The influence of endogenous and exogenous factors on investor risk-tolerance behaviour

A van den Bergh-Lindeque

orcid.org/0000-0002-8157-3171

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Promoter: Prof Z Dickason-Koekemoer
Co-promoter: Dr S Ferreira-Schenk
Co-promoter: Prof PMS van Heerden

Graduation ceremony: June 2021
Student number: 22983120

DECLARATION

I declare that:

“THE INFLUENCE OF ENDOGENOUS AND EXOGENOUS FACTORS ON INVESTOR RISK-TOLERANCE BEHAVIOUR”

is my own work and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references, and that this thesis has not previously been submitted by me for a degree at any other university.

_____

Anzel van den Bergh-Lindeque

November 2020

Vanderbijlpark

LETTER FROM THE LANGUAGE EDITOR

Jomoné Müller
Language Practitioner
SATI No. 1002831
BA Hons (Language practice)

www.jmuller.co.za
Tel: +27 84 406 0029
jomone@jmuller.co.za

DECLARATION OF LANGUAGE EDITING

9 November 2020

To whom it may concern

This is to confirm that I, the undersigned, have language edited the completed research of Anzel van den Bergh-Lindeque for the Doctor of Philosophy in Risk Management entitled: The influence of endogenous and exogenous factors on investor risk-tolerance behaviour.

No changes were permanently affected and were left to the discretion of the author. The responsibility of implementing the recommended language changes rests with the author of the thesis.

Yours truly

Jomoné Müller

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Proverbs 3: 5-6: Trust in the Lord with all your heart and lean not on your own understanding; in all your ways acknowledge Him, and He will make your paths straight.

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ABSTRACT

Keywords: endogenous factors, exogenous factors, individual investors, risk tolerance behaviour, investment decisions, risk assessment forms, risk profiling, investor life cycle, behavioural finance, financial planners, investment companies, financial industry

Individual investors expect investment companies to construct, measure and evaluate strategies that will assist them to make successful investment decisions. Financial planners are operating in an environment where it is prudent and legally required to be acquainted with their clients' financial, attitudinal and emotional circumstances before making recommendations regarding investment decisions. Risk assessment forms, which are constructed based on institutional intellect regarding rational investor behaviour, are utilised by financial planners to measure the risk tolerance of individual investors. However, a lack of regulatory guidance on risk profiling in the financial industry resulted in a diverse approach to risk profiling evaluations. Consequently, existing and conventional risk assessment forms used by practitioners in the financial industry have major shortcomings, as it is not comprehensive enough to consider all the factors that may affect the risk tolerance behaviour of individual investors when making investment decisions. Therefore, existing and conventional risk assessment forms can be improved by recommending a framework that makes provision for client-specific questions by considering a multitude of pre-identified endogenous and exogenous factors that influence investor risk tolerance behaviour. For this reason, the primary objective of this research study was to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors to improve existing and conventional risk assessment forms and accordingly, to profile the risk tolerance behaviour of individual investors more accurately and comprehensively.

In order to facilitate the achievement of the primary objective, theoretical and empirical objectives were formulated. The theoretical objectives presented a thorough analysis of the theory of risk tolerance and risk behaviour and contextualised a theoretical framework about individual investment decision-making. The theoretical theories and previous studies relating to the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions were also examined. It can be inferred from the theoretical objectives that individual investors, financial planners and investment companies ought to consider and comprehend the factors related to risk tolerance behaviour, as it has a momentous influence on the risk profiling and the investment decision-making of individual investors. Even though previous research studies have examined the factors related to investor risk tolerance behaviour, they have not considered the influence of a multitude of both

endogenous and exogenous factors on the risk tolerance behaviour of individual investors when making investment decisions. Also, previous research studies have not addressed the shortcomings of existing and conventional risk assessment forms by considering endogenous and exogenous factors to provide a more accurate and comprehensive model to profile investor risk tolerance behaviour.

