exposed to that proposition. The individual's current exposure thus depends on what his/her current preference is, which is considered of significant consequence. Furthermore, Holton (2004:22) defines *risk* as “the exposure to a proposition of which one is uncertain”. Kaplan and Garrik (1981) define *risk* as a concept of a triplet, consisting of scenario, probability and consequence. This definition is founded on the idea that *risk* as a concept answers to three related questions: (i) what could happen (ii) how likely is that scenario and (iii) what the consequences could be if the event happens. A similar view is held by Renn (1998) who refers to risk as “the possibility that human actions or events lead to consequences that affect aspects of what humans value”.

Huang and Ruan (2008:682) define *risk* as “a scene in the future associated with some adverse incident”. In recognising that there is no single definition for *risk* they challenge the core of most definitions, which is: risk is present when loss is possible and the financial impact significant. They are of the view that loss, probability or probability of loss, at most describes features of risk. Ganzach (2000) agrees with this view, namely that although *risk* is more commonly defined in terms of the variance of the probability distributions of possible outcomes, this variance appears to be in disagreement with people’s perceptions. The way in which *risk* is conceptualised often differs noticeably between those responsible for designing the messages (including expert risk assessors) and the users of risk messages, which has implications for the effectiveness of any risk communication (Williams & Noyes, 2007).

Due to the increased interest and the abundance of literature discussing uncertainty and risk, Samson, Reneke and Wiecek (2009) reviewed different perspectives and definitions concerning both *risk* and *uncertainty*, accessing sources from literature in economics, finance, general mathematics, engineering and operations research. Their study found that most of the scholars in the finance and economics field view uncertainty as risk and more specifically they assume that uncertainty follows a distribution or sets of distributions allowing uncertainty to be quantifiable. It is, however, universally accepted that when other things (particularly expected returns) are held constant, risk is negatively related to preference (Ganzach, 2000).

From the mentioned descriptions of the concept *risk*, it is evident that risk is affected by many more factors and characteristics such as control, choice and human subjectivity such as background, preferences and perceptions. For the purpose of this study, *risk* will be defined as “the exposure to uncertain possibilities of outcomes bearing consequences which could be favourable or unfavourable as a result”. The vast literature existing on risk and its features allows for the conclusion that *risk* is a central feature of the alternatives faced by decision-makers, of which the outcome is uncertain.

2.3 THE IMPORTANCE OF RISK AND DECISION-MAKING

2.3.1 Risk aversion and choice under risk

The view that humans are, or should be, risk averse is a belief held among economic researchers (Corter & Chen, 2006; Davies & Satchell, 2007), at least in decisions that have outcomes in the domains of gains or losses or mixed outcomes including both gains and losses. Economic decisions in uncertain conditions, usually take place in the presence of multiple risks and in markets which are less than complete (Eeckhoudt, Gollier & Schlesinger, 1996). It can be inferred that most decisions entail some degree of risk, because individuals are usually in a position to make choices without knowing in advance what the consequences will be.

Choice under risk implies that the decision-maker is expected to integrate (i) information about the characteristics attributable to the risky outcomes and (ii) information regarding the probability of each outcome (Rasouli & Timmermans, 2014). Thus it implies that individuals cannot be certain about the exact state of choice alternatives along uncertainty dimensions or about the outcome of his/her decision.

As explained by Trepel, Fox and Poldrack (2005), the basics in most traditional models of decision-making under risk and uncertainty are acts, states and consequences. Accordingly, an *act* is an action which is associated with possible consequences that depend on a particular state that could result from the action.

Corter and Chen (2006) point out that some studies showed that people have varying risk attitudes (tolerance), which exist independently of their financial circumstances and these attitudes affect investment decisions. An array of explanations has been provided including personality traits and generalised disposition to tolerate anxiety or excitement-seeking behaviour. Corter and Chen

(2006) assert that whatever their causes, it is more important to be able to assess individual differences in risk attitudes. Furthermore, they explain that it is widely accepted that individuals' risk attitudes predict the level of comfort with different investment strategies and perhaps include their unhappiness with negative investment outcomes. Risk tolerance or attitude will be explored in greater detail in Section 2.4.

It appears that financial and investment decision-making is founded on some important theoretical issues that need to be faced in order to assess and interpret decision-makers' behaviour in a meaningful way. This includes the traditional assumptions and literature which describes the existing assumptions of decision-making theories and models, highlighting the expected economic behaviour of decision-makers under risky choices. The following section explores the decision-making theories.

2.3.2 Decision theories and models

Previous studies investigated the foundation on which decision models were used to explain human behaviour. These investigations were done in the context of decision-making under risk as well the underlying decision theories (Leland, 2010; Simon, 1959; Suhonen, 2007; Tamura, 2008).

The purpose of normative theories (prescriptive theories) is to prescribe the optimal behaviour of individuals when they are confronting risky decisions. The theory fundamentally expresses how people should behave and says less of how people actually behave (Simon, 1959).

The descriptive theory's point of view is concerned with how people make decisions in actual life. The starting point for these theories was in empirical experiments showing that people's behaviour is inconsistent with normative theories (Leland, 2010).

According to Suhonen (2007), the decision theories separate the concepts of *risk* and *uncertainty*. Decision-making under risk means that outcome probabilities are known, whereas in decision-making under uncertainty, these probabilities are unknown. However, the author concludes that most decisions are made inbetween known and unknown probabilities.

2.3.2.1 Expected Utility Theory

The expected utility theory (EUT) has led as the theory governing normative models of analysis for decision making under uncertainty, for decades. The expected utility theory was generally accepted as the normative model of rational choice and was widely applied as a prescriptive model of economic behaviour (Kahneman & Tversky, 1979). Based on the accepted assumption of utility, which describes the decision-maker's preference, Jensen (1967) derived the expected value which an individual aims to maximise when choosing among probability distributions.

According to Trepel *et al.* (2005), the decision-maker is, firstly, characteristically said to be risk neutral if he/she is indifferent to a gamble or the expected value; secondly, is thought to be risk averse if he/she prefers an assured payment to a risky prospect of equal or higher expected value; and lastly, he/she is said to be risk seeking if he/she prefers a risky prospect to a sure payment of an equivalent or higher expected value. They conclude that maximisation of the expected value assumes a risk neutral attitude towards risk.

Table 2.1: Example of expected value maximisation

A decision-maker who employs the expected value rule will prefer, for example, to receive \$100 (and nothing otherwise) if a fair coin lands heads up to a sure payment of \$49. This is because the expected value of the gamble (\$50 = .5 x \$100) is higher than the value of the sure thing (\$49). Expected value maximisation poses some problems in that it does not allow decision-makers to exhibit risk aversion — it cannot explain, for example, why people would prefer a sure payment of \$49 over a .5 probability of \$100.

Source: Trepel *et al.* (2005)

From the example in Table 2.1, the mathematician Daniel Bernoulli asserts that individuals do not make decisions based on the objective value but rather by their utility (moral value); this led to the development of the expected utility theory (Treple *et al*., 2005).

The prediction of the EUT model in the standard case depends on (i) given probabilities, (ii) outcome values rather than the valuation of these values and (iii) deterministic decision rules. In normative applications of the EUT, the probability of a decision outcome occurring is given. This is unlike in real life where these probabilities will not be given, but will be determined by individuals (Rasouli & Timmermans, 2014).

Various studies (Davies & Satchell, 2007; Levy & Wiener, 2013; Rasouli & Timmermans, 2014; Suhonen, 2007; Tversky & Kahneman, 1992) point out that the EUT does not provide adequate description of individual choice. A major disadvantage of the basic expected utility model concerns its insensitivity to an individual's risk attitude by implying that decision-makers are risk neutral.

According to Davies and Satchell (2007), the simple framework of the EUT was found to provide a weak description of actual behaviour in risky situations, resulting in some attempts at remedying this descriptive failure. They state that a few theoretical investigations of risk attitude in terms of the cumulative prospect theory (discussed below) found that risk attitude is affected by loss aversion and decision weight distortions, as well as utility curvatures for both gains and losses.

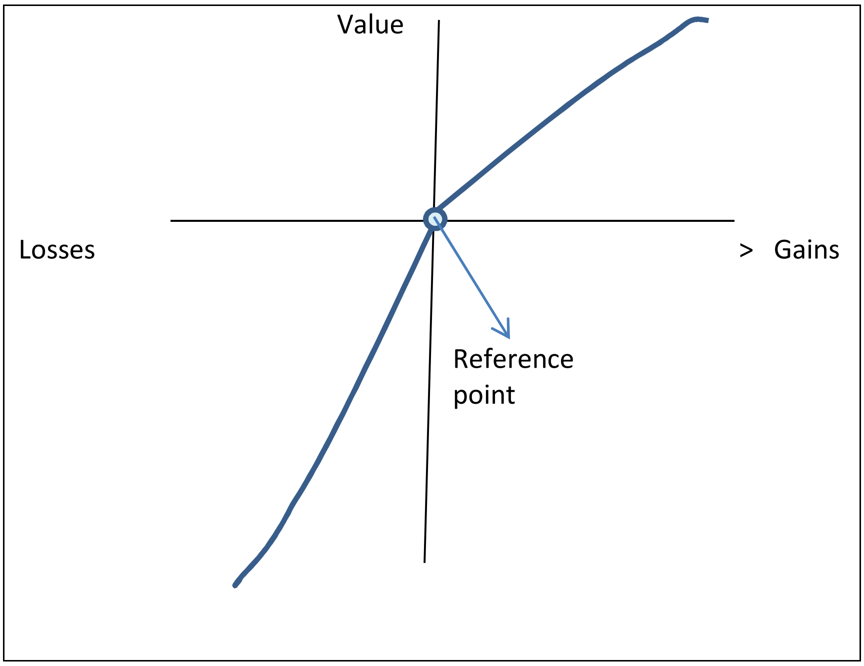
2.3.2.2 Prospect theory

Kahneman and Tversky's (1979) prospect theory (PT) is a theory of choice behaviour that focuses on the valuation of gains and losses relative to a shifting reference point (i.e. loss vs gain) of the decision-maker. Tversky and Kahneman (1992) developed the prospect theory that employs cumulative rather than separable decision weights extending this theory to the cumulative prospect theory (CPT). A significant component of the PT is the hypothesized value function.

The value function is the subjective value of an outcome, where *value* is defined in terms of possible gains or losses instead of absolute level of financial wealth or consumption from a reference point.

This value function is concave over gains displaying risk aversion function, (illustrated in Figure 1) but convex (risk seeking) and steeper over losses, indicative of loss aversion (Davies & Satchell, 2007; Kahneman & Tversky's,1979; Pasquariello, 2014;Tversky & Kahneman, 1992).

Figure 1: A hypothetical value function



Source: Kahneman & Tversky (1979)

The study by Highhouse and Yüce (1996) explains the hypothesised value function. In the concave gains domain, as gain increases, each unit increase in wealth has less positive value than the preceding unit. This means that this function disposes one towards risk aversion. The convex losses domain implies that as loss increases, each unit decrease in wealth has less negative value than the previous unit. Thus this convex loss function disposes one towards risk seeking.

It is widely cited that findings from research experiments by Kahneman and Tversky (1979) and Tversky and Kahneman (1992) are the groundwork for the prospect theory. As explained by Kühberger and Tanner (2010), the PT was developed as a psychologically more realistic alternative to the expected utility theory.

Previous studies discuss the following characteristics or phenomena of choice which must be met by any adequate descriptive model and answer to the problems in EUT (Levy & Wiener, 2013; Suhonen, 2007; Tversky & Kahneman, 1992). In table 2.2 the phenomena of choice from these studies are explained collectively.

Table 2.2: **Characteristics of adequate descriptive models**

Characteristics of choice	**Interpretation**
Framing effect	There is much evidence that variation in the framing of options (e.g. in terms of gains and losses) yields systematically different preferences.
Certainty effect	People tend to choose a sure gain when it is possible to do so.
Risk seeking	Risk-seeking choices tend to be observed within two classes of decision problems. Firstly, people often prefer a small probability of winning a large gain over the expected value of that prospect. Secondly, it is prevalent when people must choose between a sure loss and a large probability of a substantial loss.
Loss aversion	One of the basic principles of choice under both risk and uncertainty is that losses loom larger than gains. In other words this is the observed asymmetry between gains and losses which are too extreme to be explained by decreasing risk aversion.
Isolation effect	The isolation effect generally indicates that the decision-maker is more concerned with absolute changes in wealth rather than the final asset position, which takes account of current wealth.

Source: Levy & Wiener (2013); Suhonen (2007) ; Tversky & Kahneman (1992)

Table 2.2 lists the five characteristics of choice that should support the foundations of a descriptive decision model, namely framing effect, certainty effect, risk seeking (probability of gain or loss), loss aversion and isolation effect (absolute measures).

The PT has been tested in theoretical analysis. For instance, Pasquariello's (2014) study was conducted primarily to investigate the effects of prospect theory on market quality. The study revealed that introducing informed speculators displaying preferences consistent with features the of prospect theory, namely loss aversion and mild risk seeking led to important implications from being drawn for market quality. Particularly, the study found that risk-seeking behaviour induces speculators to trade more and aggressively with private information, while loss aversion encourages speculators to trade less (and more cautiously) or not at all with private information. The results imply that these forces affect the perceived risk aversion of market makers and have state-dependent effects on market liquidity, price volatility and market efficiency.

Furthermore, Highhouse and Yüce (1996) sought to empirically separate threat and opportunity perceptions from loss and gains perceptions of PT, through two experiments. The findings of their first experiment revealed that most decision-makers perceived the risky alternative as an opportunity in the loss domain, but perceived the choice as a threat in the gain domain. Their second experiment, framing the same loss and gain problems as threats versus opportunity, revealed that decision-makers took more risk in the loss problem (opportunity framed) and less risk for the gain problem (threat problem). The study concluded that threat and opportunity perceptions are theoretically and empirically distinguishable from loss and gain perceptives.

Corter and Chen (2006) suggest two, among many, potential factors affecting the degree of the observed risk aversion (low risk tolerance). Firstly, in expected utility theory, risk aversion is a necessary conclusion if people face diminishing marginal utility. Secondly, individuals show loss aversion, that is, an assumed financial loss has a greater impact than the corresponding amount of gain (Kahneman & Tversky, 1979). Both these general ideas enhance the appeal of risk aversion accepted as the default assumption of human behaviour.

A longstanding acceptance is found in previous research, namely that prudent decision-making happens in the most rational context. It is evident that most of the theoretical models, until recently, made the assumption that risky decision-making is an all-encompassing cognitive practice that incorporates all diverse possible results with their respective probability. However, the individual making the decision is influenced by the many factors described above, which could influence the way in which an individual assesses financially risky decisions or situations. Section 2.4 discusses this subjective willingness (financial risk tolerance) by individuals who considers choices within financial and investment decision contexts.

2.4 DEFINING FINANCIAL RISK TOLERANCE

People react differently to risk, whereby some are more willing to accept risk, while others are more inclined to be more risk averse. Individual willingness to take financial risks affects portfolio decisions and investment returns amongst other factors which are broad in scope ranging from economic cycles, societal trends and individual characteristics (Yao et al., 2011).

Financial risk tolerance (FRT), according to Hallahan et al., (2003) is a term widely used in the personal financial planning industry to refer to an investor's attitude towards risk. Harlow and Brown (1990:51) similarly define *risk tolerance* as "the degree to which an investor is willing and able to accept the possibility of an uncertain outcome to an economic decision". Hallahan, Faff and McKenzie (2004:57) describe risk tolerance as "a person's attitude towards accepting risk". Risk tolerance, also used interchangeably as risk appetite, is the measurement of an individual's willingness to adopt added risk, which has a possibility of increased wealth in the future (Davies & Brooks, 2014).

Cordell (2001) proposes a framework separating risk tolerance into four components which must all be individually assessed to form a complete risk profile. The four risk tolerance components are attitude (personality trait), propensity, capacity (financial ability to incur risk) and risk knowledge. Researchers such as Cooper et al., (2014) and Moreschi (2005) are among those who recognise that risk tolerance has a multidimensional nature.

Hanna and Chen (1997) differentiate between objective and subjective risk tolerance. Their definition of *objective risk tolerance* is coherent with risk capacity as described by Cordell (2001). It is only when the attitudes of investors with similar wealth are compared that variations in subjective preferences for risk can be observed. Without accounting for wealth, both the risk tolerance related to financial resource capacity (objective risk) as well as the true willingness to accept variations in asset returns (subjective risk tolerance) are being measured (Barksy, Juster, Kimball & Shapiro, 1997; Hanna, Waller & Finke, 2008). In order to explain the differences between objective and subjective risk tolerance, Hanna and Chen (1997) conducted expected utility analyses of portfolios. One of the conclusions from the study was that the ratio between risky assets and total wealth was an important input for determining objective risk tolerance. The other significant conclusion from Hanna and Chen (2007) relating to subjective risk tolerance was that answers to hypothetical investment allocation questions were related to measuring subjective risk tolerance. An analysis using expected utility method involves the tradeoff between risk and return, whereby higher risk levels are associated with higher returns and vice versa (Hanna & Lindamood, 2004). Inherent in this relationship is that an investor's risk aversion or alternatively risk tolerance is an important factor in selecting an optimal portfolio (Hanna & Lindamood, 2004).

It is implied that having a sound understanding of financial risk tolerance is one of many components necessary for an investor making portfolio allocation decisions. A lack of consideration for financial risk tolerance could result in disappointments for the investor, and this is not only important for the investor but also for the investor's financial advisor where applicable. The current study focuses on measuring subjective risk tolerance.

Although financial risk tolerance has been studied extensively, the issue of a lack of agreement on its definition there remains (Cooper, Kingyens & Paradi, 2014). Thus for the purpose of this study, the terms *financial risk tolerance*, *risk tolerance* and *attitude towards risk* will be used interchangeably to mean "the willingness of an individual to accept financial risk when making a financial decision with an uncertain outcome". The following section explores measures and techniques to assess subjective risk tolerance.

2.5 MEASURES OF FINANCIAL RISK TOLERANCE

Previous literature reporting on measuring risk tolerance used several methods in an attempt to most effectively quantify risk levels. A lack of a single standardised measure encouraged financial professionals to use a variety of self-developed or in-house assessment methods ranging from client questionnaires to simple conversations with clients to determine their level of comfort with different financial scenarios.

A number of studies confirm that the assessment of an individual's level of risk tolerance is a challenging task, mainly because risk tolerance is a complex concept (Cooper et al., 2014; Harlow & Brown 1990; Moreschi, 2005). Enhancing an individual's knowledge of financial risk tolerance is important because financial risk tolerance provides one approach to operationalising a key input into an investor's preference in investment strategy. Furthermore, the financial industry is in pursuit of finding a reliable risk tolerance metric that facilitates the advisors' role in dealing with an important aspect of their duty of care to their client (Gerrans, Faff & Hartnett, 2013). Therefore, measures of financial risk tolerance are considered to play an important role in assisting decision-makers as well as the financial advisors in making the appropriate investment choices.

According to Linciano and Soccorso (2012), the tools used to elicit risk attitude and risk preferences over time can be divided into two categories. The first method draws from the theoretical framework of economic theories, behavioural finance and experimental economics. This category relies on economic and quantitative measures. The second category is based on psychology and psychometrics. This field of study is concerned with the theory and techniques of psychological measurement of knowledge, capacities, attitudes and personality traits.

Several techniques can be used to measure financial risk tolerance. These techniques include observing actual behaviour whereby portfolio allocations can be used to infer attitudes to risks, asking about a combination of investment choices and subjective questions, as well as asking about carefully specified hypothetical scenarios in questionnaires to assess the individual's risk tolerance levels (Anbar &

Eker, 2010; Hanna, Gutter & Fan, 2001; Hanna *et al.* 2008). Grable and Lytton (1999a) state that the most widely accepted method of determining an individual's level of financial risk tolerance is by employing a psychometric-based assessment instrument which measures subjective risk tolerance through a multidimensional risk assessment instrument.

The various measures of financial risk tolerance researched and referred to widely includes but not limited to (i) personal or professional judgement, (ii) investment choice measures, (iii) heuristics, (iv) lottery choice experiments and (v) questionnaires (Davey & Grable, 2005; Dohmen, Falk, Huffman, Sunde, Schupp & Wagner, 2009; Grable & Lytton 1999a, 1999b; Hanna et al., 2001; Roszkowski, Faff, Mulino & Chai, 2008).

Furthermore, Hallahan *et al.* (2004) describes three basic approaches namely (i) interviews, (ii) assessing actual investment behaviour and (iii) assessing responses to hypothetical scenarios and investment choices through surveys. These accepted measures of financial risk tolerance are collectively summarised and discussed further.

2.5.1 Personal or professional judgement

Personal or professional judgement could be a judgement made by the individual of his/her own financial risk tolerance (FRT) or could be a judgement by a professional such as a financial advisor. This method of assessing FRT might be biased by the subjectivity of the judge; subsequently, it could often lead to inaccurate results. An individual can also judge his/her own FRT. For example, Roszkowski and Grable (2005) studied a sample of clients and their financial advisors and their findings showed that financial advisors did not fare well at judging their clients' risk tolerance. This was found to be the case both when comparing with the client's own judgement as well as when compared with the FRT scores measured by a developmental form of the Survey of Financial Risk Tolerance, which consisted of 66 questions measuring FRT. In their conclusions, they provide recommendations to financial planners to use valid tests to measure FRT or alternatively to use the client's own self-assessment of their risk tolerance rather than the advisors' judgement of the client's FRT.

2.5.2 Investment choice measures

A good example of investment choice measures when assessing financial risk tolerance is the questions which have been included in the Survey of Consumer Finances (SCF) since 1983. The single-item risk tolerance question relates to how much the respondent is willing to take in order to save or make investments. The question is: "Which of the following statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?" Four possible options are available as an answer. Answering the question from the SCF returns a score close to the investment choice attitude, however it is often affected by some distortions. According to Hanna *et al.* 2001, researchers using the SCF risk tolerance data found that only a minority of respondents are willing to take above average risks in order to make above average returns. A drawback of the SCF or similar measures is that they might reflect a combination of the investor's current situation and/or the investor's limited information. This is due to the fact that the current situation and the limited knowledge of the investor are not rigorously linked to the concept of risk tolerance in economic theory (Hanna *et al.*, 2001).

2.5.3 Heuristics

Risk tolerance can be assessed in terms of heuristics. Heuristic methods assume a strong relationship between socio-economic and demographic characteristics and financial risk tolerance (Grable, 2000). Although used in the professional industry, it is argued that making judgements about an investor's risk tolerance based on demographic characteristics, i.e. the common assumption that women are more financially cautious than men, does not necessarily align itself to or explain actual investor behaviour (Grable & Lytton, 1999a). However, this process can potentially lead to miscalculations and incorrect clustering of individuals (Lucarelli & Brighetti, 2010). Some studies also found that heuristics was not a reliable predictor of FRT and could consequently result in errors when classifying individuals into risk tolerance categories (Grable & Lytton 1999a; Grable, 2000).

2.5.4 Lottery choice experiments

Lottery choice experiments are designed to engage participants in hypothetical or in real money payoffs. Experimental studies which measure risk-taking behaviour with real money at stake offer an incentive-compatible measure of risk attitudes. Dohmen *et al.,* (2009), for example, were concerned with using only survey questions, doubting that it could be meaningfully interpreted in actual risk-taking behaviour. To resolve this concern their study used a second data source: a field experiment conducted with an additional representative sample of 450 subjects, drawn from an adult population in Germany. Their findings documented that a simple qualitative survey measure can meaningfully measure risk attitudes, which map into actual choices in lotteries with real money stakes.

The challenges faced in the experimental context, are among other drawbacks, that the nature of the task might be too abstract or lacking in field references for the participants to understand what is required of them, the size of the stakes, it could be costly and the environment of the study could make it too difficult to carry out.

2.5.5 Interviews

A form of measuring financial risk tolerance is interviews by financial planners. This method entails the financial planners asking the client questions regarding certain demographics, information about their financial experience, knowledge and asset allocation decision currently and previously. The information could be obtained in a face-to-face consultation or telephonically. While interviews provide a thorough assessment, some issues could arise. Firstly advisors could lack the time required to build a significant relationship with their client and consequently find it convenient ti use questionnaires. Secondly, assessment by interview can be unreliable because it is qualitative and generally unstructured with conclusions drawn from cognitive biases (Roszkowski et al., 2005).

Subedar et al. (2006) are of the opinion that the major weakness of using interviews or informal discussions with investors about their previous and current portfolio holdings is that the interviews or discussions are a subjective measure that is not scientific or objective and they do not provide adequate information for the financial planner to advise on.

2.5.6 Assessing actual behaviour

Objective measurements of risk tolerance are based on the actual asset allocation decisions of the investor. Although Schooley and Worden (1996) state that "portfolio allocations are reliable indicators of attitudes toward risk", it could also raise validity concerns. Grable and Lytton (1999b) state that objective measures make the assumption that investors exhibit rational behaviour and that an individual's asset allocation is primarily due to the consequence of personal preference and choice.

In a study aimed at investigating risk attitudes, using a large, representative survey and complementary experiment, Dohmen et al. (2009) found that the experiment confirmed the behavioural validity of the survey measure using paid lottery choices. Experimental studies which assess a particular behaviour are typically conducted in a survey form, aiming to measure risk-taking behaviour with real money at stake, offering in turn, an incentive-compatible risk attitude measure. The drawback of this technique however, is that it is costly and difficult to perform with a large, representative sample and consequently prevents studies at a large scale (Dohmen et al., 2009).

2.5.7 Risk assessment with questionnaires

The use of subjective risk tolerance survey questionnaires is a widely accepted method for assessing financial risk tolerance. A good attitudinal test is required to meet accepted psychological standards for both face validity (perceived relevance of the included questions) and predictive validity (prediction of future performance or behaviour). The test should also meet a reliability standard which implies consistency in repeated tests for the same person, as well as appropriate test norms to allow the participants' test scores to be interpreted against an appropriate reference group (Roszkowski et al., 2005).

Psychometrically designed scales are the most popular of the questionnaire-based measures as most of these scales are protected by copyrights. Studies such as that of Roszkowski et al. (2005) highlight the importance of the quality of a psychometrically developed questionnaire and share recommendations that could be used to verify whether the questionnaire is an appropriate tool for evaluating FRT discussed in the following section.

Due to the complex nature and potential problems associated with creating a risk assessment measure, many researchers employ questionnaires as a data source for studying financial risk tolerance (Grable & Lytton, 2001). A quantitative instrument, such as a questionnaire, allows a more standardised and repeatable assessment, as well as the translation of observations into numerical values (Roszkowski et al., 2005).

Other surveys which are prominently used in assessing subjective financial risk tolerance such as the FinaMetrica risk- profiling questionnaire used for this study are discussed below.

A number of researchers provided financial planners with useful guidelines on how to assess and advise clients regarding their levels of risk tolerance (Corter & Chen, 2006; Roszkowski & Grable, 2005; Roskowski et al., 2005). These authors noted that assessing someone's level of risk tolerance is a difficult process because risk tolerance is an elusive and ambiguous concept. It has been argued that the best way to accurately identify an individual's subjective risk tolerance is to use an instrument designed to specifically measure the risk tolerance using multidimensional financial/investment situations (MacCrimmon & Wehrung, 1985).

Because risk tolerance is a composite quantity, a valid questionnaire measure must measure each item separately from the set of variables such as time horizon and investment objectives which are required to formulate the investment recommendation (Linciano & Soccorso, 2012). Risk questionnaires could differ in terms of whether they focus only on the risk attitude component or include items assessing other components particularly risk propensity (Corter & Chen, 2006). The following section describes prominent risk tolerance questionnaires, with merits and challenges faced when they are used to assess FRT.

2.5.7.1 Survey of Consumer Finance (SCF) risk tolerance item

One of the most common and widely used risk tolerance assessment instruments in literature on risk tolerance is the SCF single-question measure. This a single- item question that requires the respondent to place him pr herself into one of four risk categories. It is widely used because it is (i) available in the public domain, (ii) easy to administer and (iii) relatively easy for the respondent, to answer the questions (Gilliam, Chatterjee & Grable, 2010).

While the SCF item has been a popular measure of risk tolerance, it has received some criticism. One of these critiques is the concern by Hanna and Chen (1997) about the situational nature of the measure and particularly their concern that it does not capture the true preferences of investors. According to Hanna, Gutter and Fan (2001), a major drawback of financial planning risk tolerance measures including the SCF question relating to risk tolerance, is that they do not rigorously link the concept of risk tolerance to economic theory. The SCF question could reflect a combination of the individual's current situation and/or the individual's limited information.

The SCF question could be a better measure for either investment risk or a measure for financial experience. From a qualitative perspective, the item could be more appropriate measuring a person's financial experience; as such the SCF question should not be used as a proxy for a person's overall financial risk tolerance (Grable & Lytton, 2001).

2.5.7.2 Grable and Lytton 13-item scale

Another widely used questionnaire is the 13-item scale, which is a multidimensional measure developed by Grable and Lytton (1999a). The method which they followed in its development started with 100 questions, which were selected by reviewing industry and academic journals. These were reduced to 50 by removing those items that were thought to measure constructs other than financial risk tolerance. By using bivariate and multivariate item analyses, 20 questions which measured eight dimensions of risk remained. These dimensions included choices between a sure loss and a sure gain, risk as experience and knowledge, risk as a level of comfort, speculative risk, prospect theory, guaranteed versus probable gambles, investment risk and general risk choices. A component factor analysis resulted in a refined version of the instrument containing the 13 items that were found to test the constructs of risk comfort and experience, speculative risk and investment risk. The Cronbach alpha coefficient calculated was 0.75, which indicates that the scale has a high level of internal reliability (Gilliam *et al.,* 2010).

2.5.7.3 Survey of Financial Risk Tolerance (SOFRT)

The Survey of Financial Risk Tolerance (SOFRT) is a commonly used survey among researchers. The SOFRT questionnaire developed by Roszkowski consists of 51 items and uses a comprehensive set of questions including cognitive aspects such as probabilities and payoff preferences as well as emotional reactions to risk. In the final section of the SOFRT, information about both household and personal income brackets, along with other demographic information is obtained.

The Cronbach alpha computed on the SOFRT developmental sample equalled 0.9 and samples of actual users, found Cronbach alphas ranging between 0.81 and 0.86 (Roszkowski & Grable, 2005).

2.5.7.4 FinaMetrica Personal Financial Profiling

FinaMetrica Ltd is an Australian company, which uses a questionnaire as an approach to measure the preferred level of risk of an individual. The FinaMetrica Personal Financial Profiling system is a proprietary, commercial FRT metric. It is a psychometrically validated attitude test consisting of 25 questions that generate a standardised financial risk tolerance score (1 to 100), in which a higher score indicates higher risk tolerance. The 0-100 scale is normally distributed and has a mean of 50, standard deviation of 10. The normal distribution allows for the scale to be divided into seven segments referred to as risk groups (FinaMetrica, 2014). In order for a test to be a good indicator of attitudes of risk tolerance, it needs to report validity and reliability. An item or scale used to assess financial risk tolerance should be both psychometrically valid and reliable (Roszkowski, Davey & Grable, 2004).

FinaMetrica has been available commercially to the Australian financial planning industry since 1998 and was introduced in the United States in 2002 (Faff et al., 2008). The metric was subjected to useability, reliability and norming trials by the University of NSW, exceeding international psychometric standards (FinaMetrica, Riskprofiling.com, 2014). Further discussions on the FinaMetrica questionnaire and its appropriateness as measurement tool for this study is provided in Chapter 3.

2.5.8 Problems with questionnaires

The prevalent problem is described by Roszkowski et.al., (2005) with risk tolerance questionnaires is that many of them deal with financial matters that are not really part of the construct of risk tolerance. In their study, they argue that typical risk tolerance questionnaires are deficient for five reasons.

Firstly, each individual investor has a multitude of risk tolerances; specifically investors consider their portfolios as collections of mental accounts devoted to various goals which might include college education, retirement income or accumulation of funds for travelling. Probing for one global risk tolerance misses this multitude.

Secondly, guidance towards portfolio asset allocation is one of the more important tasks that rest with the financial advisor and assessment of the individual investor's risk tolerance is important in terms of that task. The deficiency arises where existing risk questionnaires offer no clear linkage between risk tolerance scores derived from the questionnaire and portfolio asset allocations. Some risk questionnaires, they argue, provide no links at all to the investor's portfolio asset allocations whilst others provide links, however, only based on vague rules of thumb.

Thirdly, an investor's risk tolerance varies by both circumstances and the associated emotions. Failure to recognise this could lead to disappointment for the investor. Risk tolerance questions asked following periods of high returns on asset classes are likely to induce overenthusiasm, exaggerating risk tolerance conversely following a period of low returns on asset classes, inducing fear and underestimating risk tolerance.

Fourthly, risk tolerance varies when assessed in foresight or hindsight. Investors with a high propensity for hindsight and regret may claim that advisors over estimated their risk tolerance. Investors with a low propensity for hindsight and regret might accept lower returns experienced when they learn in hindsight that other investments they could have chosen mighthave given them better returns.

Lastly, propensities other than risk tolerance and regret matter to advisors when they advise their clients. For example, individuals with high propensity for overconfidence might exhibit high risk tolerance. The question could arise of whether this is truly a risk-tolerant investor or whether his/her measured risk tolerance is exaggerated by overconfidence (Pan & Statman, 2012).

2.5.9 Summary of FRT measures

Hanna, Waller and Finke (2008) argue that risk tolerance measures not based on portfolio theory could actually encourage behavioural biases such as framing, particularly by focusing on a response to a single hypothetical investment without considering its impact on consumption in the household's overall current portfolio context. Inappropriate assumptions about risk tolerance of clients in consultation with an advisor may be harmful to clients with limited experience with investing on their own and/or the ability to draw from experiences of family (Hanna *et al.,* 2008).

In their discussion of alternative risk tolerance measures, Grable and Lytton (1999a) comprehensively included choice dilemmas, utility analysis, objective functions, heuristic judgements and subjective assessments. The authors acknowledged that objective measures are commonly used but the inference of a person's risk tolerance from his/her asset holdings could pose some validity concerns. They state that the reasons are that objective measures are based on the assumptions that investors behaved rationally and that an individual's asset allocation was a personal choice as opposed to advice from a financial advisor. They further stated that objective measures tend to be descriptive rather than predictive thus they not account for the different dimensions of risk and generally cannot explain actual investor behaviour (Grable & Lytton, 1999a).

The discussion above emphasises the importance of financial advisors and clients being able to accurately measure risk tolerance, as well as using the appropriate assessment to avoid potential misclassifications. Further, there is a lack of consensus amongst researchers who investigated the association of FRT and the influence of socio-demographics in risk-taking behaviour. Given the importance of financial risk tolerance in financial decision-making, understanding the relationship between demographic factors and FRT is discussed in the next section.

2.6 FINANCIAL RISK TOLERANCE AND DEMOGRAPHIC FACTORS

A number of international studies were conducted to assess factors which determine risk tolerance, or alternatively, examine how these factors affect an individual or a household's willingness to accept risk (Faff, Hallahan & McKenzie, 2011; Hallahan et al., 2003; Van de Venter, Michayluk & Davey, 2012). There are two South African studies in this line of research namely by Van Schalkwyk (2012) and Metherell (2011). While extensive research proposed and tested a variety of socio-economic variables and financial risk tolerance, Moreschi (2005) indicated that research to date has not always provided a consensus regarding the influences of these factors on risk tolerance. Research on certain demographics for example age, gender and income and their relationship to risk tolerance has yielded inconclusive outcomes, giving rise to a need for further understanding of client's demographic factors and risk tolerance (Cooper *et al.,* 2014).

Literature on the relationship of each of the demographic factors with financial risk tolerance identified for the study is discussed in the following sections.

2.6.1 Age

According to Anbar and Eker (2010), age is one of the widely used demographic factors for differentiating between levels of financial risk tolerance. Grable, McGill and Britt (2009) state that aside from gender, age is the most widely studied factor which is thought to be associated with financial risk tolerance. It is reasonable to assume that a negative relationship exists between age and risk tolerance because older individuals have less time to recover from losses (Finke & Huston 2003; Hallahan et al. 2004, Sharma 2006; Metherell 2011; Van Schalkwyk, 2012).

In contrast to the mentioned findings, Wang and Hanna (1997) conclude that relative risk tolerance increases as people age (i.e. the proportion of net wealth invested in risky assets increases as people age) because younger individuals are likely to have limited financial resources that could endure short-term losses. Hallahan et al. (2003) found a negative but non-linear relationship between age and financial risk tolerance, but further found that this relationship is significantly different when discerning among high-income and low-earning individuals, i.e.; as income increases, so does the financial risk tolerance, which changes the initial relationship found between just age and financial risk tolerance scores. Sulaiman (2012) found no significant relationship between age and risk tolerance.

Anbar and Eker (2010) also found that there is no significant relationship between age and financial risk tolerance; however this may be due to the sample primarily made up of university students with an age group range of 21 to 30 years.

2.6.2 Gender

Many researchers found that men are more risk tolerant than women (Anbar & Eker 2010; Cooper et al., 2014). Faff, Hallahan & McKenzie, 2011; Jianakoplos & Bernasek, 1998; Metherell, 2011; Sharma 2006; Sung & Hanna 1996; Van Schalkwyk, 2012). Consequently, this belief has generated consensus among investment managers and financial planners that gender is an effective demographic factor to consider. Casanovas and Merigò (2012) examined differences between males and females in financial decisions in various contexts of financial risks namely social, health, gambling (hypothetical financial product) and leisure context. Their study confirmed that men were more risk tolerant than women except in financial decisions concerning health and leisure risk contexts.

Hanna and Lindamood (2004) investigated the willingness of married couple households to take risk with investments. The conclusions from their study showed that the wives were much less willing to take on risk than the husbands were.

Faff *et al.,* (2011) analysed a database consisting of psychometrically derived risk profiles for around 20 000 adult Australians within an age range of 20 to 80 years. The aim of their investigation was to provide formal evidence on the differences between males and females in their attitude to financial risk taking. Furthermore, they considered the extent to which women's conservatism was enhanced with age (given the longevity advantage of women documented in the US census report). The study provided strong evidence that women invest differently from men. However, the magnitude of this impact is reduced once other demographics are considered. The implications of their study are that they expect to see an overall shift to less risky investment portfolios in asset allocation decisions in the future, noting further, that this potentially could lead to lower levels of wealth for women in their retirement years.

2.6.3 Income and wealth

Another demographic factor that is frequently assessed in relation to an individual's level of risk tolerance is the accumulation of wealth and income levels. A significant number of studies indicate that those in higher income and wealth brackets show more financial risk tolerance than those who earn lower levels of income (Anbar & Eker, 2010; Finke & Huston, 2003; Grable, 2000; Hallahan *et al.*2004; Metherell 2011; Sharma, 2006; Sung & Hanna, 1996; Van Schalkwyk, 2012).

According to Hanna *et al.,* (2008), without accounting for wealth, the resulting measure captures the risk tolerance related to financial resources availability (risk capacity or objective risk tolerance) as well as the risk tolerance that is related to the true willingness to accept variation in asset returns (subjective risk tolerance).

Reasons for a growing number of researchers finding a positive relationship between income and risk tolerance, could be that higher levels or increasing income levels allow for greater access to more resources. This increased risk capacity could, in turn, increase an individual's risk tolerance level or encourage more risk seeking behaviour. True to most risky activities, acceptance of a chance of experiencing a financial loss is motivated by higher average utility gained in the possibility of a positive outcome resulting in increased wealth (Finke & Huston, 2003).

2.6.4 Number of dependents

Few studies considered whether the number of financial dependents was associated with the level of subjective financial risk tolerance. It was found that individuals with more children or financial dependents tend to be less risk tolerant than those who do not have financial dependents (Jianakoplos & Bernasek, 1998). Other studies have found that there is no significant relationship between financial risk tolerance and the number of financial dependents (Anbar & Eker, 2010; Hallahan et al. 2003; Metherell, 2011; Sulaiman 2012; Van Schalkwyk, 2012).

2.6.5 Education

It is common for investment managers and financial planners to assume that increased levels of education and financial knowledge are associated with higher risk tolerance. Numerous studies have found that individuals with higher levels of education and investment experience are more likely to have higher financial risk tolerance (Faff et al., 2011; Finke & Huston 2003; Gilliam, Goetz & Hampton, 2008; Hallahan et al., 2004; Sharma, 2006; Sulaiman, 2012). With increasing evidence and support that this relationship is positive, Moreschi (2005) states that the presumption is that with increased knowledge and formal attained academic training, an individual is better equipped to assess risks and benefits more carefully.

The level of education referred to by most studies, as well as the present study, is attained formal academic training and not investment knowledge. However, studies such as those of Grable and Lytton (1999a), Grable (2000) and Grable and Joo (1999) considered financial and investment knowledge and found that it is positively related to FRT. MacCrimmon and Wehrung (1985) report that higher levels of education encourage risk taking and as such, investment managers assume that increased levels of education are associated with increased levels of risk tolerance.

2.6.6 Marital status

Although family transitions such as new financial dependents and children are thought to influence the household's financial risk tolerance, the effects of marital status are uncertain (Cooper et al., 2014). Marital status as a demographic characteristic provided inconclusive findings when assessed in terms of financial risk tolerance (Anbar & Eker, 2010; Grable & Lytton, 1999a).