This research study entailed a descriptive research design, whereby a positivist research paradigm was applied and a quantitative research approach was followed. The target population comprised individual investors from an investment company within the South African context. A non-probability purposive sampling method was used to filter the individual investors from the investment company, who met the inclusion criteria of 18 years and older, a current investor with some form of a formal investment product with the investment company and lives in Gauteng, to obtain the representative sample. The sample size of 463 individual investors was considered adequate for the analysis of the quantitative data, as it sufficiently met all the requirements for the statistical analysis applied to facilitate the attainment of the empirical objectives. The primary quantitative data were collected through a self-administered questionnaire and validated scales were utilised.

It can be inferred from the empirical results that the majority of individual investors have a propensity to take average risks when making investment decisions and are in the defensive (cautious) investor phase of the life cycle rather than in the growth investor phase of the life cycle. Corresponding to the investor life cycle theory, younger individual investors with a smaller net worth are in the growth investor phase of the life cycle, while older individual investors with a greater net worth are in the defensive (cautious) investor phase of the life cycle. It was also established that the investment decisions of individual investors are driven to the greatest extent by the self-control bias and to the smallest extent by the anchoring bias. Furthermore, the investment decisions of individual investors in the growth investor phase of the life cycle are only driven by the representativeness bias and the overconfidence bias. However, the investment decisions of individual investors in the defensive (cautious) investor phase of the life cycle are driven by the representativeness bias, the overconfidence bias, the gambler's fallacy bias, the availability bias, the loss aversion bias, the mental accounting bias and the self-control bias. Moreover, it was also confirmed that all the endogenous factors, except for the demographical factor, namely income variability, and all the exogenous factors had significant effects on individual investor risk tolerance behaviour.

The successful findings of the empirical results make a remarkable contribution to the field of study and the financial industry. However, the key contribution of the research study is encompassed in the final empirical objective, the development and validation of a model to

profile investor risk tolerance behaviour based on endogenous and exogenous factors, since no other researcher has developed such a model to date. Based on the structural equation modelling results, only the demographical factor, namely education, did not significantly contribute towards explaining individual investor risk tolerance behaviour. Nonetheless, all the other endogenous factors and all the exogenous factors significantly contributed towards explaining individual investor risk tolerance behaviour. This led to the successful development of the multifaceted and sophisticated risk profiling model, which incorporated a multitude of pre-identified endogenous and exogenous factors to profile investor risk tolerance behaviour.

Overall, the research study contributed to the enhancement of existing literature regarding the various aspects of the risk tolerance behaviour and investment decision-making of individual investors. It also provides individual investors, financial planners and investment companies with better insights and comprehension regarding the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions. The risk profiling model will contribute significantly to the improvement of existing and conventional risk assessment forms by recommending a framework that makes provision for client-specific questions by considering pre-identified endogenous and exogenous factors that influence investor risk tolerance behaviour. Accordingly, the risk profiling model will facilitate the more practical, executable and accurate profiling of the risk tolerance behaviour of individual investors and successful investment decision-making in practice.

Considering the limitations and implications of the research study, future research endeavours can engage several investment companies to take part in the research study to analyse the effect of endogenous and exogenous factors on individual investor risk tolerance behaviour from the databases and perspectives of several investment companies. Furthermore, a mixed-methods research approach can be followed, by also incorporating qualitative interviews to examine the rationales for the influence of endogenous and exogenous factors on individual investor risk tolerance behaviour. Given that the risk profiling model is multifaceted and sophisticated, the review and further investigation of the multitude of pre-identified endogenous and exogenous factors incorporated into the model to profile investor risk tolerance behaviour will assist to further refine and simplify the model. Larger sample sizes can also be utilised to review the robustness of the risk profiling model and accordingly, to profile the risk tolerance behaviour of individual investors even more accurately.