Some studies report that single individuals are more risk tolerant than those who are married (Hallahan et al. 2004; Sulaiman 2012). In contrast, Grable (2000) found that married respondents were more risk tolerant than single respondents. Faff, Hallahan and McKenzie (2011), suggest that married couples have a greater capacity to withstand financial difficulties and are thus likely to have higher financial risk tolerance. Results from Metherell (2011) for marital status and FRT, found that being single or divorced was insignificant while that other studies found more conclusive relationships. Van Schalkwyk (2012) also found no significance in this relationship.

Unlike previous studies which assessed gender and financial risk tolerance or alternatively assessed marital status (single individual compared with married couples) and financial risk tolerance, Yao and Hanna (2005) took a different approach in studying the effect of gender-marital status interactions on financial risk tolerance. Their results revealed that risk tolerance was highest for single males followed by married males, then single females and then married females. The study highlights that there is perhaps the need for females to learn more about investments and financial risk to encourage them to be more willing to take more appropriate levels of financial risk.

2.6.7 Race/ethnicity

It is believed that an individual's race or ethnicity can potentially be a determinant of the amount of risk incurred (Yao, Gutter & Hanna, 2005). However, the evidence of which race group displays the most risk tolerance is conflicting. The particular study by Yao *et al*. (2005) focused on determining the effect of race and ethnicity on financial risk tolerance. Their study found that Blacks and Hispanics were less likely to be willing to take some financial risk but were more likely to be willing to assume substantial financial risk than Whites. These findings suggest that a possible reason for Blacks and Hispanics to favour the substantial risk category was due to the ethnic groups' desire to reduce the gap in the standard of living or income inequality. Low participation in the financial markets probably explains why Blacks and Hispanics are less likely than Whites to be willing to take some financial risk.

The study by Metherell (2011), which was conducted in South Africa, found that there was a significant difference in risk tolerance between White and Indian respondents, who were found to be less risk tolerant. The study revealed that there were significant differences in financial risk tolerance levels between Whites and Indians. Van Schalkwyk, (2012) also found that black respondents had higher levels of FRT than white respondents in his study. The present study however, will not investigate race or ethnicity as it is not one of the demographic factors captured by the questionnaire. In recognising the importance of cultural differences, this study investigates the relationship between FRT and nationality as an independent variable.

2.6.8 Interrelationships between demographic factors and financial risk tolerance

Grable (2000) investigated relationships between demographic, socio-economic variables and attitudinal characteristics with financial risk tolerance. His results showed that risk tolerance was associated with being male, older, married, employed professionally with high income, higher knowledge and more education. On the other hand, when considering the interactions of these variables, his study determined that a combination of education, knowledge and income explained the most variations in an individual's financial risk tolerance.

Enough evidence and research support the fact that women invest differently to men, FRT decreases with age and that there is a relationship between age, gender and FRT (as shown by Casanovas & Merigò, 2012).

Practitioners and researchers alike are warned against relying only on age as a factor when classifying an individual into financial risk categories without taking into account other factors such as financial knowledge, education and income/wealth levels because when all interactions between the related demographic factors are taken into account, age is found to explain small amounts of variances in financial risk tolerance levels (Grable & Lytton,1999a).

2.7 CULTURE AND FINANCIAL RISK TOLERANCE

Culture generally is a complex, and vague term, which, depending on the discipline and objective, has different connotations. Culture consists of beliefs and values held by various ethnic, religious and social groups, passed from one generation to the next (Statman & Weng, 2010). Furthermore, culture stands for the content and form of expression of the predominant values and mentality of a social group. Consequently, culture involves and shapes moral attitudes, habits and customs, the legal, political and economic systems as well as language, art, and the social and academic education of the group concerned (Breuer & Quinten, 2009).

Cultural backgrounds affect the financial attitudes of individuals and culture varies from country to country and affects all parts of life, including its economic and financial parts (Statman & Weng, 2010). According to Levinson and Peng (2007), by examining fundamental financial, economic, legal and behavioural principles in a cultural psychological context, it could create understanding not only of how a variety of phenomena vary across cultures, but also how behavioural economics and finance might be modelled in a culturally competent way.

Understanding how individuals estimate the financial value of given objects is relevant to the basic assumptions of modern behavioural, social and economic sciences. The study by Levinson and Peng (2007) for example, found that cultures differ in their value estimations and property ownership judgements, as well as their tendency to take social and contextual information into account when making those estimations. Their results highlighted the importance of understanding the influence of cultural background on economic decision-making.

According to Statman (2010), risk tolerance is associated with culture. In his study exploring links between culture and risk tolerance among 23 different countries he found that risk tolerance is relatively low in countries where uncertainty avoidance is relatively high. Weber and Hsee (1998) also showed evidence that respondents from China, the USA, Germany and Poland differed in risk preferences, as measured by buying prices for risky financial options. Their results have practical implications for cross cultural negotiation and commerce by suggesting the positioning of cultural differences in risky choice that may allow for the creation of joint gains.

In using buying prices for risky financial choices as a measurement for risk preference, Weber and Hsee (1998) found that Chinese students in their sample were significantly more risk tolerant in their pricing than American students. Nevertheless, these seeming differences in risk preference were related primarily to cultural differences in the perception of risk of the financial choices rather than to cultural differences in attitude towards perceived risk.

Fan and Xiao (2006) used a sample of Chinese workers from the city to compare their risk-taking attitude and behaviour with a sample of American respondents from the Survey of Consumer Finances. Their study revealed that the Chinese in this sample were more risk tolerant than Americans in their financial decisions, both in attitude and behaviour, a result consistent with Weber and Hsee's (1998). They concluded that lack of knowledge about the relationship between financial risk and return amongst the sampled generation of Chinese due to their limited exposure to financial markets, may serve as an explanation.

The empirical evidence to date regarding cultural differences in risk tolerance between Chinese and Americans suggests that Chinese are more risk tolerant in financial decision-making than Americans. However, Fan & Xiao (2006) argue that this prevalent evidence is far from conclusive. In particular, they point out firstly; most of the empirical studies use college student samples residing in large cities. Given the varying knowledge levels, philosophies, customs, and habits within any culture, the criticism is that this may be an over generalising way to describe the sample differences found between Chinese and Americans. Secondly, most empirical studies reviewed only used risk attitude as a measure of risk preference whilst not considering cultural temperaments or cultural backgrounds.

Most studies found that culture is associated with risk tolerance. Investigating cultural differences in how individuals make financial decisions has important implications for individuals and household financial wellbeing.

2.8 SUMMARY AND CONCLUSION

The literature review sheds more light on the concepts of *risk* and *risk perceptions*, *financial risk tolerance*, financial and *investment decision-making* and the various demographic factors that influence the behaviour of individuals faced with financial decisions. From the wide descriptions of the concept risk, it appears that risk is affected by many more factors and characteristics such as control, choice and human subjectivity such as background, preferences and perceptions.

Previous studies referred to the categories of decision theories, which formed the basis for which decision models were used to explain human behaviour in decision-making under risk. The purpose of normative theories (prescriptive theories) is to prescribe the optimal behaviour of individuals when they are confronted with risky decisions, for example the expected utility theory. On the other hand, the descriptive theory is concerned with how people make decisions (rational and irrational) in actual life, for example the prospect theory.

The literature review detailed the importance of FRT and risk tolerance and the impact they have on financial decision-making. Several techniques may be used to measure financial risk tolerance. Techniques discussed in the literature include, observing actual behaviour whereby portfolio allocations can be used to infer attitudes to risks, asking questions about a combination of investment choices and subjective questions, as well as asking questions about carefully specified hypothetical scenarios with questionnaires to assess an individual's risk tolerance levels.

The interactions between the demographic factors and FRT levels were considered, as it is necessary to understand the relationship with/and the influence of the combined demographic factors.

Given the variability of knowledge, philosophies, customs and habits in any culture, this study could add value in investigating cultural differences in demographics and FRT. The literature found sufficient evidence that cultural differences and influences have important implications for individuals and household financial wellbeing.

CHAPTER 3

RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

Chapter 3 presents the research design and methods used in this study. The chapter begins with a discussion of the research design, which includes a description of the research approach namely the use of previously collected survey data. A section discussing the research instrument used to collect the data as well as the reliability and validity of the instrument is included in the chapter. The chapter also describes the statistical techniques of analysing the data in the study; this is followed by a conclusion and a discussion of the ethical considerations for the study.

3.2 DESCRIPTION OF OVERALL RESEARCH DESIGN

The approach that this study will take is a cross-cultural comparison of previously collected survey data. The study takes a quantitative approach, followed within a positivist paradigm. This type of comparative study, according to Mouton (2001) focuses on the similarities and especially the differences between groups of units of analysis. The ultimate goal of conducting survey research is to learn about a large population by surveying a sample of that population. This is according to Leedy and Ormrod (2010:187) who define survey research as "the acquiring of information about one or more groups of people – perhaps about their characteristics, opinions, attitudes, or previous experiences – by asking individuals questions and tabulating their answers".

Some of the strengths of employing a comparative cross-cultural analysis of secondary data are that firstly, it allows for comparison of different theoretical viewpoints across different settings. Secondly, the logic of comparison assesses causal inferences and allows the researcher to attempt stronger causal hypotheses (Mouton, 2001). Limitations typically include issues about the degree of comparability, for example in some cases there are obvious constraints associated with differences in languages, culture, currencies, and so on.

The ability to have access to the previously collected survey data, saves time and is cost effective. A limitation of this design is the lack of control of errors that might have been made while collecting the data as well as constraints in analysis borne by the original objective of the research and sample (Mouton, 2001).

However, having access to secondary survey data allows for the study to be conveniently conducted and enables the study to deal with the research objectives suitably.

3.3 SURVEY INSTRUMENT

3.3.1 Description of the instrument

Research conducted by way of questionnaires requires clear and easy-to-understand questions as the respondents do not have someone to explain the questions to them. As mentioned previously, the secondary data was collected from a survey which used a risk tolerance assessment measure developed by FinaMetrica. FinaMetrica Personal Financial Profiling system is a commercially provided computer-based risk tolerance measurement tool. The questionnaire consists of two parts, a set of 25 financial risk tolerance questions and nine demographic questions (age, gender, marital status, income/household income, wealth, number of dependent and educational level). The risk tolerance components of the questionnaire include questions about the respondent's attitude, values and experience.

Currently, the technical quality of any psychological assessment tool (which includes questionnaires) can be measured against internationally agreed psychometric standards. To meet these standards, a test must go through a rigorous development process (Roszkowski et al., 2005). Furthermore, Roszkowski et al. (2005) explain that the test includes, firstly, a large pool of questions created and tested on representative samples of the population for which the test is intended, to test if the question is understandable and answerable by this sample. Secondly, the questions with apparent promise, founded on their understandability and answerability, are tested on further representative samples using statistical criteria. The results are examined to determine if the statistical characteristics of the questions and the scoring algorithm are suitable.

3.3.2 Reliability and validity

Faff et al. (2004) maintain that a good attitudinal test will meet accepted psychological standards for perceived relevance of the questions (face validity) and prediction of later performance (predictive validity). The test should also display consistency in results for repeated tests (reliability) and have appropriate test norms that can interpret the subject's scores against an appropriate reference group (Faff et al., 2004).

Psychometrics, a blend of psychology and statistics, is the measurement science for attributes such as financial risk tolerance. Psychometrics also provides criteria and analytical tools for defining a "reliable and valid" questionnaire. A valid measure is one that measures what it is intended to measure; it is also reliable when it gauges a hypothesis consistently across time, individuals and situations (Roszkowski *et al.*, 2005).

The reliability of survey instruments and scales is often assessed in terms of the Cronbach alpha coefficient. The Cronbach alpha provides a lower-bound estimate for how much variance in the empirical scale would be explained by (or shared with) an imaginary perfect measure of the same theoretical construct (Injodey & Alex, 2011). Grable and Lytton (1999b) support the recommendations of other researchers such as; MacCrimmon and Wehrung (1985) that a risk tolerance assessment tool must produce a reliability coefficient alpha within a range of 0.5-0.8 to ensure consistency.

The FinaMetrica personal profiling test has a univariate factor structure, which was subjected to useability, reliability and norming trials by the University of New South Wales and was found to have reliability indicators in excess of international psychometric standards (Faff et al., 2004). An Australian norm was established in

1998 with a sample size of 3 000 (under FinaMetrica's former name, ProQuest Financial Risk Tolerance Questionnaire). The scale reported a Cronbach alpha of 0.87 (FinaMetrica, 2014).

FinaMetrica is a tool widely used by numerous academic studies around the world (Hallahan et al., 2004; Moreschi, 2005; Sulaiman, 2012; Van de Venter et al., 2012). FinaMetrica's risk tolerance test meets or surpasses the internationally accepted standards for psychometric instruments of this type (Faff et al., 2008).

3.3.3 Problems associated with questionnaires: assessing FinaMetrica Scale

As mentioned in chapter 2, a problem as described by Roszkowski, et al., (2005) with risk tolerance questionnaires is that many of them deal with financial matters that are not really part of the construct of risk tolerance.

Table 3.1 summarises and lists what they perceived to be the biggest problems with FRT questionnaires and these are measured against the FinaMetrica questionnaire used in this study.

Table 3.1 Summary of problems associated with risk tolerance questionnaires

Problems with risk tolerance questionnaires	**FinaMetrica questionnaire overcomes or encounters these problems**
(i) Some questionnaires do not assess risk tolerance but are rather asset allocation calculators.	i) Overcome as the survey is psychometrically validated.
(ii) Popular inclusions of questions relating to a client's asset allocation decisions, where these might provide clues to a client's risk capacity or investment goals, but not to the client's risk tolerance.	ii) Overcome through possessing high validity and reliability.
(iii) Questions about a client's time horizon (or age or stage of life), while valid for making investment recommendations, are invalid questions for assessing risk tolerance. Time horizon is relevant in a strategy selection context but not in a direct assessment of risk tolerance context.	iii) Overcome with a separate demographic survey portion of the questionnaire administered separately.
(iv) Questionnaires are simplistically too short or inadequate.	iv) Problem could be one of too long as opposed to too short.
(v) Questions are included in the assessment requiring a level of investment and risk understanding beyond the vast majority of clients.	v) This problem may be evident in the FinaMetrica questionnaire.

Source: Davey (2010), Roszkowski, Davey and Grable (2005)

3.3.4 Questionnaire appropriateness for the study

Literature suggests the use of questionnaire-type of instruments over other types of measures or experiments used to measure risk tolerance. This is because a questionnaire does not subject the risk tolerance of a respondent to the influences of the decisions of the financial advisor during the assessment process (Indojey & Alex, 2011). Questionnaires are also recommended because they allow a large number of subjects to participate in assessments, therefore eliminating response biases that could arise when multiple analysts are used to assess risk tolerance on an interactive basis (Grable & Lytton, 1999b).

Linciano and Soccorso (2012) analysed questionnaires used by investment firms in Italy to assess a client's risk tolerance in comparison with the existing economic and psychological literature. Their study relied on the set of factors affecting risk preferences and perceptions by individuals and a series of effective tools for risk profiling. Their study intensively focused on reviewing the way that most of the industry risk questionnaires were structured; content included, as well as the wording of each question type in the respective surveys. Table 3.2 summarises key considerations for the questionnaires to be of a good standard measured against those of the FinaMetrica questionnaire which is used in this study.

Table 3.2 Summary of standards of a good questionnaire

Standards of a good questionnaire	FinaMetrica Questionnaire
1. With respect to each item included in the questionnaire, it is necessary to find the relevant questions, finding the balance between reliability and the briefness of the question. Quantitative techniques such as factor analysis or Cronbach alpha make it possible to select questions based on their significance and correlation to the quantity to be measured.	Meets these standards as a psychometrically valid instrument that exceeds industry standards.
2. The contents of the questions should be those suggested by theory and empirical evidence, for example, as postulated by Cordell (2001), where he classifies financial risk tolerance factors into four categories, namely risk knowledge, risk propensity, risk capacity and risk attitude.	Meets both face validity (perceived relevance of the questions) and predictive validity (prediction of later performance or behaviour).
3. Wording questions is an important aspect that requires attention as this can affect the reliability of the questionnaire. The questions need to be clear and comprehensive. The clarity of the questions is fundamental particularly with respect to investment choices, a complex subject that can easily lead to misunderstanding and confusion.	Useability trials on the questions included, based on understandability and answerability criteria were tested using statistical criteria (through norming trials).

Source: Faff et al. (2008); Davey & Grable (2005); Linciano and Soccorso (2012); Davey & Van de Venter (2012).

It can thus be inferred from the extensive use of survey-based studies by academic researchers who used this method that this is an acceptable and effective method and suitable for this study (Faff et al. 2011; Finke & Huston, 2003; Hallahan et al. 2003; Sulaiman, 2012; Van de Venter et al., 2012).

The FinaMetrica risk questionnaire continues to be popular among researchers as a preferred instrument to measure individual risk tolerance. Despite some argument on the general accuracy of questionnaires, FinaMetrica provides evidence that the survey was developed in accordance with psychometric principles. These standards deal with the process used to create the questionnaire as well as characteristics of the results produced by the survey. It is inferred from the merits and problems faced generally by questionnaires, that FinaMetrica's adherence to these principles ensures that the questionnaire's results are both reliable and valid.

3.4 DATA

The previously collected survey data was drawn from a sample that consists of a total of 6 828 participants from four different countries. From the total the numbers of respondents by country was as follows: 728 participants were from South Africa (ZA), 2 189 from the United States of America (USA), 2 328 from the United Kingdom (UK) and 1 583 from Australia (AUS).

The survey was available electronically; therefore the respondents were required to have internet access in order to participate in the survey. The data collected for the AUS, the UK, the USA and the ZA samples consists primarily of respondents who are privy to financial information or topics, which also limits the results from being generalised to the larger national populations.

3.5 DATA ANALYSIS

The following section discusses the main approaches and techniques that the study will use to analyse the previously collected survey data. Data analysis is conducted with the Statistical Package for the Social Sciences (SPSS).

The dependent variable is financial risk tolerance as determined by the risk score obtained from the assessment measure. The financial risk tolerance (FRT) score will be treated as either a scale variable or as a binary variable. Should FRT be defined as a scale variable, it implies that FRT can take on a score or value between 0 and 100 and the actual differences between each value have meaning. Should FRT be defined as binary variable, this requires that it can take only two possible value outcomes. For the study, the normally distributed FinaMetrica scale has a mean of 50, therefore a score of 50 or above will be considered “above average” and scores below 50 are considered as ‘below average’ FRT. The independent variables are each of the demographic factors captured (age, gender, marital status, annual income, education, personal net worth, number of dependents and nationality).

The sample sizes for this study are deemed adequate for using parametric statistics. This is due to central limit theorem in terms of which the sampling distribtion of means is considered normal for large samples (Field, 2009). The sample of the study is assumed to be normally distributed for this reason of having large samples. Parametric tests are therefore appropriate for this study due to the large sample sizes.

The data will be analysed to determine the relationship between each of the demographic factors and the risk tolerance. The categorical classification of the variable as well as the proposed statistical technique to be applied is set out in Table 3.3.

Table 3.3 Approaches/statistical techniques proposed to analyse the data

Independent variable & category type	FRT as a scale variable	FRT as a binary variable
Age (scale)	Pearson correlation	Logistic regression
Gender (nominal)	t-test	Logistic regression
Marital status (nominal)	t-test	Logistic regression
Education (ordinal)	t-test / ANOVA	Logistic regression
Personal net worth (ordinal)	t-test ANOVA	Logistic regression
Number of dependents (scale)	Pearson Correlation	Logistic regression
Income (ordinal)	t-test / ANOVA	Logistic regression
Culture/Nationality (nominal)	t-test ANOVA	Logistic regression

For comparing differences between samples, the Chi-square test will be the appropriate statistical test. Table 3.3 identifies the categorical nature of the independent variable for which FRT could be considered for analysis (as a scale or binary variable). The appropriate statistical test to analyse the relationship between the category of independent variable and FRT is identified. A discussion of each one of the proposed statistical tests is provided further in the following section.

3.5.1 Chi-square test

The chi-square test is typically used to analyse the relationship between two categorical variables when the following conditions are met:

1. Both variables are qualitative in nature (that is, both measured on a nominal level).
2. The two variables have been measured on the same individual;
3. The observations on each variable are between subjects.

Chi-square =

$$x^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

O_i = observed frequency

E_i = expected frequency

(Jaccard & Becker, 1997)

With the above conditions met, the chi-square test is the statistical technique that would typically be used to analyse the relationship between variables. Since this is only applicable for ordinal or nominal data, it would be appropriate for analysing the independent variables (education, income, net worth, gender, marital status and nationality/culture) relationship to above or below FRT levels. The logic underlying the chi-square test focuses on the concept of expected frequencies. When the marginal frequencies of both variables are random or one is random and the other fixed, the tests are described as chi-square test of independence and chi-square test of homogeneity respectively (Jaccard & Becker, 1997). Therefore the chi-square test of independence will be used.

The effect size statistic for 2 by 2 tables (two categories in each variable) is the phi coefficient, which ranges between 0 and 1. For tables larger than 2 by 2, the value to report is Cramer's V, which takes into account the degrees of freedom (df). The strength for three categories, equal to .07 is small, 0.21 is medium and 0.35 is large.

3.5.2 Pearson product-moment correlation coefficient

There are many different ways in which two variables may be related. Research in behavioural science is often concerned with the linear relationships between variables. When both variables under the study are quantitative, have many values and are measured on a level that at least approximates interval characteristics, the statistical technique of Pearson product-moment correlation (simply referred to as Pearson correlation) may be used to determine the extent to which they are linearly related (Jaccard & Becker, 1997).

Pearson correlation is designed for continuous variables. It can also be used if one variable is continuous and the other is a binary variable, for example, the FRT scores and gender (male/female). Preliminary analysis of the data is essential to ensure issues related to correlation analysis, such as outliers and non-linear relationships, are carefully considered if present in the data.

Pearson product-moment correlation

$$r = \frac{SCP}{\sqrt{(ss_x)(ss_y)}}$$

r = Pearson correlation

SCP = sum of cross products $=\sum(X-\bar{X})(Y-\bar{Y})$

SS_x $=\sum(X-\bar{X})(X-\bar{X})$ SS_y $=\sum(Y-\bar{Y})(Y-\bar{Y})$

(Jaccard & Becker, 1997)

The extent of linear approximation between two variables is indexed by a statistic known as the Pearson correlation coefficient, represented by the letter *r*. The correlation coefficient can range from -1.00 through to =1.00. The magnitude of *r*, as indexed by the absolute value indicates the degree to which a linear relationship is approximated: the further *r* is in either a negative or a positive direction from 0, the better is the approximation. A correlation coefficient of +1.00 means the two variables form a perfect linear relationship that is direct in nature (that is, if there is an increase in one variable there is an increase in the other variable). A correlation coefficient of -1.00 also means the two variables form a perfect linear relationship that is inverse in nature, meaning that as one variable increases, the other decreases. A correlation coefficient of 0 means there is no linear relationship between the two variables (Jaccard & Becker, 1997).

The strength of the relationship between two variables in a correlational analysis can be represented by eta-squared in the form of the ratio of explained variability ($SS_{EXPLAINED}$) to total variability (SS_{TOTAL}). Eta-squared bears a direct relationship to the correlation coefficient specifically,

$$r^2 = eta^2 = \frac{(SS_{explained})}{SS_{total}}$$

r = correlation coefficient

(Jaccard & Becker, 1997).

Formally known as coefficient of determination, r^2, represents the proportion of variability in one variable that is associated with the other variable.

3.5.3 Independent samples t-tests

The independent samples t-test is typically used to compare the mean scores of two different groups of people for example (male or female). This test is used when there are two experimental conditions and different participants were assigned to each condition (Field, 2009).

Assumptions which should be met for a t-test, include that the continuous variable's sampling distribution be normally distributed and data are measured at least at the interval level. The independent *t*-test, because it is used to test different groups of people, also assumes that variances in these populations are roughly equal (homogeneity of variance). Furthermore, the test assumes that the scores are independent because they come from different people (Field, 2009).

$$t = \frac{(M_1 - M_2) - (\mu_1 - \mu_2)}{M_1 - M_2}$$

M_1 = sample mean for the first population

M_2 = sample mean for the second population

μ_1 = mean for the first population

μ_2 = mean for the second population

$M_1 - M_2$ = estimated standard error

(Jaccard & Becker,1997)

The computed *t*-value can be compared to the maximum value that could be expected, by chance alone in a *t*-distribution with the same degrees of freedom associated with the t-distribution. If the value obtained exceeds this critical value, one can be confident that this reflects an effect of ones's independent variable (Field, 2009).

To measure the strength of the relationship between the independent and dependent variables, one approach is to measure the size of the mean difference between the two groups. Eta-squared as previously defined is an index used to explain the proportion of variability in the dependent variable that is explained by the independent variable (Jaccard & Becker, 1997).

3.5.4 One-way analysis of variance (ANOVA)

The one-way analysis of variance (ANOVA) is used to analyse the relationship between two variables. It is used under the same circumstances as one would use the t-test except that the independent variable has more than two levels (Jaccard & Becker, 1997).

ANOVA indicates whether three or more means are the same. Therefore, it tests the null hypothesis that all group means are equal (that is, there is no relationship between means). An ANOVA produces an F-statistic or F-ratio, which is similar to the t-statistic in that it compares the amount of systematic variance in the data to the amount of unsystematic variance. In other words, F is the ratio of the model to its error (Field, 2009).

$$F\ ratio = \frac{MS_{between}}{MS_{within}}$$

$MS_{BETWEEN}$ = mean square between

MS_{WITHIN} = mean square within

ANOVA is an omnibus test, which means that it tests for an overall experimental effect. Although ANOVA tells one whether the experimental manipulation was generally successful, it does not provide specific information about which groups were affected. Assuming an experiment was conducted with three different groups, the *F*-ratio informs one that the means of these three samples are not equal (i.e. that

$X_1 = X_2 = X_3$ is not true). However, there are many ways in which the means can differ. For example: the first possibility is that all three sample means are significantly different ($X_1 \neq X_2 \neq X_3$). A second possibility is that the means of group 1 and 2 are the same but group 3 has a significantly different mean from both of the other groups ($X_1 = X_2 \neq X_3$). Another possibility is that groups 2 and 3 have similar means but group 1 has a significantly different mean ($X_1 \neq X_2 = X_3$) or that group 1 and 3 are similar but significantly different to group 2. In an experiment the F-test informs only that the manipulation had some effect, but does not explain what that effect was (Field, 2009).

A key assumption for conducting ANOVA is the homogeneity of variances. This implies that samples are obtained from populations of equal variances. This means that the variability of scores for each of the groups is similar. The SPSS program performs a Levene's test of homogeneity of variance. To interpret this test, a significant value of above 0.05 is preferred since it suggests that the assumption of homogeneity of variances was not violated. Should this assumption be violated, Robust tests of equality of means should be conducted, either the Welch or Brown-Forsythe is preferable when the assumption of the homogeneity of variance is violated (Pallant, 2010).

Post-hoc tests could be used in ANOVA to determine where differences lie. There are a number of different post hoc tests that one can use, and these vary in terms of their nature and strictness. The assumptions underlying the post-hoc tests also differ. Some assume equal variances for the two groups (e.g. Tukey); others do not assume equal variance (e.g. Dunnett's T3 test). One of the most commonly used post-hoc tests is Tukey's Honestly Significant Different test (HSD) test (Pallant, 2010). For this study, the Tukey test will be used under the applicable circumstance.

3.5.5 Logistic regression

Logistic regression is multiple regression but with an outcome variable that is categorical and the predictor variables are categorical or continuous. It means that it is possible to predict which of two categories a person is likely to belong to (Field, 2009).

Logistic regression allows one to assess how well the set of predictor variables predicts or explains the categorical dependent variable. It provides an indication of the adequacy of the model (set of predictor variables) by assessing the 'goodness of fit' (Pallant, 2010).

One of the assumptions of linear regression is that the relationship between variables is linear. When the outcome variable is categorical, this assumption is violated. One way to counter this problem is to transform the data using the logarithmic transformation. This transformation is a way of expressing a non-linear relationship in a linear way. The logistic regression equation described below is thus based on this principle whereby the multiple linear regression equation is expressed in logarithmic terms (called the logit) and thus overcomes the problem of violating the assumption of linearity. The assumption of linearity in logistic regression, therefore, assumes that there is a linear relationship between any continuous predictors and the logit of the outcome variable. This assumption can be tested by looking at whether the interaction term between the predictor and its log transformation is significant using the logit step test (Field, 2009).
In logistic regression, instead of predicting the value of a variable Y from a predictor variable X_1 or several predictor variables (X_s), one predicts the probability of Y occurring given known values of X_1 (or X_s). In its simplest form, when there is only one predictor variable X_1, the logistic regression equation from which the probability of Y is predicted is given by:

$$P(Y) = \frac{1}{1 + e^{-b_0 + b_1 1_i}}$$

P(Y) = probability of Y
E = is the base of natural logarithms
(b_0) = constant
(X_1) = a predictor variable
(b_1) = coefficient (or weight) attached to that predictor

(Field, 2009)

It is possible to extend this equation so as to include several other predictors. When there are several predictors the equation becomes:

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1 x_1 i + b_2 x_2 + \cdots + b_n x_{ni})}}$$

(Field, 2009)

An important interpretation of the logistic regression model is the odds ratio, which is an indicator of the change in odds resulting from a unit change in the predictor. As such, it is similar to the b coefficient in linear regression (Field, 2009).

The *odds* of an event occurring are defined as the probability of an event occurring divided by the probability of that event not occurring.

3.6 RESEARCH METHOD ASSUMPTIONS, LIMITATIONS AND DELIMITATIONS

The study assumed that the intended participants were the individuals who did indeed complete the survey. It also assumed that participants answered the questions honestly, to the best of their ability, without influence from others, and completed the questionnaire seriously. The study also assumed participants gave informed consent.

The study was subject to potential weaknesses regarding internal validity through the presence of some limitations. The results of the study could be limited in the following manner. Firstly, all variables were self-reported electronically in the form of an online survey. A participant could have answered on the FRT questionnaire what he/she perceived to be the 'correct' answer and skewed the FRT score. There could also have been general issues concerning the truthfulness of responses. Particularly, this relates to response bias.

Participants could have faked results in the manner questions were answered in a way that the participant thought would make a good or bad impression. However, for this study, the confidentiality and anonymity of the respondent's answers might have considerably reduced or eliminated falsified results.

3.7 ETHICAL PROCEDURES

In the discipline of survey research, *ethical principles* are defined as the standard practices for privacy and confidentiality protection for human subject participants (Lavrakas, 2008). All ethical issues related to the study were adhered to in accordance with legal and ethical guidelines. Approval from the Ethics Committee of the Faculty of Economic and Management Sciences was obtained.

3.8 SUMMARY

The chapter described the overall research design of the study, the data as well as the psychometrically validated survey created by FinaMetrica. The chapter gave a detailed description of the different types of statistical tests that will be used to analyse the data. ANOVA, correlational analysis, chi-square, t-tests and logistic regression were discussed as the statistical techniques for appropriately meeting the research objectives. All the assumptions and preliminary requirements were assessed and dealt with for this study, to ensure the suitability of the data and subsequently the data analysis will be conducted fittingly. The chapter ends with assumptions, limitations and ethical procedures for this particular study.

CHAPTER 4

DATA ANALYSIS

4.1 INTRODUCTION

In the previous chapter, the appropriate statistical tests to analyse the data were noted. This chapter carries out the statistical analysis. This entails testing the various hypotheses formulated to meet the objectives of the study. The reports from the analysis are discussed and presented in table formats and charts.

4.2 VARIABLE DESCRIPTION

4.2.1 Sample characteristics

Information on nationality was captured for the total sample consisting of 6 828 respondents. As mentioned, the sample comprised of four different nationalities; Australia (AUS), n=1 583, the United Kingdom (UK), n= 2 328, the United States of America (USA), n= 2 189 and South Africa (ZA), n= 728. Each of the demographic variables as well as the FRT scores will be evaluated for the total sample as well as per country. In reporting the results, the total number of respondents will be referred to as the total sample.

4.2.2 Dependent variable

4.2.2.1 Descriptive statistics: dependent variable

The dependent variable is the level of financial risk tolerance (FRT) of each respondent measured using the FinaMetrica scale, which scores an individual between 0-100.

Table 4.1 Financial risk tolerance (FRT) score by nationality

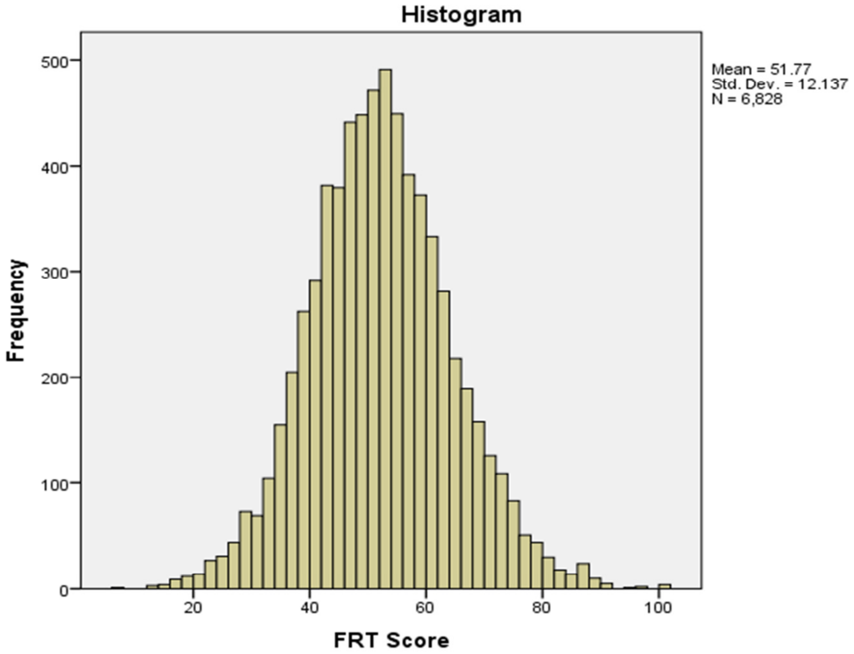
		Financial risk tolerance (FRT) score			
Nationality	**N**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
AUS	1583	15	90	51.44	11.803
UK	2328	7	100	50.36	12.536
USA	2189	13	100	52.07	11.068
ZA	728	17	91	56.11	13.518
Total	6828	7	100	51.77	12.137

Source: SPSS output

4.2.2.2 Distribution of dependent variable

The mean FRT score for the total sample (n = 6 828) is 51.77 and standard deviation of 12.137% shown in Table 4.1 and the distribution histogram for the total sample are shown in Figure 2. The mean FRT score is highest for ZA (n= 728, M= 56.11) which is above the sample mean of 51.77. The remaining countries reported mean FRT scores closer to that of the entire sample. Figures 3, 4, 5 and 6 show the FRT histograms for each country.

Figure 2: The distribution of FRT scores for the entire sample (n= 6828).



Source SPSS

Figure 3: Histogram FRT scores: AUS

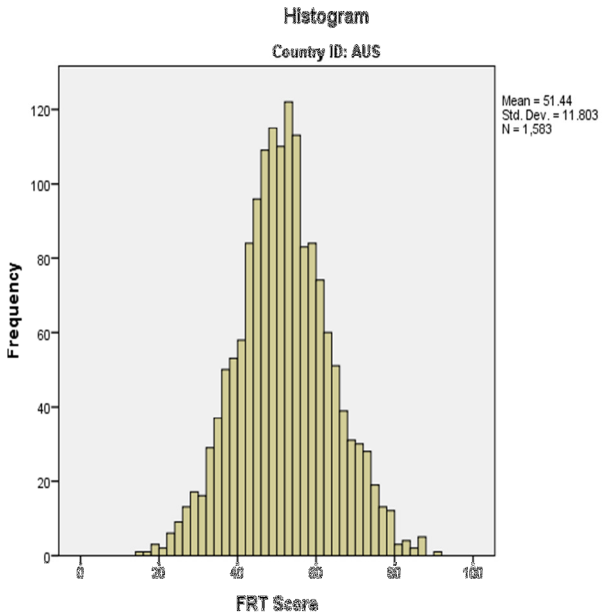


Figure 4 Histogram FRT scores: UK

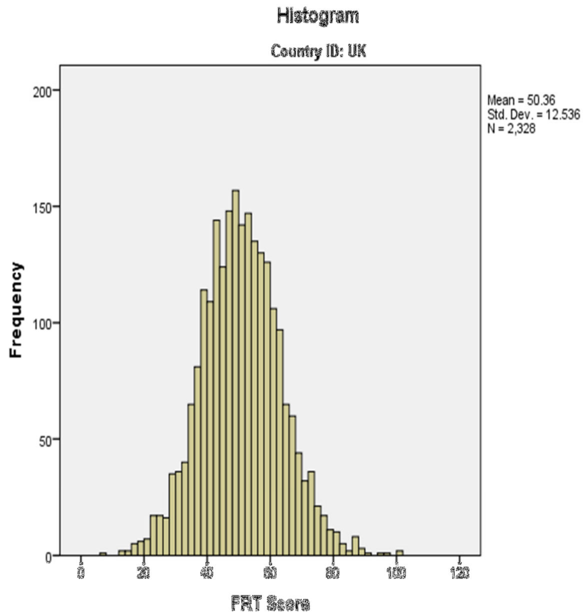


Figure 5: Histogram FRT scores: USA

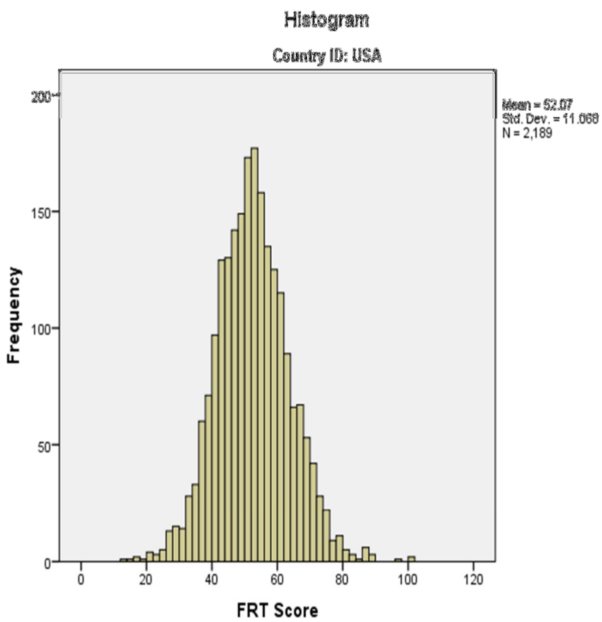
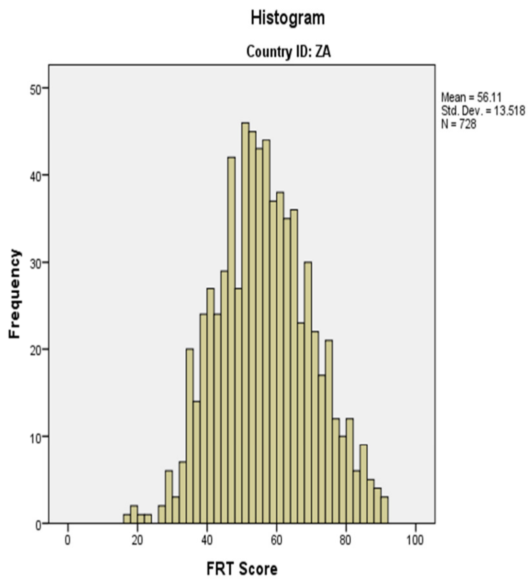


Figure 6: Histogram FRT scores ZA



Source: SPSS

4.2.2.3 The reliability of the FinaMetrica scale

One of the most commonly used measures of internal consistency is the Cronbach alpha coefficient (as discussed in the previous chapter). The reliability of the scale can vary depending on the sample size (Pallant, 2010). Table 4.2 shows the individual countries and the total sample's standardised alphas. According to Gliem and Gliem (2003), the Cronbach alpha based on standardized items is used when the individual scale items are not scaled the same, as is the case with the FinaMetrica scale. Each country showed high reliability of the scale for their particular sample sizes, with each nation reporting Cronbach alphas in excess of the recommended .70.

Table 4.2: Reliability assessment: Cronbach alpha per country

Reliability Statistics	
Country	**Cronbach alpha**
AUS (n=1 583)	0.88
UK (n= 2 328)	0.903
USA (n= 2 189)	0.876
ZA (n= 728)	0.883
TOTAL (n=6 828)	0.89

Source: SPSS

It can be inferred from the reliability report in Table 4.2, that the FinaMetrica scale used for the particular sample of the study is reliable.

4.3 INDEPENDENT VARIABLES

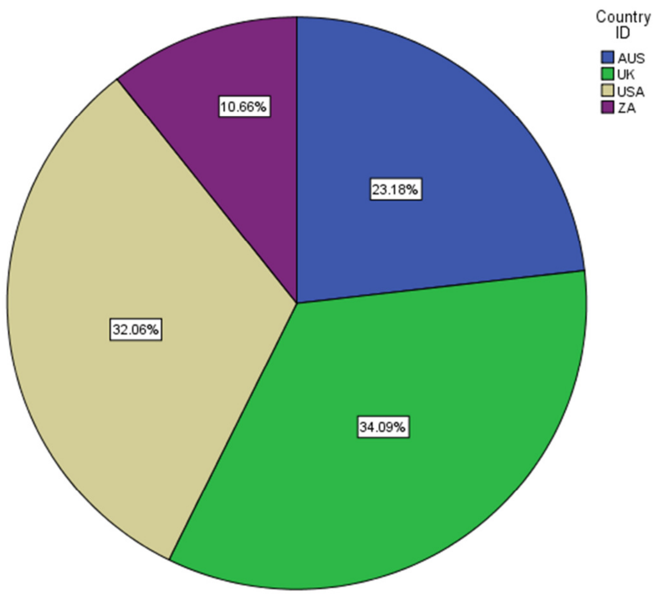
The following section describes the sample demographic characteristics.