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LIST OF ABBREVIATIONS

AGFI	Adjusted goodness-of-fit index
ANOVA	Analysis of variance
CFA	Confirmatory factor analysis
CFI	Comparative fit index
DOSPERT	Domain-specific risk-taking scale
EFA	Exploratory factor analysis
EU	European Union
GDP	Gross domestic product
GFC	Global financial crisis
GFI	Goodness-of-fit-index
GL-RTS	Grable and Lytton's risk tolerance scale
JSE	Johannesburg Stock Exchange
KMO	Kaiser-Meyer-Olkin
NFI	Normed fit index
NNFI	Non-normed fit index
PGFI	Parsimony goodness-of-fit index
PNFI	Parsimony normed fit index
RA	Retirement annuity
REITs	Real estate investment trusts
RMSEA	Root mean square error of approximation
RMSR	Root mean square residual

RNI	Relative non-centrality index
SCF	Survey of Consumer Finances
SEM	Structural equation modelling
SPSS	Statistical Package for the Social Sciences
SRMR	Standardised root mean square residual
TFI	Tax-free investment
TLI	Tucker-Lewis index
UK	United Kingdom
UTREFs	Real estate unit trust funds

CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

Risk management is a relatively simple concept to explain and is regarded as a strategy that is implemented with the purpose of managing specific risks (Louw, 2017:23). The future is unpredictable and uncertain. As a result, individuals encounter risks in their lives on a daily basis (Kitches, 2018:49). When risk emerges in a given situation, it is anticipated that there is uncertainty regarding the outcome in the given situation and as a result, the outcome may be adverse (Vaughan & Vaughan, 2008:2). Uncertainty comes about when there is a lack of knowledge regarding a potential event that may take place and consequently, the inferences drawn from the obtainable information regarding the event lessens confidence (Project Management Professionals, 2016:1).

When it comes to investing, risk can be viewed as the uncertainty regarding prospective losses or returns (Van den Berg, 2004:238). However, Louw (2017:23) stated that risk caused by uncertainty can be controlled. Although risk can be described in theoretical terms, the inherent perception and comprehension an individual holds regarding the relationship between risk and return is somewhat refined by their experiences in life (Crouhy *et al.,* 2014:5). Moreover, a fundamental factor to consider when making investment decisions is the willingness of an individual investor to take risks. The global financial crisis (GFC) in 2007 had an influential effect on financial markets worldwide, characterised by excessive volatility. As a result, investors were committed to improve their comprehension regarding the notion of risk tolerance (Ryack, 2011:190; Du Plessis, 2015:1). Grable (2000:625) affirmed that risk tolerance is the highest level of uncertainty or volatility in investment returns that individuals are prepared to take when making an investment decision. On the other hand, Botha *et al.* (2012:541) defined risk tolerance as an individual's emotional acceptance of volatility or attitude towards experiencing a loss.

The measurement and evaluation of risk tolerance are key requirements for successful and sound financial and investment planning (Roszkwoski & Davey, 2010:42). Irrespective of the type of investment being considered, the risk-taking propensities of individuals ought to be established prior to developing an investment strategy (Louw, 2017:23). The propensities of individual investors to take risks are unique to every individual and vary throughout the investor life cycle in proportion to their investment goals and objectives (Old Mutual, 2014:7). Risk tolerance should be measured by taking into consideration emotional risk tolerance and financial risk tolerance that are directly allied with an individual's financial well-being (Louw, 2017:23). Furthermore, risk tolerance and risk perception can autonomously contribute to risk-taking behaviour, even though they are

allied and sometimes mystified constructs. Risk perception is regarded as a cognitive activity entailing the precise evaluation of internal and external situations, whereby risk tolerance is conceptualised as a personality trait (Roszkwoski & Davey, 2010:43).