A total of 6 828 responses were gathered from the survey, however, in some cases respondents did not complete all the demographic data required in the questionnaire.

4.3.1 Culture/Nationality

The sample consisted of data from the four countries and the following representation from each nation was observed: the UK (34.09%), the USA (32.06%), AUS (23.18%) and ZA (10.66%) (see Figure 7).

Figure 7: Country representation in the total sample



Source: SPSS

4.3.2 Gender

The majority of the respondents for the total sample were male (58%). The ZA sample had a higher percentage of male respondents (75.9%). The UK gender distribution resembled the entire sample's gender distribution, male (59.5%) and female (40.5%) as shown in Table 4.3. The AUS and USA samples were more evenly distributed between male and female.

Table 4.3: Gender frequency

Gender	AUS (N)	%	UK (N)	%	USA (N)	%	ZA (N)	%	TOTAL	%
Male	691	52.6	887	59.5	527	50.8	532	75.9	2 637	58.03
Female	623	47.4	604	40.5	511	49.2	169	24.1	1 907	41.97
Total	**1 314**	**100**	**1 491**	**100**	**1 038**	**100**	**701**	**100**	**4 544**	

Source: SPSS

4.3.3 Educational level

The educational attainment of respondents ranged from less than a high school diploma to a university degree or higher qualification. As seen in Table 4.4, a total of 4 374 responses were useable for the analysis of the highest education level the respondents attained. The majority of the sample (58%) attained a university degree or higher, while almost (20%) obtained a trade or diploma qualification. In both ZA and the USA samples, less than 1% of the respondents indicated that they had not completed high school while a higher percentage of respondents from the AUS (7%) and UK (17%) indicated that they had not complete high school.

Table 4.4: Educational level frequencies

Highest education level	AUS (N)	%	UK (N)	%	USA (N)	%	ZA (N)	%	TOTAL	%
Did not complete high school	92	7.1	237	17.1	4	0.4	3	0.4	336	7.68
Completed high school	241	18.7	108	7.8	156	15.7	108	15.3	613	14.01
Trade or Diploma	320	24.9	260	18.7	114	11.5	180	25.5	874	19.98
University degree or higher	634	49.3	783	56.4	719	72.4	415	58.8	2 551	58.32
Total	**1 287**	**100**	**1 388**	**100**	**993**	**100**	**706**	**100**	**4 374**	

Source: SPSS

4.3.4 Income levels and combined income

With respect to the income levels and combined income information, the questionnaires for each country used the respective currency of that country. The amounts are translated to be equivalent in value in order to be comparable across countries. A conversion for the brackets, which took into account the income brackets and wealth distributions for each countries was done by FinaMetrica.

Table 4.5: **Income and combined income categories per country**

Income Category	ZA	AUS$ & USA$	UK
1	Under R100,000.	Under $20,000	Under £10,000.
2	R100,000 - R249,999.	$20,000 - $49,999.	£10,000 - £19,999.
3	R250,000 - R499,999.	$50,000 - $99,999.	£20,000 - £49,999.
4	R500,000 - R999,999.	$100,000 - $199,999.	£50,000 - £99,999.
5	R1,000,000 - R2,999,999.	$200,000 - $499,999.	£100,000 - £199,999.
6	R3,000,000 or over.	$500,000 or over.	£200,000 or over.

Source: Potts (2015); FinaMetrica (2014)

Table 4.5 defines the applicable six categories of income as well as for combined income levels, as they were given on the questionnaire in each country. Table 4.5 displays the foreign currency equivalent income values, which were used for the respective countries to allow for comparisons in the analysis. Total individual income levels and combined household income before taxes for respondents, as shown in Table 4.6 and Table 4.7 respectively, show income in six different categories.

Table 4.6: Income distribution frequencies

Income levels	AUS (n)	%	UK (n)	%	USA (n)	%	ZA (n)	%	TOTAL (n)	%
1	179	14.0	119	8.5	77	7.9	44	6.2	419	9.6
2	310	24.3	215	15.4	164	16.8	143	20.3	832	19.1
3	410	32.1	485	34.7	306	31.4	268	38.0	1469	33.7
4	266	20.8	339	24.2	226	23.2	181	25.6	1012	23.2
5	95	7.4	166	11.9	164	16.8	66	9.3	491	11.3
6	18	1.4	75	5.4	38	3.9	4	.6	135	3.1
Total	**1 278**	**100**	**1 399**	**100**	**975**	**100**	**706**	**100**	**4 358**	**100**

Source: SPSS

For three of the countries, less than 9% were represented in the lowest income level (1), the UK (8.5%), the USA (7.9%) and ZA (6.2%). In the Australian (AUS) sample however, 14% of the respondents were represented in the lowest income level. For all the countries, Category 3 represented the largest frequency, AUS (32.1%), UK (34.7%), USA (31.4%) and ZA (38%). For the highest category (6), fewer respondents from the ZA (0.6%) and AUS (1.4%) fell into that category compared with those observed for the USA (3.9%) and the UK (5.4%).

Table 4.7: Combined income distribution frequencies

Combined Income level	AUS (n)	%	UK (n)	%	USA (n)	%	ZA (n)	%	TOTAL (n)
1	16	1.7	11	1	11	1.4	8	1.5	46
2	125	13.3	48	4.6	44	5.8	60	10.9	277
3	218	23.2	274	26.1	173	22.7	159	28.9	824
4	364	38.8	385	36.7	290	38.1	224	40.7	1263
5	175	18.7	221	21.1	200	26.3	97	17.6	693
6	40	4.3	110	10.5	43	5.7	2	0.4	195
Total	**938**	**100**	**1049**	**100**	**761**	**100**	**550**	**100**	**3 298**

Source: SPSS

The combined income before taxes with a total number of responses of 3 298 was only applicable to those who were married or in a de facto relationship with the same six categories as applied to income. As seen in Table 4.7, AUS had the greatest percentage represented for the lowest combined income levels (1.7%) compared with, the UK (1%), ZA (1.5%), and the USA (1.4%). Each country had the biggest representation in the fourth combined income level namely, AUS (38.8%), the UK (36.7%), the USA (38.1%) and ZA (40.7%). The highest category of combined income had the largest representation in the UK (10.5%) compared with AUS (4.3%), the USA (5.7%) and ZA (0.4%).

4.3.5 Net worth

The foreign currency equivalent net worth values shown in Table 4.8 were used for the various countries. A conversion which considered the wealth distributions in each country was applied by FinaMetrica. The total number of responses for net worth was 4 255 and the net worth was divided into 10 brackets.

Table 4.8: Net worth categories for all countries

Net	ZA	USA $ & AUS $	UK
1	Under R50,000.	Under $10,000.	Under £5,000.
2	R50,000 - R124,999.	$10,000 - $24,999.	£5,000 - £9,999.
3	R125,000 - R249,999.	$25,000 - $49,999.	£10,000 - £19,999.
4	R250,000 - R499,999.	$50,000 - $99,999.	£20,000 - £49,999.
5	R500,000 - R999,999.	$100,000 - $199,999.	£50,000 - £99,999.
6	R1,000,000 - R2,499,999.	$200,000 - $499,999.	£100,000 - £199,999.
7	R2,500,000 - R4,999,999.	$500,000 - $999,999.	£200,000 - £499,999.
8	R5,000,000 - R9,999,999.	$1,000,000 - $1,999,999.	£500,000 - £999,999.
9	R10,000,000 - R24,999,999.	$2,000,000 - $4,999,999.	£1,000,000 - £1,999,999.
10	R25,000,000 or over.	$5,000,000 or over.	£2,000,000 or over.

Source: Potts (2015); FinaMetrica (2014)

Table 4.9 shows that the lowest net worth category. Category 1, had less than 5% representation in three of the countries, AUS (4.7%), UK (3.1%) and USA (2.8%) in comparison with ZA (7%). The largest represented net worth category for the total sample was the seventh bracket. The following frequencies were shown in this particular category: AUS (25.4%), the UK (30.4%), the USA (25.7%) and ZA (19.3%).

Table 4.9: Net worth frequency distribution

Net worth	AUS (n)	%	UK (n)	%	USA (n)	%	ZA (n)	%	Total	%
1	60	4.7	41	3.1	27	2.8	49	7.0	177	4.2
2	50	3.9	17	1.3	24	2.5	47	6.7	138	3.2
3	32	2.5	19	1.4	27	2.8	55	7.8	133	3.1
4	59	4.6	55	4.2	50	5.2	47	6.7	211	5.0
5	89	7.0	89	6.8	74	7.6	86	12.2	338	7.9
6	265	20.9	187	14.2	217	22.4	165	23.5	834	19.6
7	322	25.4	400	30.4	249	25.7	136	19.3	1107	26.0
8	228	18.0	270	20.5	149	15.4	78	11.1	725	17.0
9	138	10.9	150	11.4	112	11.6	30	4.3	430	10.1
10	27	2.1	86	6.5	39	4.0	10	1.4	162	3.8
Total	**1 270**	**100**	**1 314**	**100**	**968**	**100**	**703**	**100**	**4 255**	**100**

Source: SPSS

For South Africa (ZA) however, this was not the highest percentage represented in a net worth category, the sixth bracket was the highest for ZA (23.5%). Noticeable differences were found in frequencies observed for the ninth category between AUS (10.9%), the UK (11.4%), and USA (11.6%), all showing just fewer than 12%, in comparison with a smaller observed frequency for ZA (4.3%). For the last category, varying frequencies were observed per country, from smallest to largest, the varying frequencies showed ZA (1.4%), AUS (2.1%), the USA (4%) and the UK (6.5%).

4.3.6 Marital status

The total number of responses for marital status was 4 443; approximately 77% of respondents were married or in a de facto relationship and almost 23% of the respondents were single. The marital status distribution for the entire sample was in line with what was witnessed for married respondents in the various countries, namely AUS (74.5%), the UK (76.4%), the USA (80.4%) and ZA (79.7%) as seen in Table 4.10. Further references to 'married' when considering as a respondents' marital status will include those in de facto relationships.

Table 4.10: Marital status frequency distributions

Marital status	AUS (N)	%	UK (N)	%	USA (N)	%	ZA (N)	%	TOTAL	%
Married/de facto relationship	968	74.5	1106	76.4	797	80.4	562	79.7	3 433	77.27
Single	332	25.5	341	23.6	194	19.6	143	20.3	1 010	22.73
Total	**1 300**	**100**	**1 447**	**100**	**991**	**100**	**705**	**100**	**4 443**	

Source: SPSS

4.3.7 Age

The number of responses for age was 4 461 and the age of respondents ranged from 15 to 111 years with a mean age for the entire sample of 51.97 years. The data set verified respondents' date of birth (as it was filled in on the questionnaire), which was then converted into the actual age in numbers of years for analysis. This allowed for the inspection for outliers. The dates of birth corresponded with the ages attributed to the outliers.

Table 4.11: Age descriptive statistics per nationality

	N	Minimum Age	Maximum Age	Mean Age	Std. Deviation
AUS	1301	15	107	51.23	16.131
UK	1462	15	111	52.93	14.363
USA	996	19	98	54.85	13.358
ZA	702	19	85	47.28	13.039

Source SPSS

Table 4.11 shows the mean age for the respective nationalities, AUS (51.23), the UK (52.93), a slightly higher mean age for respondents from the USA (54.85) and the lowest mean age was for ZA (47.28).

4.3.8 Number of dependents

The number of responses for financial dependents was 4 282, with responses varying from respondents indicating that they had no dependents to those who have 10 dependents. The mean number of dependents per country in order of highest to lowest was as follows: ZA (1.7), the USA (1.46), the UK (1.22) and the lowest for AUS (1.16), is shown in Table 4.12.

Table 4.12: Number of dependents descriptive statistics

Number of dependents	N	Minimum	Maximum	Mean	Std. Deviation
AUS	1233	0	7	1.16	1.324
UK	1388	0	9	1.22	1.376
USA	962	0	10	1.46	1.423
ZA	699	0	6	1.7	1.306

Source: SPSS

For the total sample as shown in Table 4.13, approximately 34% of the respondents had zero dependents; almost 46% had one or two dependents while almost 18% indicated that they had three or four. The remaining 2.5% indicated that they had between five and ten financial dependents. An apparent difference between ZA and the other countries was observed in respect of the lowest possible number of dependent (having none). Particularly for AUS (42.2%), the majority of respondents had no dependents; similarly for the UK (40.8%) a majority also had no dependents.

This followed by a much lower representation in the USA (27.5%) and the lowest representation by ZA (17.7%) for this particular response.

Table 4.13: Number of dependents frequency distribution

Number of dependents	AUS (n)	%	UK (n)	%	USA (n)	%	ZA (n)	%	TOTAL	%
None	520	42.2	566	40.8	265	27.5	124	17.7	1 475	34.4
1 dependent	328	26.6	356	25.6	339	35.2	233	33.3	1 256	29.3
2 dependents	164	13.3	210	15.1	152	15.8	167	23.9	693	16.2
3 dependents	141	11.4	151	10.9	121	12.6	106	15.2	519	12.1
4 dependents	59	4.8	75	5.4	54	5.6	46	6.6	234	5.5
5 to 10	21	1.7	30	2.2	31	3.2	23	3.3	105	2.5
Total	**1233**	**100**	**1388**	**100**	**962**	**100**	**699**	**100**	**4 282**	

Source: SPSS

4.4 RELATIONSHIP BETWEEN FINANACIAL RISK TOLERANCE AND DEMOGRAPHIC FACTORS

Preliminary analyses were conducted to ensure that no violations of the assumptions of normality, linearity and homoscedasticity were present. The hypotheses for testing relationships between financial risk tolerance and a particular demographic factor were derived from the literature reviewed in Chapter 2. Therefore, a directional hypothesis is formulated in particular tests when consensus in previous literature supports the particular view of that relationship.

4.4.1 The relationship between FRT and Age

The relationship between FRT and age is investigated using the Pearson product-moment correlation coefficient (r). The correlation coefficient (r) describes the strength of the relationship and the direction between the FRT and age of the respondents.

Hypothesis:

H_o: There is no relationship between FRT and age.

H_a: There is a negative relationship between FRT and age.

Table 4.14: Correlation between FRT and age

		AUS	UK	USA	ZA	Total
Correlations	**Age in years**					
FRT Score	Pearson Correlation	-.271	-.299	-.223	-0.031	-.243
	Sig. (1-tailed)	.000	.000	.000	0.204	.000
	N	1301	1462	996	702	4461

Source: SPSS

Table 4.14 shows that there was a small, negative, statistically significant correlation between the FRT score and the age of AUS respondents, r= -.27, n= 1301, p<.001. The coefficient of determination R^2 shows that 7.34% of variation in FRT is explained by age.

There is a small, negative, statistically significant correlation between the FRT score and the age of UK respondents, r= -.30, n= 1 462, p<.001. The coefficient of determination R^2 shows that 8.94% of variation in FRT is explained by age.

There is a small, negative, statistically significant correlation between the FRT score and the age of USA respondents, r= -.22, n= 996, p<.001. The coefficient of determination R^2 shows that 4.97% of variation in FRT is explained by age

The correlation between the FRT score and the age of ZA respondents, r = -.03, n= 702, p >.05 was not statistically significant.

There is a small, negative, statistically significant correlation between FRT score and age for the total sample, r = -.24, n = 4 461, p<.001. The coefficient of determination R^2 shows that 5.90% of variation in FRT is explained by age

It appears that a small and negative relationship exists between the FRT score and the age of respondents, for the total sample, AUS, the UK, and the USA samples. The higher (lower) FRT scores are associated with younger (older) respondents. Therefore, the null hypothesis is rejected for all these samples. The implication of not finding a statistically significant relationship between FRT and age for the ZA sample will be considered in the findings; however, the null hypothesis is not rejected.

4.4.2 The relationship between FRT and number of dependents

The relationship between FRT and the number of dependents is investigated using the Pearson product-moment correlation coefficient (r).

Hypothesis:

H_o: There is no relationship between FRT and the number of dependents.

H_a: There is a relationship between FRT and the number of dependents.

As seen in Table 4.15, there is a small, positive statistically significant correlation between the FRT level and the number of dependents for the AUS sample, r =.12, n= 1 233 p<0.001. The coefficient of determination R^2 shows that 1.44% of the variation in FRT is explained by the number of dependents.

Table 4.15: Correlation between FRT and number of dependents

		AUS	UK	USA	ZA	Total
Correlations	**Number of dependents**					
FRT Score	Pearson Correlation	.120	.186	.142	-0.024	.138
	Sig. (2-tailed)	.000	.000	.000	0.52	.000
	N	1233	1388	962	699	4282

Source:SPSS

There is a small, positive, statistically significant correlation between the FRT level and the number of dependents for the UK sample, r =.19, n= 1388, p<0.001. The coefficient of determination R^2 shows that 3.46% of the variation in FRT is explained by the number of dependents.

There is a small, positive, statistically significant correlation between the FRT level and the number of dependents for the USA sample, r = .14, n= 962, p<0.001. The coefficient of determination R^2 shows that 2.02% of the variation in FRT is explained by the number of dependents.

A small, negative correlation between the FRT level and the number of dependents for the ZA sample, r = -.02 n= 699, p> 0.05, is not statistically significant.

There was a small, positive statistically significant correlation between the FRT level and the number of dependents for the total number of respondents, r= .14, n =4282, p <0.001. The coefficient of determination R^2 shows that 1.90% of the variation in FRT is explained by the number of dependents.

Therefore, for the total sample as well as for AUS, the UK and USA, a small, positive relationship exists between individuals' FRT level and their financial dependents. Those with more financial dependents appear to display higher levels of FRT. Thus the null hypothesis for these samples is rejected. The implication of not finding a statistically significant relationship between FRT and the number of dependents for the ZA sample will be considered in the findings. Therefore the null hypothesis for ZA fails being rejected.

4.4.3 The relationship between FRT and gender

Independent samples t-tests are used to determine if there is a statistically significant difference in the mean scores of the males and females. Hypothesis:

H_o: The mean FRT score of males is not different from females.

H_a: The mean FRT score of males is higher than females.

Table 4.16: Independent samples t-test: FRT and gender

Country	t-test for Equality of Means			Eta-squared
	t	df	Sig.(1-tailed)	
AUS	8.34	1311.399	.000	0.050
UK	13.897	1489	.000	0.114
USA	9.941	1030.683	.000	0.087
ZA	8.175	312.595	.000	0.097
TOTAL	21.350	4325.462	.000	0.095

Source: SPSS

The results of the t-test are summarised in Table 4.16. On average, AUS males showed higher FRT scores (M = 54.23 SD = 12.175) than those of AUS female respondents (M = 48.96, SD = 10.743). The difference is statistically significant t(1 311.39) = 8.34, p<.05. The magnitude of the differences in the means is small (eta-squared = .050).

The UK males showed a higher average FRT score (M = 54.60, SD = 11.962) than those of the UK female respondents (M =45.93, SD = 11.633). The difference is statistically significant t(1 489) = 13.897, p<.05. The magnitude of the differences in the means is large (eta-squared = .1148).

On average, males from the USA showed higher FRT scores (M = 55.84 SD = 10.927) than those of the females from the USA (M = 49.43, SD = 9.858). The difference is statistically significant t(1 030.683) = 9.941, p<.05. The magnitude of the differences in the means is moderate (eta-squared = .087).

On average ZA males showed higher FRT scores (M = 58.45, SD = 13.234) than females (M = 49.19, SD = 11.827). The difference was statistically significant t(699) = 8.175, p<.05. The magnitude of the differences in the means was moderate (eta-squared = .087).

On average the total sample showed higher FRT scores (M = 55.53, SD = 12.185) than those of ZA females (M = 48.14, SD = 11.00). The difference is statistically significantis t(4 325.462) = 21.350, p<0.05. The magnitude of the differences in means was moderate (eta-squared =.095).

It therefore appears that males display higher levels of FRT on average than those of females. This is observed for all respective countries as well as when the total sample is considered. The null hypothesis is rejected.

4.4.4 The relationship between FRT and Marital status

An independent-samples t-test is conducted to compare the FRT scores between respondents' marital status (married and single). Results are shown in Table 4.17.

Hypothesis:

H_o: There is no difference in the mean FRT scores between married and single respondents.

H_a: There is a difference in the mean FRT scores between married and single respondents.

Table 4.17: Independent samples t- test: FRT and marital status

Country	t-test for Equality of Means			Eta-squared
	t	df	Sig.(2-tailed)	
AUS	-0.509	1298	0.611	0.000
UK	0.756	1445	0.450	0.000
USA	1.921	262.923	0.056	0.004
ZA	-0.825	703	0.409	0.001
TOTAL	1.001	4441	0.317	0.000

Source: SPSS

The difference between the mean FRT for married (M= 51.65, SD = 11.763) and single (M= 52.03, SD= 11.587) AUS respondents is not statistically significant t (1 298) = -0.509, p > .05.

The difference between the mean FRT scores for UK married (M = 51.21, SD = 12.425) and single (M =50.62, SD = 13.250) respondents is not statistically significant t (1 445) = 0.756, p > .05.

The difference between the mean FRT scores for USA married (M = 53.05, SD = 10.301) and single (M = 51.22, SD = 12.278) respondents, is not statistically significant t (262.923) = 1.921, p >.05.

The difference between the mean FRT scores for ZA married (M = 55.99, SD = 13.589) and single (M =57.03, SD = 13.2042) respondents, is not statistically significant t (703) = -0.825, p > .05.

The difference between the mean FRT scores for the total number of respondents, who were married (M = 52.54, SD = 12.095) and single (M = 52.10, SD = 12.661) is not statistically significant t (4 441) =1.001, p >.05.

It can be inferred from the results that there is no statistically significant differences in mean FRT levels between married and single respondents for the total sample and per country basis. Thus null hypothesis fails to be rejected.

4.4.5 The relationship between FRT and education

A one-way group analysis of variance (ANOVA) is conducted to explore the relationship between educational attainment and the level of FRT. The descriptive analysis for the level of education responses revealed that the number of respondents per level of education varies among countries, within the four possible groups for ANOVA. For South Africa (ZA) and the UK, there were too few responses in the lowest category. To account for this, the data obtained for respondents who did not complete high school and those who completed high school is combined, to enable an appropriate analysis. For the entire sample as well as within each country's sample, the analysis compares respondents within three groups according to their highest level of education obtained. An analysis for the total sample will also be considered.

Hypothesis:

H_o: There is no relationship between FRT and the level of education attained.

H_a: There is a positive relationship between FRT and the level of education attained.

Table 4.18: ANOVA subset table for FRT and educational level for AUS

	AUS				
FRT Score	Education	N	Subset for alpha = 0.05		
			1	2	3
Tukey HSD	Completed high school or lower	333	48.54		
	Trade or Diploma	320		50.8	
	University degree or higher	634			53.98

Source: SPSS

There is a statistically significant difference at p< 0.05 level in FRT scores for AUS: F (2, 1 284) = 26.028, p = .000. Despite reaching statistical significance, the actual difference in mean scores between the groups is quiet small. The effect size calculated using eta-squared, is .039. Post-hoc comparisons, using the Tukey HSD test in Table 4.18, indicate that the mean score for those who completed high school or lower (M = 48.54, SD =11.282) is significantly different from the mean score of those with trade or Diploma (M = 50.80, SD =11.672) and from those with a university degree or higher (M = 53.98, SD =11.492). Respondents with a trade qualification or diploma differed significantly from those with a university degree or higher.

The results for AUS indicate that higher mean FRT scores are associated with higher levels of educational attainment.

Table 4.19: ANOVA subset table for FRT and educational level for the UK

	UK			
FRT Score	Education	N	Subset for alpha = 0.05	
			1	2
Tukey HSD	Completed high school or lower	345	48.20	
	Trade or Diploma	260		50.85
	University degree or higher	783		52.88

Source: SPSS

There is a statistically significant difference at p< 0.05 level in FRT scores for UK: F (2, 1385) = 17.282, p = .000. Despite reaching statistical significance, the actual difference in mean scores between the groups is quiet small. The effect size calculated using eta-squared, is .024.

Post-hoc comparisons using the Tukey HSD test shown in Table 4.19, for the UK indicate that the mean score for those who completed high school or lower (M = 48.20, SD =11.943) is significantly different from the mean score of those who had trade or diploma (M = 50.85, SD =12.858) and from the mean score of those with a university degree or higher (M = 52.88, SD =12.432).

The results for the UK indicate that higher mean FRT scores are associated with higher levels of educational attainment.

Table 4.20: ANOVA subset table for FRT and educational level for the USA

	USA			
FRT Score	Education	N	Subset for alpha = 0.05	
			1	2
Tukey HSD	Completed high school or lower	160	49.09	
	Trade or Diploma	114		51.73
	University degree or higher	719		53.66

Source: SPSS

There is a statistically significant difference at p< 0.05 level in FRT scores for the USA: F (2, 990) = 12.561, p = .000. Despite reaching statistical significance, the actual difference in mean scores between the groups is quiet small. The effect size calculated using eta-squared, is .025. Post-hoc comparisons for the USA using the Tukey HSD test in Table 4.20, indicate that the mean score for those who completed high school or lower (M = 49.09, SD = 11.111) is significantly different from the mean score of those with a trade or Diploma (M = 51.73, SD = 10.296) and from the mean score of those with a university degree or higher (M = 53.66, SD =10.598).

It can be inferred from the results for the USA that higher mean FRT sores are associated with higher levels of educational attainment.

Table 4.21: ANOVA subset table for FRT and educational level for ZA

	ZA			
FRT Score	Education	N	Subset for alpha = 0.05	
			1	2
Tukey HSD	Completed high school or lower	111	52.31	
	Trade or Diploma	180	53.63	
	University degree or higher	415		58.33

Source: SPSS

There is a statistically significant difference at p< 0.05 level in FRT scores for the ZA respondents: F (2, 703) = 13.645, p = .000. Despite reaching statistical significance, the actual difference in mean scores between the groups is quiet small. The effect size calculated using eta-squared, is .037. Post-hoc comparisons for ZA in Table 4.21, using the Tukey HSD test indicate that the mean score for those who completed high school or lower (M = 52.31, SD =14.378) is significantly different from the mean score of those with a university degree or higher (M = 58.33, SD =13.248). The mean score of respondents with a trade or diploma (M = 53.63, SD =12.337) is significantly different from the mean score of those with a university degree or higher.

The results for ZA indicated that higher mean FRT scores are associated with higher levels of educational attainment.

Table 4.22: ANOVA Subset table for FRT and educational level for the total sample

	Total sample				
FRT Score	Education	N	Subset for alpha = 0.05		
			1	2	3
Tukey HSD	Completed high school or lower	949	48.95		
	Trade or Diploma	874		51.52	
	University degree or higher	2551			54.26

Source SPSS

There is a statistically significant difference at p< 0.05 level in FRT scores for the total sample of respondents: F (2, 4 371) = 71.884, p = .000. Despite reaching statistical significance, the actual difference in mean scores between the groups is quiet small. The effect size calculated using eta-squared, is .032. Post-hoc comparisons for the total sample in Table 4.22, using the Tukey HSD test indicate that the mean score for those who completed high school or lower (M = 48.95, SD =11.942) is significantly different from the mean score of those with a trade or Diploma (M = 51.52, SD =12.042) and from the mean score of those with a university degree or higher (M = 54.26, SD =11.988). The mean score of those with a trade or Diploma is significantly different from the mean score of those with a university degree or higher. The results for total sample indicated that higher mean FRT scores are associated with higher levels of educational attainment.

It can be inferred from the results for education, that there is a positive relationship between FRT and the level of educational attainment. Thus the null hypothesis is rejected for all countries and the total sample.

4.4.6 The relationship between FRT and Income levels

A one-way group analysis of variance is conducted to explore the relationship between income levels and FRT scores. The descriptive analysis for the level of income revealed that the number of respondents among the income levels varies prominently among countries and within the six possible groups, which need to be regrouped into smaller groups for ANOVA. To account for this, the data obtained for respondents falling into the first three groups is combined into one group (low income). Those falling into the fifth and the last income group are combined into one group (very high) to enable an appropriate analysis with more comparable sample sizes.

Hypothesis:

H_o: There is no relationship between FRT and income levels.

H_a: There is a positive relationship between FRT and income levels.

For the AUS sample, the significance value for the Levene's test for homogeneity of variance is less than .05, which violates the assumption of homogeneity of variance. The robust test of equality of means, particularly the Welch test, is thus preferable as the statistic is an asymptotically F distribution. There was a statistically significant difference at $p< 0.05$ level in FRT scores for the AUS sample: Welch (3, 416.331) = 25.077, p= .000.

Table 4.23: ANOVA Subset table for FRT and income for AUS

FRT Score AUS				
Income	N	Subset for alpha = 0.05		
Dunnett T3		1	2	3
Low	489	48.76		
Medium	410		51.77	
High	266			55.28
Very High	113			56.7

Source: adapted from SPSS

Post-hoc comparisons in Table 4.23, using the Dunnett T3 test indicate that the mean score for the lowest AUS income group, low (M = 48.76, SD =11.0152) is significantly different from medium (M = 51.77, SD =10.889); high (M = 55.28, SD

=11.792) and very high (M = 56.70, SD = 12.835). Medium income is also significantly different from high and very high income.

There is a statistically significant difference at p< 0.05 level in FRT scores for the UK sample: F (3, 1395) = 65.086, p = .000. The actual difference in mean scores between the income groups is large. The effect size, calculated using eta-squared, is .122. Post-hoc comparisons in Table 4.24 using the Tukey HSD test indicate that the UK mean scores for all the income groups were significantly different from each other. Low (M = 44.95, SD = 11.261), medium (M = 50.12, SD = 12.013); high (M = 54.43, SD = 11.994) and very high (M = 57.51, SD = 11.280). Higher FRT scores are associated with higher income levels.

Table 4.24: ANOVA subset table for FRT and income for the UK

FRT Score	**UK**					
	Income level	N	Subset for alpha = 0.05			
			1	2	3	4
Tukey HSD	Low	334	44.95			
	Medium	485		50.12		
	High	339			54.43	
	Very High	241				57.51

Source: SPSS

There is a statistically significant difference at p< 0.05 level in FRT scores for the USA sample: F (3, 971) = 9.083, p = .000. The actual difference in mean scores between the income groups was small. The effect size calculated using eta-squared, is .027.

Table 4.25: ANOVA subset table for FRT and income for the USA

FRT Score	**USA**			
	Income level	N	Subset for alpha = 0.05	
			1	2
Tukey HSD	Low	241	49.88	
	Medium	306		52.92
	High	226		54.03
	Very High	202		54.62

Source: SPSS

Post-hoc comparisons in Table 4.25, using the Tukey HSD test indicate that the mean score for USA incomes; low (M = 49.88, SD = 10.577) is significantly different from medium (M = 52.92, SD = 10.427); high (M = 54.03, SD =11.327) and very high (M = 54.62, SD = 10.141). This indicates that higher income levels are associated with higher mean FRT scores.

Table 4.26: ANOVA subset table for FRT and Income for ZA

FRT Score	**ZA**				
	Income level	N	Subset for alpha = 0.05		
			1	2	3
Tukey HSD	Low	187	52.68		
	Medium	268	55.83	55.83	
	High	181		57.43	
	Very High	70			64.34

Source: SPSS

There is a statistically significant difference at p< 0.05 level in FRT scores for the ZA sample: F (3, 702) = 14.121, p = .000. The actual difference in mean scores between the income groups is medium. The effect size calculated using eta-squared, is .057. Post-hoc comparisons in Table 4.26, using the Tukey HSD test, indicate that the ZA mean score for the income group, low (M = 52.68, SD = 14.376) is significantly different from high (M = 57.43, SD = 12.666) and very high (M = 64.34, SD = 11.503), medium (M = 55.83, SD = 12.819) is significantly different from very high. High income is significantly different from very high income. The results indicate that higher income levels are associated with higher average FRT scores.

Table 4.27: ANOVA subset table for FRT and income levels for the total sample

FRT Score	**Total**					
	Income level	N	Subset for alpha = 0.05			
			1	2	3	4
Tukey HSD	Low	1251	48.55			
	Medium	1469		52.21		
	High	1012			55.10	
	Very High	626				57.20

Source: SPSS

There is a statistically significant difference at p< 0.05 level in FRT scores for the entire sample total: F (3, 4354) = 96.635, p = .000. The actual difference in mean scores between the income groups was medium. The effect size calculated using eta-squared, is .062. Post-hoc comparisons in Table 4.27, using the Tukey HSD test, indicate that the total samples' mean scores for all the income groups were significantly different from each other. Low (M = 48.55, SD = 11.872), medium (M = 52.21, SD = 11.709); high (M = 55.10, SD = 11.960) and very high (M = 57.20, SD = 11.576).

It can be inferred from the results that higher mean FRT scores are associated with higher income levels for all the countries as well as the total sample. Thus, the mean FRT scores are positively related to income levels and thus the null hypothesis is rejected.

4.4.7 The relationship between FRT and combined income

A one-way group analysis of variance is conducted to explore the relationship between combined income levels and FRT scores of married participants. Participants in each country indicated which of the six divisions of combined income levels applied to them. The descriptive analysis for the level of combined income reveals that the number of respondents among the income levels varies noticeably among countries and within the six possible groups. As a result, they are regrouped into smaller groups for ANOVA. To account for this, the data obtained for respondents who fall into the first three groups is combined into a group (low combined income). Those who belonged in the fifth and the last income group are combined into a group (very high combined income) to enable an appropriate analysis with more comparable sample sizes.

Hypothesis:

H_o: There is no relationship between the FRT and combined income levels.

H_a: There is a positive relationship between FRT and combined income levels.

There is a statistically significant difference at $p< 0.05$ level in FRT scores for the combined income groups for the AUS sample: $F (3, 1017) = 21.327$, $p = .000$. The actual difference in mean scores between the combined income groups is medium. The effect size calculated using eta-squared, is .059.

Table 4.28: ANOVA subset table for FRT and Combined income for AUS

FRT Score	**AUS**			
Tukey HSD				
Combined income	N	Subset for alpha = 0.05		
		1	2	3
Low	189	47.22		
Medium	237	49.71		
High	375		52.57	
Very High	220			55.68

Source: SPSS

Post-hoc comparisons in Table 4.28, using the Tukey HSD test, indicate that the AUS mean score for the lowest combined income group, low (M = 47.22, SD = 11.623) is significantly different from high (M = 52.57, SD = 11.785) and very high (M = 55.68, SD = 11.822). The medium combined income (M = 49.71, SD = 10.686) is significantly different from high and very high combined income groups. The high combined income is significantly different from the very high income group. The results for AUS show that higher mean FRT scores are associated with higher combined income levels.

There is a statistically significant difference at $p < 0.05$ level in FRT scores for the combined income groups for the UK sample: F (3, 1105) = 23.472, p = .000. The actual difference in mean scores between the combined income groups is medium. The effect size, calculated using eta-squared, was .060.

Table 4.29: ANOVA subset table for FRT and Combined income for UK

FRT Score	UK			
Tukey HSD				
Combined income	N	Subset for alpha = 0.05		
		1	2	3
Low	73	44.89		
Medium	298	47.88		
High	398		51.66	
Very High	340			54.68

Source: SPSS

Post-hoc comparisons in Table 4.29, using the Tukey HSD test indicate that the UK mean score for the lowest combined income group, low (M = 44.89, SD = 10.624) is significantly different from high (M = 51.66, SD =12.881) and very high (M = 54.68, SD = 11.981). The medium combined income (M = 47.88, SD = 11.739) is significantly different from high and very high combined income groups. The high combined income is significantly different from the very high combined income group. The results for UK show that higher mean FRT scores are associated with higher combined income levels.

Table 4.30: ANOVA subset table for FRT and combined income for USA

FRT Score	USA		
Tukey HSD			
Combined income	N	Subset for alpha = 0.05	
		1	2
Low	70	48.49	
Medium	184		52.52
High	295		52.79
Very High	254		54.63

Source: SPSS

There is a statistically significant difference at $p< 0.05$ level in FRT scores for the combined income groups for the USA sample: $F(3, 799) = 6.733$, $p = .000$. Despite reaching statistical significance, the actual difference in mean scores between the combined income groups is small. The effect size, calculated using eta-squared, is .025. Post-hoc comparisons in Table 4.30, using the Tukey HSD test, indicate that the mean USA score for combined income group, low (M = 48.49, SD = 9.898) is significantly different from all the other groups; medium (M = 52.52, SD = 10.037), high (M = 52.79, SD = 10.431) and very high (M = 54.63, SD = 10.495).

The results for the USA indicate that higher mean FRT scores are associated with higher combined income levels.

There is a statistically significant difference at $p < 0.05$ level in FRT scores for the combined income groups for the ZA sample: $F(3, 567) = 13.043$, $p = .000$. The actual difference in mean scores between the combined income groups is large. The effect size, calculated using eta-squared, is .065.

Table 4.31: ANOVA subset table for FRT and combined income for ZA

FRT Score	**ZA**			
Tukey HSD				
Combined income	N	Subset for alpha = 0.05		
		1	2	3
Low	76	50.88		
Medium	167	54.71	54.71	
High	229		55.72	
Very High	99			62.69

Source: SPSS

Post-hoc comparisons in Table 4.31 using the Tukey HSD test, indicate that the mean ZA score for the lowest combined income, low (M = 50.88, SD = 14.276) is significantly different from combined income levels; high (M = 55.72, SD = 12.577) and very high (M = 62.69, SD = 12.090). Combined income medium (M = 54.71, SD = 13.806) is significantly different very high combined income. High combined income group is significantly different from very high combined income. The results for ZA showed that higher mean FRT scores were associated with higher levels of combined income.

There is a statistically significant difference at $p < 0.05$ level in FRT scores for the combined income groups for the total sample: $F(3, 3500) = 53.005$, $p = .000$. Despite reaching statistical significance, the actual difference in mean scores between the combined income groups is small. The effect size, calculated using eta-squared, is .043.

Table 4.32: ANOVA subset table for FRT and combined income levels for total sample

FRT Score	**Total**				
Tukey HSD					
Combined income	N	Subset for alpha = 0.05			
		1	2	3	4
Low	408	47.70			
Medium	886		50.62		
Relatively High	1297			52.90	
Very High	913				55.77

Source: SPSS

Post-hoc comparisons in Table 4.32, using the Tukey HSD test indicated that the total sample mean score for combined income group, low (M = 47.70, SD = 11.834) is significantly different from all the other groups; medium (M = 50.62, SD = 11.829), high (M = 52.90, SD = 12.032) and very high (M = 55.77, SD = 11.798). All the groups are significantly different from each other.

The results for the total sample indicated that higher mean FRT scores are associated with higher combined income levels. It can thus be inferred from the results for all four countries that there is a positive relationship between combined income levels and the mean FRT scores. Thus higher mean FRT levels are related to higher combined income. Therefore, reject the null hypothesis.

4.4.8 The relationship between FRT and net worth

A one-way group analysis of variance is conducted to explore the relationship of household net worth on FRT scores. The groups for net worth permitted respondents to select one of 10 net worth levels. The descriptive analysis for the levels of net worth levels reveal that the number of respondents among the groups varies noticeably amongst countries and within the 10 possible groups. As a result, the groups are collapsed into six groups for ANOVA to be appropriate. To account for this, the respondents who fall into the first three groups are combined into one group (very low). Those who fall into the fourth and fifth are grouped (low) and the ninth and last net worth group are combined into one group (very high) to enable an appropriate analysis with comparable sample sizes.

Hypothesis:

H_o: There is no relationship between FRT and net worth levels.

H_a: There is a positive relationship between FRT and net worth levels.

The ANOVA results for AUS show that there is no statistically significant difference at the p< 0.05 level in FRT scores and net worth for the AUS sample: F (5, 1 264) = 2.116, p = .061.

For the UK sample, the significance value for the Levene's test for homogeneity of variance is less than .05, which violates the assumption of homogeneity of variance. The robust tests of equality of means, the Welch test, is preferable as the statistic is an asymptotically F distribution.

There is a statistically significant difference at p< 0.05 level in FRT scores for the UK sample: Welch (5, 413.926) = 3.90, p= .002.

Table 4.33: ANOVA subset table for FRT and net worth UK

FRT Score			
Dunnett T3			
Net Worth	N	Subset for alpha = 0.05	
		1	2
Medium high	400	49.03	
Medium	187	50.72	50.72
Low	144	51.19	51.19
High	270	51.78	51.78
Very high	236		52.71
Very low	77	53.43	53.43

Source: Adapted from SPSS

Post-hoc comparisons in Table 4.33 using the Dunnett T3 test indicate that there is a significant difference between medium high net worth category (M = 49.03, SD =11.742) and very high net worth (M = 52.71, SD = 11.643) in the UK sample. It can be inferred from the results that although significance was found, the mean FRT scores for the remaining net worth groups are not significantly different from each other. The relationship between each level of net worth and the mean FRT scores is not orderly.

The ANOVA results show that there is no statistically significant difference at the p< 0.05 level in FRT scores and net worth, for the USA sample: F (5, 962) = .354, p =

.880. Results indicate that there is no positive relationship between mean FRT scores and net worth levels.

There is a statistically significant difference at the $p < 0.05$ level in FRT scores for the net worth, for the ZA sample: $F (5, 697) = 6.457$, $p = .000$. Despite reaching statistical significance, the actual difference in mean scores between the net worth categories was small. The effect size calculated using eta-squared, is .044.