Previous studies attained conflicting results with reference to the relationship between risk perception and risk tolerance. Chang *et al*. (2004:66) found that the self-assessment of the amount of risk an individual is willing to take is positively related to the number of risky assets in the individual's investment portfolio. Other researchers, such as Jianakoplos and Bernasek (2006:988), found a gap between how individual investors perceive risk tolerance and the amount of actual risk taken in their investment portfolios. As a result, previous studies do not clearly indicate whether risk perception is consistently converted into the actual degree of risk individual investors take. Furthermore, when a gap between risk perception and risk tolerance is reported, there is no particular examination providing the reason for the inconsistency, for example, is it due to incorrect self-assessment or inappropriate portfolio composition. However, the current postulation is that the gap originates from individuals' inabilities to accurately measure their financial risk tolerance (Moreschi, 2005:40; Marinelli *et al*., 2017:220).

Over the last several years, two questions of significant importance in the financial industry relates to whether risk tolerance is a stable or variable trait and if investors behave rationally or irrationally when making investment decisions (Roszkwoski & Davey, 2010:42; Kuzniak & Grable, 2017:315). Firstly, Roszkwoski and Davey (2010:43) studied how main events, like the GFC, influenced individual investors' financial risk tolerance. They found that certain individual investors viewed financial risk tolerance as an entirely stable trait, whereas other individual investors viewed financial risk tolerance as a variable trait depending on the mood or environment of the individual. However, as indicated by the self-assessments, changes in individual investors' risk perceptions were found (Roszkwoski & Davey, 2010:50; Kuzniak & Grable, 2017:317). Secondly, derived from traditional finance theories, it is mainly presumed that individual investors behave rationally to benefit from available opportunities when making investment decisions (Chaudhary, 2013:85; Mutswenje, 2014:93). As established by Chaudhary (2013:85), individual investors do not always behave rationally, and markets are not efficient at all times.

The competence of financial planners and investment companies to understand and determine the willingness and abilities of individual investors to take risks are considered to be fundamental components in the investment planning process (Larkin *et al*., 2013:1). It is also essential to determine the degree to which risk tolerance changes over time and if changes do transpire, the factors related to the variability should be established (Kuzniak & Grable, 2017:315).

1.2 PROBLEM STATEMENT, MOTIVATION AND AIM

Warren Buffet asserted that “investing is simple, but not easy”. The difficulties that individual investors and financial planners are confronted with in the identification and implementation of suitable investment strategies are represented by this eloquent phrase (Jacobsen *et al*., 2014:1). These difficulties frequently take on preferences that relate to how risk is perceived by individual investors and accordingly, how they behave towards risk. The issue with not considering risk tolerance is that perceptions lead to actions. Traditional finance theories believe that investors make rational investment decisions with the objective of maximising their returns (Chaudhary, 2013:85; Baghani & Sedaghat, 2014:80). However, the risk-taking propensities of individual investors deviate from theory and are mainly reliant on their individual characteristics and attitudes towards risk (Jacobsen *et al*., 2014:1; Van den Bergh, 2018:207). As affirmed by Mutswenje (2014:92), individual investors have a tendency to behave irrationally with uncertainty and fear of loss for the future, irrespective of how well-educated they are and their considerable level of financial and investment knowledge.

Nobre and Grable (2015:19) stated that individual investors anticipate that investment companies should construct, measure and evaluate strategies that will assist them to make successful investment decisions. Financial planners are operating in an environment where it is prudent and legally required to be acquainted with their clients’ financial, attitudinal and emotional circumstances before providing recommendations with regard to investment decisions (Brayman *et al.*, 2017:79). Financial planners use risk assessment forms, which are constructed on the basis of institutional intellect with reference to rational investor behaviour, to measure the risk tolerance of individual investors (Di Dottorato, 2013:47; Coronation Fund Managers, 2016:97). However, a lack of regulatory guidance on risk profiling in the financial industry resulted in a diverse approach to risk profiling evaluations (Brayman *et al.*, 2017:79).