Table 4.34: ANOVA subset table for FRT and net worth for ZA

FRT Score	**ZA**				
	Net Worth	N	Subset for alpha = 0.05		
			1	2	3
Tukey HSD	Very low	151	52.88		
	Low	133	54.27	54.27	
	Medium	165	56.64	56.64	
	Medium high	136	57.27	57.27	
	High	78			60.29
	Very high	40			63.18

Source SPSS

Post-hoc comparisons in Table 4.34 for ZA, using the Tukey HSD test indicate that the mean score for very low net worth (M = 52.88, SD = 14.753) is significantly different from high (M = 60.29, SD = 11.957) and very high (M = 63.18, SD = 12.083), low net worth (M = 54.27, SD =12.778) is significantly different from very high and very high net worth.

The analyses for ZA reveal that higher mean FRT scores are associated with higher net worth levels. It can be inferred from the results that a positive relationship exists between mean FRT scores and the net worth levels for ZA.

There is a statistically significant difference at the $p < 0.05$ level in FRT scores for net worth, for the total sample: $F (5, 4249) = 2.497$, $p = .029$. Despite reaching statistical significance, the actual difference in mean scores between the net worth categories is small. The effect size, calculated using eta-squared, is .003.

Table 4.35: ANOVA subset table for FRT and net worth for total sample

FRT Score	**Total sample**			
Net Worth		N	Subset for alpha = 0.05	
			1	2
Tukey HSD	Medium high	1107	51.52	
	Medium	834	52.34	52.34
	Very low	448	52.7	52.7
	High	725	52.9	52.9
	Low	549	52.98	52.98
	Very high	592		53.43

Source SPSS

Post-hoc comparisons for the total sample in Table 4.35, using the Tukey HSD test, indicate that the mean score for medium high net worth (M = 51.52, SD = 11.857) is significantly different from that of very high (M = 53.43, SD = 11.817). The results do not show a directional positive relationship between mean FRT scores and net worth levels.

It can be inferred thus that for AUS and USA, no statistically significant differences are found, thus the null hypothesis is not rejected. For ZA, however, the null hypothesis is rejected, because the sample showed a positive relationship between net worth levels and the mean FRT scores. For the UK and the total sample, a relationship is found, however it is not orderly in a positive direction.

4.4.9 The relationship between FRT and culture (nationality)

A one-way group analysis of variance (ANOVA) is conducted to explore the association of cultural background (nationality) on the mean FRT scores. Participants are divided into four groups according to their nationality.

Hypothesis:

H_o: There is no relationship between the mean FRT scores and culture (nationality).

H_a: There is a relationship between FRT scores and culture (nationality).

The significance value for the Levene's test for homogeneity of variance is less than .05, which violates the assumption of homogeneity of variance. The robust test of equality of means using the Welch test is preferable as the statistic is asymptotically

F distributed. There was a statistically significant difference at $p< 0.05$ level in FRT scores for the four groups: F Welch (3, 2616.520) = 35.669 $p= 0.000$.

Despite reaching statistical significance, the actual difference in mean scores between the groups is quiet small. The effect size, calculated using eta-squared, is .01.

Table 4.36: ANOVA subset table for FRT and nationality

FRT score	**Country**	N	Subset for alpha = 0.05		
			1	2	3
Dunnett T3	UK	2328	50.36		
	AUS	1583		51.44	
	USA	2189		52.07	
	ZA	728			56.11

Source: adapted from SPSS

Post-hoc comparisons in Table 4.36 using the Dunnett T3 test indicated that the mean score for AUS (M = 51.44, SD =11.803) is significantly different from that of the UK (M = 50.36, SD =12.536) and ZA (M = 56.11, SD =13.518). The UK is significantly different from all three countries, USA (M = 52.07, SD = 11.068), AUS and ZA. The USA was significantly different from UK and ZA. It appears that there are differences in mean FRT scores between the countries. The null hypothesis is to be rejected.

4.5 DIFFERENCES IN DEMOGRAPHICS BETWEEN SOUTH AFRICA AND THE REST OF THE COUNTRIES

Additional tests are conducted to analyse whether differences in results of the demographics tested between ZA sample and the rest of the countries are statistically significant. The analysis is conducted only for those variables where ZA shows different results compared with the others.

AGE: Independent samples t–tests are used to determine whether there are statistically significant differences in the mean age between ZA and the rest of the countries. The analysis reveals that the other countries collectively show a higher mean age (M=52.85, SD=14.813) than that of ZA respondents (M= 47.28, SD=

13.039). The test results revealed that the differences is statistically significant t(1 068.057) = 10.155, p<.05. The magnitude of the differences in the means is small (eta-squared= 0.023).

NUMBER OF DEPENDENTS: Independent samples t–tests, determine whether there is a significant difference between the mean number of dependents of the ZA sample and the rest of the countries. The three countries collectively show a lower average number of dependents (M=1.26, SD=1.376) than that of the ZA respondents (M=1.70, SD=1.306). The difference is statistically significant t(4 280) = -7.741, p<.05. The magnitude of the differences in the means is small (eta-squared= 0.014).

It therefore appears that the mean age and number of dependents between the rest of the countries collectively and that of ZA are significantly different. This confirms that the ZA sample was on average younger than the rest of the countries. Furthermore the ZA sample had on average a higher number of dependents.

EDUCATION: The Chi-square tests for independence are conducted to investigate the relationship between education levels of the ZA sample and the remaining countries' sample to investigate further any differences in income categories and net worth levels between ZA and the rest of the countries.

The Chi-square test reveals that there is a significant relationship between the level of education attained and whether one is from ZA or the other countries $\chi^2(2) = 26.689$, p = .000, Cramer's V =.078.

The interpretation of the results for ZA compared to those of the rest of the countries, reveals that the lowest level of education attained (completed high school or lower) was lower than expected. Further, the results reveal that for both middle (Trade or diploma) and highest (university degree or further) levels of education, ZA representation is higher than expected. Though the relationship was significant, Cramer's V of .078 indicates a small size effect of the relationship between education levels and whether one is from ZA or from the other countries.

INCOME: There is a significant relationship between the income levels and whether one is from ZA or the other countries $\chi^2(3) = 19.692$, p = .000, Cramer's V =.067. The interpretation of the results reveals that of the extreme levels of income (low and very high), South Africa (ZA) is represented less than expected, while for medium and high income ZA is represented more than expected in those income categories compared with the rest of the countries. Though the relationship is significant, the Cramer's V of .067 indicates a small size effect for the relationship between the levels of income category and whether you were from ZA or from the other countries.

NET WORTH: There is a significant relationship between the net worth levels and whether one is from ZA or the other countries $\chi^2\,(5) = 198.768$, p = .000, Cramer's V =.216. The interpretation of the results reveals that for three lower levels of net worth (very low, low and medium), ZA is represented more than expected, while for the upper three net worth levels (medium high, high and very high), ZA is represented less than expected compared with the rest of the countries. Though the relationship is significant, the Cramer's V of .216 indicates a small size effect for the relationship between the levels of net worth and whether one is from ZA or from the other countries.

It can be inferred from the additional tests and analysis that the differences in demographics between ZA and the other countries were statistically significant particularly for the differences reported in the variables namely age, number of dependents, education, income and net worth levels in univariate basis. These results imply that the ZA sample was characteristically younger, more educated, higher income earners, had more dependents and lower net worth, thereby displayed above-average levels of FRT. These findings may explain why the mean FRT score for ZA is higher than for other countries. However, a multivariate analysis, where these aspects are controlled for is discussed in Section 4.6.5.

4.6 BINARY LOGISTIC REGRESSION

Logistic regression is conducted to assess the impact of all the independent variables on the likelihood that respondents would report a higher or lower than average FRT score. The independent variable combined income (which only refers to those who were married) is excluded from the full model analysis as this restricts the sample size to married individuals. This exclusion of combined income from the model is also deemed preferable to assuming a combined household income variable into a model which assesses an individual's FRT level. Preliminary tests to confirm linearity of the logit were conducted. The number of dependents met the assumption. Age (number of years), however, was found to be in violation of this assumption of linearity using the Box-Tidwell test. Age brackets are therefore created and tested with the Logit step test, where linearity is confirmed. The following three age categories applied: (i) 39 and younger, (ii) 40 – 60 years and (iii) 61 and older. This allows for the treatment of the linear age categories as a continuous indicator in the full model.

Education and income categories meet the assumptions for linearity using the logit step test and therefore are treated as continuous variables in the model.

Net worth categories are treated as categorical indicators in the model as they did not meet the assumption of linearity, with the reference category being the highest net worth. The forced entry method is used for the model to include all variables as they are theoretically important as found in literature.

4.6.1 Logistic regression full model for Australia

The model contains seven independent variables (age, gender, education, income, marital status, number of dependents and net worth). The full model containing all predictors was statistically significant χ^2 (11, N= 1171) = 150.713, p< .05, indicating that the model with predictors is statistically better at distinguishing between above average FRT and below-average FRT levels than a model without predictors. The model as a whole explains 12.1% (Cox and Snell R square) and 16.1% (Nagelkerke R square) of the variance and correctly classifies 64.6% of the cases.

Table 4.37: Logistic regression full model for AUS

AUS	Beta	Standard error	Wald statistics Sig.	95% C.I.for odds ratio		
Variables in the Equation				**Lower**	**Odds ratio**	**Upper**
Gender	0.706	0.13	0.000	1.568	2.025	2.614
Education	0.133	0.079	0.092	0.978	1.142	1.334
Income	0.242	0.08	0.003	1.088	1.274	1.491
Marital Status	0.061	0.172	0.724	0.759	1.062	1.488
Dependents	0.003	0.052	0.956	0.906	1.003	1.111
Networth			0.343			
Networth (1)	-0.363	0.328	0.268	0.366	0.695	1.322
Networth (2)	-0.092	0.29	0.751	0.516	0.912	1.612
Networth (3)	-0.391	0.242	0.106	0.421	0.676	1.086
Networth (4)	-0.144	0.23	0.532	0.551	0.866	1.36
Networth (5)	0.038	0.238	0.874	0.652	1.038	1.655
Age brackets	-0.74	0.115	0.000	0.381	0.477	0.598
Constant	0.656	0.458	0.152		1.928	

Source SPSS

As shown in Table 4.37, only three of the seven independent variables make a unique statistically significant contribution to the AUS model (gender, income and age).

To assess practical significance, in interpreting the odds ratio, all other variables were held constant:

- Gender as a predictor has an odds ratio of 2.025. This indicates that being male increases the odds of having an above average FRT score by 102.5% [(2.025 -1) x 100].
- Each increase in income to the next income bracket increases the odds of respondents showing above average FRT levels by 27.40% [(1.2741 -1) x100].
- For each increase to the next age bracket, the odds of respondents showing above average FRT levels decrease by 52.30% [(0.477 -1) x 100].

4.6.2 Logistic regression full model for the United Kingdom

The model contains seven independent variables (age, gender, education, income, marital status, number of dependents and net worth). The full model containing all predictors is statistically significant χ^2 (11, N= 1206) = 204.639, p< .05 indicating that the model with predictors is statistically better at distinguishing between above average FRT and below average FRT levels than a model without predictors. The model as a whole explains 15.6% (Cox and Snell R square) and 20.8% (Nagelkerke R square) of the variance and correctly classifies 68.5% of the cases.

Table 4.38: Logistic regression full model for UK

UK	**Beta**	**Standard error**	**Wald statistics Sig.**	**95% C.I.for odds ratio**		
Variables in the Equation				**Lower**	**Odds ratio**	**Upper**
Gender	0.996	0.141	0.000	2.052	2.707	3.572
Education	0.051	0.078	0.515	0.903	1.052	1.227
Income	0.363	0.078	0.000	1.234	1.437	1.674
Marital Status	-0.257	0.167	0.124	0.557	0.773	1.073
Dependents	0.061	0.054	0.258	0.957	1.062	1.18
Net worth			0.783			
Net worth (1)	-0.266	0.349	0.445	0.387	0.766	1.518
Net worth (2)	-0.107	0.271	0.692	0.528	0.898	1.528
Net worth (3)	-0.174	0.241	0.471	0.525	0.841	1.347
Net worth (4)	-0.09	0.2	0.653	0.617	0.914	1.353
Net worth (5)	0.117	0.211	0.579	0.743	1.124	1.701
Age brackets	-0.64	0.115	0.000	0.421	0.527	0.661
Constant	0.001	0.448	0.998		1.001	

Source SPSS

As shown in Table 4.38, only three of the seven independent variables make a unique statistically significant contribution to the UK model (gender, income and age).

To assess practical significance, in interpreting the odds ratio, holding all other variables constant:

- Gender as a predictor has an odds ratio of 2.707. This indicated that being male increases the odds of having an above average FRT score by 170.7%
- Each increase in income to the next income bracket increases the odds of respondents showing above average FRT levels by 43.70%.
- For each increase to the next age bracket, the odds of respondents showing above average FRT levels decrease by 47.30%.

4.6.3 Logistic regression full model for the United States of America

The model contains seven independent variables (age, gender, education, income, marital status, number of dependents and net worth). The full model containing all predictors is statistically significant χ^2 (11, N= 925) = 97.010, p< .05 indicating that the model with predictors is statistically better at distinguishing between above average FRT and below average FRT levels than a model without predictors. The model as a whole explains 10% (Cox and Snell R square) and 13.4% (Nagelkerke R square) of the variance and correctly classifies 65.5% of the cases.

Table 4.39: Logistic regression full model for USA

USA	**Beta**	**Standard error**	**Wald statistics Sig.**	**95% C.I. for odds ratio**		
Variables in the Equation				**Lower**	**Odds ratio**	**Upper**
Gender	0.959	0.148	0.000	1.951	2.608	3.488
Education	0.135	0.099	0.172	0.943	1.144	1.388
Income	0.052	0.081	0.519	0.899	1.053	1.234
Marital Status	0.235	0.19	0.215	0.872	1.265	1.834
Dependents	-0.02	0.055	0.714	0.879	0.98	1.092
Net worth			0.237			
Net worth (1)	-0.947	0.367	0.01	0.189	0.388	0.797
Net worth (2)	-0.399	0.303	0.188	0.37	0.671	1.215
Net worth (3)	-0.358	0.262	0.172	0.418	0.699	1.168
Net worth (4)	-0.382	0.247	0.122	0.421	0.683	1.107
Net worth (5)	-0.347	0.262	0.185	0.423	0.707	1.181
Age brackets	-0.618	0.127	0.000	0.421	0.539	0.691
Constant	0.962	0.55	0.08		2.618	

Source: SPSS

As shown in Table 4.39, only two of the seven independent variables make a unique statistically significant contribution to the USA model (gender and age). There is also a significant difference between the lowest and highest net worth categories.

To assess practical significance, in interpreting the odds ratio, holding all other variables constant:

- Gender as a predictor has an odds ratio of 2.608. This indicated that being male increases the odds of having an above average FRT score by 160.8%.
- Net worth indicated significant differences only between the highest and lowest categories. This reveals that being in the lowest category decreases the odds of showing above average FRT by 61.2% compared with the highest category.
- For each increase to the next age bracket, the odds of respondents showing above average FRT levels decrease by 46.10%.

4.6.4 Logistic regression full model for South Africa

The model contains seven independent variables (age, gender, education, income, marital status, number of dependents and net worth). The full model containing all predictors is statistically significant χ^2 (11, N= 679) = 77.772, $p< .05$, indicating that the model with predictors is statistically better at distinguishing between above average FRT and below average FRT levels than a model without predictors. The model as a whole explains 10.8% (Cox and Snell R square) and 15% (Nagelkerke R square) of the variance and correctly classifies 70.3% of the cases.

Table 4.40: Logistic regression full model for ZA

ZA	Beta	Standard error	Wald statistics Sig.	95% C.I. for odds ratio		
Variables in the Equation				**Lower**	**Odds ratio**	**Upper**
Gender	1.052	0.2	0.000	1.937	2.864	4.235
Education	0.311	0.114	0.006	1.092	1.365	1.708
Income	0.149	0.114	0.191	0.928	1.16	1.45
Marital Status	-0.344	0.244	0.158	0.44	0.709	1.143
Dependents	-0.013	0.074	0.858	0.854	0.987	1.14
Net worth			0.029			
Net worth (1)	-1.46	0.543	0.007	0.08	0.232	0.673
Net worth (2)	-1.073	0.518	0.038	0.124	0.342	0.944
Net worth (3)	-0.913	0.498	0.067	0.151	0.401	1.065
Net worth (4)	-0.533	0.5	0.287	0.22	0.587	1.564
Net worth (5)	-0.288	0.535	0.59	0.263	0.75	2.139
Age brackets	-0.368	0.156	0.019	0.51	0.692	0.941
Constant	0.694	0.761	0.362		2.001	

Source: SPSS

As shown in Table 4.40, four of the seven independent variables make a unique statistically significant contribution to the ZA model (age, gender, education, net worth and age).

To assess practical significance, in interpreting the odds ratio, holding all other variables constant:

- Gender as a predictor has an odds ratio of 2.864. This indicated that being male increases the odds of showing above average FRT score by 186.4%.
- Each increase in level of education increases the odds of respondents showing above average FRT levels by 36.50%.
- Net worth showed overall significance in the model; with significant differences between the lower two net worth categories and the highest net worth category. Being in the lowest net worth category compared with the highest category decreases the odds of showing above average FRT by 76.8%. Being in the second lowest net worth category compared to the

highest category decreases the odds of showing above average FRT by 65.8%.

- For each increase to the next age bracket, the odds of respondents showing above average FRT levels decrease by 30.80%.

4.6.5 Logistic regression full model for the total sample

The model contains eight independent variables (age, gender, education, income, marital status, number of dependents, net worth and country; ZA being the reference country). The full model containing all predictors is statistically significant χ^2 (14, N= 3981) = 518.72, p< .05, indicating that the model with predictors is statistically better at distinguishing between above average FRT and below average FRT levels than a model without predictors. The model as a whole explains 12.2% (Cox and Snell R square) and 16.4% (Nagelkerke R square) of the variance between above-and below-average FRT levels, and correctly classifies 65.8% of the cases.

As shown in Table 4.41, six of the eight independent variables make a unique, statistically significant contribution to the model (gender, education, income, net worth, age and country).

Table 4.41: Logistic regression full model for total sample

	Beta	S.E.	Wald statistics: Sig.	95% C.I. for EXP(B)		
Variables in the Equation				**Lower**	**Odds ratio**	**Upper**
Gender	0.931	0.074	0.000	2.196	2.537	2.931
Education	0.145	0.044	0.001	1.061	1.156	1.26
Income	0.217	0.042	0.000	1.145	1.242	1.349
Marital Status	-0.089	0.092	0.332	0.764	0.915	1.095
Dependents	0.008	0.028	0.788	0.954	1.008	1.065
Net worth			0.002			
Net worth (1)	-0.683	0.176	0.000	0.358	0.505	0.713
Net worth (2)	-0.301	0.152	0.047	0.55	0.74	0.996
Net worth (3)	-0.329	0.132	0.013	0.555	0.72	0.932
Net worth (4)	-0.205	0.122	0.092	0.641	0.814	1.034
Net worth (5)	-0.051	0.128	0.691	0.739	0.95	1.222
Age brackets	-0.636	0.062	0.000	0.469	0.529	0.597
Country			0.000			
Country: AUS	-0.221	0.109	0.042	0.648	0.802	0.992
Country: UK	-0.521	0.109	0.000	0.479	0.594	0.736
Country: USA	-0.065	0.115	0.569	0.748	0.937	1.173
Constant	0.755	0.273	0.006		2.127	

Source SPSS

To assess practical significance, in interpreting the odds ratio, holding all other variables constant:

- Gender as a predictor has an odds ratio of 2.537. This indicates that being male increases the odds of showing an above average FRT score by 153.7%.
- Each increase in level of education increases the odds of respondents showing above average FRT levels by 15.60%.
- Each increase in income to the next income bracket increased the odds of respondents showing above average FRT levels by 24.20%.
- Net worth is overall a significant predictor. It appears that significant differences are found between the lower net worth groups and the highest net worth category. This indicates that being in the lowest category compared to the highest category decreased the odds of showing above average FRT by 49.5%. Being in the second lowest category compared with the highest category decreases the odds of showing above average FRT levels by 26%.

Lastly, being in the third lowest net worth category compared with the highest category decreases the odds of showing above average FRT levels by 28%.

- For each increase to the next age bracket, the odds of respondents showing above average FRT levels decrease by 47.10%.
- Nationality is found to be a significant predictor in the model. AUS and the UK are found to be statistically significantly different from ZA, whereas the USA was not significantly different from ZA. This indicated that when compared to a ZA respondent, being AUS decreases the odds of showing above average FRT levels by 19.8%, furthermore being a respondent from the UK decrease the odds of showing above average FRT levels by 40.6%.

4.7 SUMMARY

The samples were analysed and the sample characteristics were described for all nations and the full sample. It was evident that for all the country samples, males represented the majority. South Africa also showed the highest mean FRT score in comparison to the other nations.

All the analysis of data was conducted to test each country sample as well as the total sample. The hypotheses were formulated based on the literature findings. They were then tested, to examine the relationships between FRT levels and each independent variable. However, additional tests were conducted to test whether significant differences were apparent, for statistical test results differed between South Africa and the other nations. It can be inferred from the additional tests and analysis that the differences in demographics between ZA and the other countries were statistically significant particularly for the differences reported in the variables namely age, number of dependents, education, income and net worth levels in univariate basis.

These additional results imply that the ZA sample was characteristically younger, more educated, higher income earners, had more dependents and lower net worth, and thereby displayed above-average levels of FRT.

In the multivariate analysis, it appears that for all the countries as well as in the full model for the total sample, gender and age were statistically significant predictors. With the exception of the USA, income was also a significant predictor for the other respective countries as well as the full sample model. Education is only found to be a significant predictor for the full sample and for the ZA sample. Net worth is not a significant predictor for AUS and the UK, whereas some significant differences are found for the total sample, USA and ZA.

CHAPTER 5

DISCUSSION OF RESULTS

5.1 INTRODUCTION

The previous chapter statistically analysed the relationship between the dependent variable and all the independent variables. This chapter reviews and interprets the previously analysed results.

5.1.1 Financial risk tolerance and age

The relationship between FRT and age was tested in terms of the following hypothesis.

H_o: There is no relationship between FRT and age.

H_a: There is a negative relationship between FRT and age.

It is reasonable to assume that a negative relationship exists between age and risk tolerance because older individuals have less time to recover from losses (Finke & Huston, 2003; Hallahan et al., 2004, Sharma, 2006).

In consensus with the literature findings above, the current study revealed that a small and negative relationship existed between the FRT score and the age of respondents for the total sample, AUS, the UK, and USA samples. This implies that higher (lower) FRT scores are associated with younger (older) respondents. The finding that risk tolerance is negatively related to an individual's age lends support to the notion that younger investors have a longer investment horizon and thus have enhanced chances for recovering potential losses in the future and consequently, appreciate taking on higher risks.

Contrary to the results found in the current study and the aforementioned literature, the ZA sample did not find a statistically significant relationship between FRT and age. The findings in the ZA sample in the current study were similar to the study of Anbar and Eker (2010) which also found no significant relationship between age and financial risk tolerance in a univariate case. However, in the multivariate context, this study found that being younger was associated with above average FRT levels. The other two South African studies considered in the literature review (Metherell, 2011; Van Schalkwyk, 2012) found a negative significant relationship.

5.1.2 Financial risk tolerance and number of dependents

The relationship between FRT and number of dependents was tested in terms of the following hypothesis:

H_o: There is no relationship between FRT and number of dependents.

H_a: There is a relationship between FRT and number of dependents.

Few studies considered whether the number of financial dependents is associated with the level of subjective financial risk tolerance. Some studies found that individuals with more children or financial dependents tend to be less risk tolerant than those who do not have financial dependents (Jianakoplos and Bernasek, 1998). Sulaiman (2012) also found a significant negative relationship between the number of dependents and FRT.

The current study contradicted the findings of previously reported literature by Jianakoplos & Bernasek (2008) and Sulaiman (2012) of the negative relationship between number of financial dependents and FRT, however, only for the total sample, AUS, UK and USA. These samples found that a small, positive, significant relationship existed between an individual's FRT level and the number of financial dependents they had. The findings imply that a higher number of dependents was associated with a higher level of FRT.

There was no significant relationship in ZA sample. Similarly, studies found no significant relationship between financial risk tolerance and the number of financial dependents (Anbar & Eker 2010; Hallahan et al., 2003). The two South African studies reviewed in this study did not test this variable.

5.1.3 Financial risk tolerance and gender

The relationship between FRT and gender was tested in terms of the following hypothesis:

H_o: The mean FRT score of males is not different from that of females.

H_a: The mean FRT score of males is higher than that of females.

Many researchers found that men are more risk tolerant than women (Anbar & Eker 2010; Cooper et al. 2014; Grable, 2000; Hallahan et al., 2003,2004; Jianakoplos & Bernasek, 1998; Sharma, 2006; Sung & Hanna, 1996). The consensus is that females have consistently been shown to have a lower preference for risk than males.

The current study confirmed findings previously reported in literature mentioned above with regards to the relationship between gender and subjective FRT. The results revealed that the mean FRT score for males was significantly higher than the mean FRT score of females. This was observed for all the respective countries as well when the total number of respondents was considered. Both South African studies considered in the literature review (Metherell, 2011; Van Schalkwyk, 2012) also found males to be more risk tolerant than females.

5.1.4 Financial risk tolerance and marital status

The relationship between FRT and marital status was tested in terms of the following hypothesis:

H_o: There is no difference in FRT scores of married and single respondents.

H_a: There is a difference in FRT scores of married and single respondents.

Marital status as a demographic characteristic has provided inconclusive findings when assessed in terms of financial risk tolerance (Anbar & Eker, 2010; Grable & Lytton, 1999a).

Some studies report that single individuals are more risk tolerant than those who are married (Sulaiman 2012; Hallahan et al. 2004). In contrast, Grable (2000) found that married respondents were more risk tolerant than single respondents. Faff, Hallahan and McKenzie (2011) state that married couples have a greater ability to withstand financial difficulties and are thus likely to have higher financial risk tolerance.

The current study found that there wasno statistically significant difference between married and single respondents for the total sample and per country basis. This non-significant finding was in line with both the South African studies considered in the literature review.

Although family transitions such as new financial dependents and children are thought to influence the household's financial risk tolerance, the effects of marital status are uncertain (Cooper et al., 2014). The current study did not capture particular changes in marital status (widowed, divorced or separated) but simply differentiated between single and married (in a de facto relationship). It is acknowledged that some who might have indicated being single or married may have differentiated themselves otherwise in terms of marital status. This suggested that, new evidence might be revealed with broader categories.

5.1.5 Financial risk tolerance and education

The relationship between FRT and education was tested in terms of the following hypothesis:

H_o: There is no relationship between FRT and the level of education attained.

H_a: There is a positive relationship between FRT and the level of education attained.

It is common for investment managers and financial planners to assume that increased levels of education and financial knowledge are associated with higher risk tolerance. Numerous studies in support of this view found that individuals with higher levels of education and investment experience are most likely to have higher financial risk tolerance (Faff et al., 2011; Finke & Huston, 2003; Gilliam et al., 2008; Grable & Lytton, 1999a; Hallahan et al., 2004; Sharma, 2006; Sulaiman, 2012).

The results from the current study confirm findings previously reviewed in the literature. The primary finding for total sample and each country was that higher mean FRT scores are associated with higher levels of education. The inference made from the results for education, is that there is a positive relationship between FRT scores and the level of education attainment. One of the two South African studies (Van Schalkwyk, 2012) also found FRT to be positively related to the level of education.

In contrast to the study's findings, research by Barsky et al. (1997) and the South African study by Metherell (2011) found no significant relationship between education and FRT levels.

With increasing evidence and support that this relationship is positive, Moreschi (2005) states that the presumption is that with increased knowledge and formal attained academic training, an individual is better equipped to assess risks and benefits more carefully. It is understood that education could be linked to other socio-economic characteristics such as income whereby, those with higher levels of education might earn more, which, in turn, might be related to higher levels of FRT.

5.1.6 Financial risk tolerance and income

The relationship between FRT and income was tested in terms of the following hypothesis:

H_o: There is no relationship between FRT and income levels.

H_a: FRT is positively related to income levels.

A significant number of international studies indicate that those in higher income and wealth brackets show above average financial risk tolerance than those who earn lower levels of income (Anbar & Eker, 2010; Finke & Huston, 2003; Grable, 2000; Hallahan et al., 2004; Sharma, 2006; Suliaman, 2012; Sung & Hanna, 1996).

The results of the current study are in line with previously reported literature. In both cases where income as well as combined income was considered, it could be inferred from the results that higher FRT scores were associated with higher income levels for all the countries. Thus, the mean FRT scores were positively related to income levels. Both South African studies showed similar findings with regard to individual and combined income.

Reasons for a growing number of researchers finding a positive relationship between income and risk tolerance, could be that higher levels or increasing income levels allow for access to more resources.

5.1.7 Financial risk tolerance and net worth

The relationship between FRT and net worth was tested in terms of the following hypothesis:

H_o: There is no relationship between FRT and net worth levels.

H_a: FRT is positively related to net worth levels.

Wealth (net worth) is perceived to be related to income and both these variables were hypothesised to show a positive relationship to FRT. A number of studies reported that wealth is positively related to FRT (Finke & Huston, 2003; Grable & Lytton, 1999a; Hallahan et al., 2003, 2004; Roskowski & Grable, 2005).

The results from the current study also revealed findings in line with previous literature however only with respect to the ZA sample, which revealed that higher mean FRT scores were associated with higher net worth levels. In contrast to the ZA sample, the study revealed no statistically significant relationship between net worth and FRT for AUS and the USA. For the UK and the total sample statistical significance was found with no positive direction established. However, despite reaching statistical significance for ZA, the actual differences in mean scores between the net worth categories were small. The South African study by Van Schalkwyk (2012) also found that higher net worth levels are associated with higher FRT. Metherell (2011) did not test this variable.

5.1.8 Financial risk tolerance and culture

The relationship between FRT and culture was tested in terms of the following hypothesis:

H_o: There is no relationship between FRT and culture (nationality).

H_a: There is a relationship between FRT and culture (nationality).

According to Statman (2010), risk tolerance is associated with culture. Cultural backgrounds affect the financial attitudes of individuals and culture varies from country to country and affects all parts of life, including its economic and financial parts (Statman & Weng, 2010).

Weber and Hsee (1998) also showed evidence that respondents from China, the USA, Germany and Poland were found to differ in risk preferences, as measured by buying prices for risky financial options. The current study revealed in the analysis, that the mean FRT score for AUS was significantly different from that of the UK and ZA, however, it was not found to be significantly different form the USA. This could suggest that AUS and the USA have a similar financial culture or similar characteristics of respondents. Despite reaching statistical significance, the actual difference in mean scores between the groups was quiet small. It appeared that there were cultural or nationality differences in mean FRT scores between the countries explored in the current study. According to Levinson and Peng (2007), by examining fundamental financial, economic, legal and behavioural principles in a cultural psychological context, it could create understanding not only how a variety of phenomena vary across cultures, but also of how behavioural economics and finance could be modelled in a culturally competent way.

The empirical evidence to date regarding cultural differences in risk tolerance between Chinese and Americans suggests that Chinese are more risk tolerant in financial decision-making than Americans (Fan & Xiao, 2006). This study, showed that the highest mean FRT was that for ZA, followed by that of the USA, AUS and lastly the UK. This observation could be because of the sample characteristic of the ZA sample. However, in the multivariate analysis where sample characteristics were controlled for, it was confirmed that those from ZA were more likely to have above average FRT compared with those from AUS and the UK.

5.1.9 Multivariate predictors of financial risk tolerance

Grable (2000) investigated relationships between demographic and socio-economic variables and attitudinal characteristics with financial risk tolerance. His results show that risk tolerance is associated with being male, older, married, employed professionally with high income, higher knowledge and more education. On the other hand, when considering the interactions of these variables, it was determined that a combination of education, knowledge and income explained the most variation in an individual's financial risk tolerance.

Grable and Lytton (1999a) caution practitioners and researchers alike against relying only on age as a factor when classifying an individual into financial risk categories without taking into account other factors such as financial knowledge, education and income/wealth levels because when all interactions between the related demographic variables are taken into account, age is found to explain small amounts of variances in financial risk tolerance levels.

For the current study, logistic regression was conducted to assess the bearing of all the independent variables on the likelihood that respondents would report a higher or lower than average FRT score. Models for the total sample as well as for each individual country were considered. The model for each country contained seven independent variables (age, gender, education, income, marital status, number of dependents, country and net worth). Controlling for other variables, the study found as follows:

The AUS and the UK samples both revealed that being male, earning higher income and being younger are associated with higher FRT. Findings for each independent variable are in line with the general consensus found in literature discussed individually above.

The USA samples revealed that being male, holding higher accumulated net worth and being younger were associated with higher FRT. Findings for each independent variable showed similar results to the consensus found in literature discussed individually above. Particularly, when compared with the highest net worth category, being in the lowest net worth category decreased the respondent's odds of showing above average FRT. On a univariate basis, results for the USA showed no significant differences for net worth.

For ZA, while age was not a statistically significant variable in the univariate context, it was found to be significant as a predictor in a multivariate context. The ZA sample revealed that being male, with a higher education level obtained, holding higher net worth and being younger were associated with higher FRT. Findings for each independent variable were in line with the general consensus found in literature discussed individually above. Per country cases, education appeared to be a significant predictor in the case for ZA only. The net worth was compared to the highest net worth category and significant differences were found only between the lowest three categories (with the odds of showing above average FRT decreasing with the lower categories).

The total sample consisting of all four country data revealed that being male, with a higher level of education attained, earning higher income, holding a higher accumulated net worth, being younger and South African were associated with higher FRT. The findings for independent variables were in line with the findings reported in literature.

5.2 SUMMARY

It can thus be inferred from the interpretation of the results and analysis conducted that differences between demographic factors and FRT for the samples were statistically significant particularly for the variables namely age, number of dependents, education, income, net worth levels and culture (nationality). The relationship between marital status and FRT was found not to be statistically significantly different for the samples, thus confirming the inconclusive results reported in literature for this relationship.

When considering the relationship between the demographic factors and FRT in the multivariate model, the results revealed that when all variables were included and therefore controlled for, previously found non-significant relationships on a univariate basis were found to be significant in the multivariate context. This was particularly for the case of age (ZA sample) and net worth (USA sample) and education (ZA & USA samples).

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 SUMMARY OF FINDINGS

This particular study used a questionnaire in order to determine the financial risk tolerance levels, and how these key demographic factors were related to the individual's FRT levels in each sample. This was conducted in a similar approach to studies by Anbar and Eker (2010) Grable and Lytton (1999b); Hanna and Lindamood (2004), Metherell (2011) and Sharma (2006).

The findings for the univariate analysis that answers the first research objective are summarised in Table 6.1.

Table 6.1 Summary of findings univariate analysis

Individual demographic factor	Hypothesis tested in the study based on literature	Particular finding of the study	Accept or reject the hypotheses
Age	H_o: There is no relationship between FRT and age. H_a: There is a negative relationship between FRT and age.	A small and negative relationship exists between the FRT and age for the total sample, AUS, UK and USA samples. No significant relationship found in the ZA sample.	Reject the null hypothesis for AUS, UK, USA and the total samples. Fail to reject the null hypothesis for ZA.
Number of dependents	H_o: There is no relationship between FRT and number of dependents. H_a: There is a relationship between FRT and number of dependents.	A small, positive, significant relationship exists between individual's FRT level and the number of dependents for the total sample, AUS, UK and USA. No significant relationship found in the ZA sample	Reject the null hypothesis for total sample, AUS, UK and USA. Fail to reject the null hypothesis for ZA.

Gender	H_o: The mean FRT score of males is not different from that of females. H_a: The mean FRT score of males is higher than that of females.	The mean FRT score of males is higher than females for all the respective countries and the total sample.	Reject the null hypothesis.
Marital status	H_o: There is no difference in FRT levels of married and single respondents. H_a: There is a difference in FRT levels of married and single respondents.	There is no statistically significant difference in mean FRT levels between married and single respondents for the total sample and per country basis.	Fail to reject the null hypothesis.
Education	H_o: There is no relationship between FRT and the level of education attained. H_a: There is a positive relationship between FRT and the level of education attained.	There is a positive relationship between FRT and the level of education attained for all countries and the total sample.	Reject the null hypothesis.
Income	H_o: There is no relationship between FRT and income levels. H_a: FRT is positively related to income levels.	FRT is positively related to income levels for all countries and the total sample.	Reject the null hypothesis.
Combined income	H_o: There is no relationship between the FRT and combined income levels. H_a: There is a positive relationship between FRT and combined income levels.	FRT is positively related to combined income levels for all countries and the total sample.	Reject the null hypothesis.

Net worth	H_o: There is no relationship between FRT and net worth levels. H_a: FRT is positively related to net worth levels.	For the AUS and USA samples, no statistically significant differences were found. ZA sample revealed a positive relationship between net worth levels and the mean FRT scores. The UK and the total sample, showed a relationship that was not orderly in a positive direction.	Fail to reject the null hypothesis For AUS and the USA. Reject the null hypothesis for ZA. Reject the null hypothesis for the UK and total sample, as direction was not confirmed.
Culture (Nationality)	H_o: There is no relationship between FRT and culture (nationality). H_a: There is a relationship between FRT and culture (nationality).	AUS was not significantly different from the USA. The UK was significantly different from all three countries. The USA was significantly different from the UK and ZA.	Reject the null hypothesis.

The summary of findings provided in Table 6.1 supports the importance of testing the relationships between demographic factors and the associated level of FRT. The study's results were generally in consensus with previous literature. These findings are particularly insightful for the South African research context, as research on this particular topic is limited. The nationality comparison provides new insight of comparing South Africa to the other three developed nations used in the study.

The fact that there has been limited research on the topic of FRT in the South African context, when compared with international literature, supports the need to provide new evidence in this field which could add significant value to the investment industry, as well as many other industries where financial risk tolerance is an important factor.

While the sample group was not representative of each country's population at large, it was representative of those individuals likely to be active investors. The analysis provided insight into the relationship of certain demographic factors on the attitudes of individuals towards risk.

The relationship between FRT and age is one which is most commonly researched. The results concerning the age relationship in this study were in consensus with the vast literature supporting the fact that higher (lower) FRT levels are associated with being younger (older). All countries except for ZA, which found no significance, revealed this relationship. In a multivariate context, however, age was a significant predictor consistently for the total sample and each of the countries.

It is notable that the number of dependents, which was found to be non-significant in most previous studies, was found to be significantly related to an individual's attitude towards risk in this study, with the exception of ZA, for all the countries and the total sample. Further research in this field, using a sample more representative of the general population, might confirm whether these results were valid.

The findings for the multivariate analysis that answers the second research objective are discussed below.

The findings on the relationship between a respondent's FRT and the independent variables, namely education, gender and income were found to be in consensus with previous literature findings implying that higher levels of FRT are associated with (i) higher education levels, (ii) being male and (iii) higher income. These were the primary findings for all countries when analysing the relationships in a univariate context. However, when considered in a multivariate context gender was the only one of these three that was found to be a significant predictor for all the countries. Education was a significant predictor only for the ZA model while income was a significant predictor only for the UK multivariate model.

The study revealed in the analysis that the mean FRT score for AUS was significantly different from the UK and ZA, however, it was not found to be significantly different from that of the USA. South Africa and the UK were found to be significantly different from each other and from AUS and the USA. This could suggest that AUS and the USA could have similar financial culture or similar characteristics of respondents. When the total sample consisting of all demographic factors including country data was considered in a multivariate context, the results revealed that being younger and male, with a higher level of education attained, earning higher income, holding a higher accumulated net worth, and being South African were associated with higher average FRT levels.

6.2 CONCLUSIONS

This study provided insight into the specific demographic factors considered and the individual's risk tolerance levels, helping to identify important aspects that need to be considered when individuals are faced with investment and financial decisions. The importance and the need to adequately measure an individual's financial risk tolerance cannot be overlooked. The consequences of inaccurate assessments and assumptions can be detrimental to an individual's investment goals. This becomes an important consideration in the light of the current study, when one considers the finding that cultural differences were related to FRT levels.

In meeting the study's research objectives, the study provided further evidence that, in line with international research, there was a relationship between individual financial risk tolerance levels and demographic factors. Furthermore, the study confirmed that culture (nationality) was significantly related to FRT levels.

6.3 RECOMMENDATIONS FOR FURTHER RESEARCH

The fact that there has been limited research on the topic of FRT in the South African context, when compared to international literature, supports the need to provide new evidence in this field, which could add significant value to the investment industry for one, as well as many other industries where financial risk tolerance is an important factor. New evidence could also be revealed if other demographic factors such as race, religion and rural or urban residency were captured for analysis.

In the instance where marital status was found not to have a significant relationship with FRT, increasing categories of marital status to include more distinguishing statuses for example, widowed or divorced, might benefit the study and reveal new evidence. Net worth was found to be inconclusive in the general finding of the tests conducted, therefore a comprehensive definition of net worth could lead to additional insights.

The Know Your Client rule requires that investors, financial planners and practitioners, use validated and accepted measures of obtaining their clients' level of risk tolerance accurately. The study used the FinaMetrica scale to measure subjectively, the FRT levels and the study revealed results in line with previous literature, implying that this risk tolerance scale may be useful in the South African context.

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