According to Masthead (2019:1), there have been many deliberations about risk profiling and its significance, or deficiency thereof, to determine suitable investment strategies for individual investors. The main problem statement is formulated against the fact that existing and conventional risk assessment forms used by practitioners in the financial industry have shortcomings, seeing that it is not comprehensive enough to consider all the factors that may affect the risk tolerance behaviour of individual investors when making investment decisions. The current risk profiling approach in the financial industry consists of a standardised and one-size-fits-all approach (Masthead, 2019:1). Dickason (2017:2) also stated that risk assessment forms used by financial planners do not make provision to examine and measure irrational behaviour of individual investors.

Furthermore, the gathering of information is an essential step in the investment planning process and therefore, it is imperative that the correct questions are asked to obtain a comprehensive understanding of the individual investor (Masthead, 2019:1). Individual investors will provide financial planners with valuable information that should be utilised to determine their risk tolerance behaviour. Financial planners need to be discerning, as the information will come from effective communication with their clients and not from standardised risk assessment forms as it consist of too few questions and the incorrect types of questions (Jacobsen *et al.,* 2014:21; Kitches, 2018:52). Brayman *et al.* (2017:73) stated that it is argued that only asking a few questions cannot adequately measure the elements associated with an individual investor's risk profile. A manner to improve risk assessment forms is to entail a wider range of possible outcomes. Therefore, existing risk assessment forms should be improved by recommending a framework that makes provision for client-specific questions by taking into account endogenous and exogenous factors that influence risk tolerance behaviour.

Accordingly, Figure 1-1 illustrates the endogenous and exogenous factors that have been examined in the research study to determine its effect on individual investor risk tolerance behaviour.

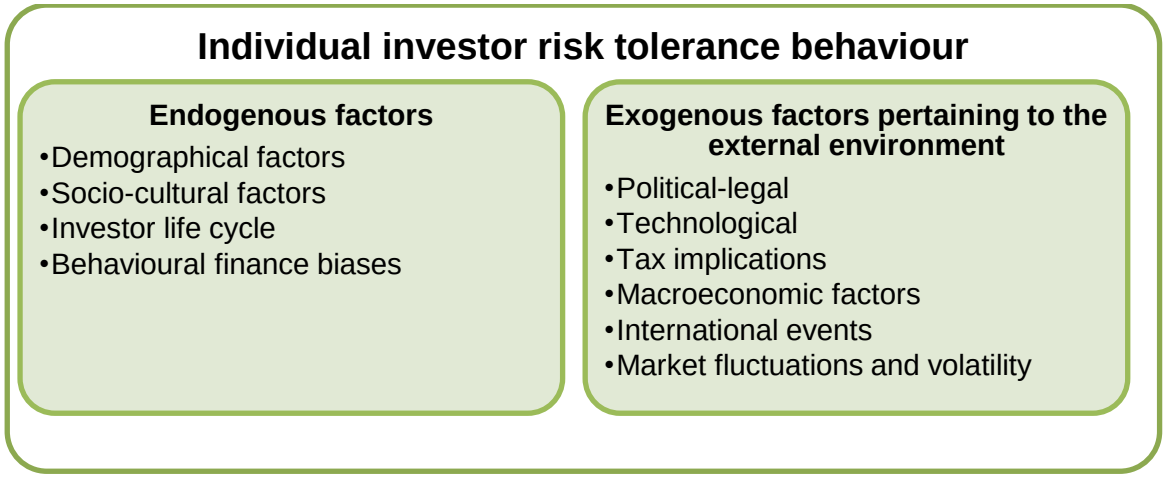

Figure 1-1: Individual investor risk tolerance behaviour influenced by endogenous and exogenous factors
Source: Author compilation

In this research study, endogenous factors, namely demographical factors, socio-cultural factors, the investor life cycle and behavioural finance biases, have been examined to determine its influence on individual investor risk tolerance behaviour. Exogenous factors pertaining to the external environment, namely political-legal, technological, tax implications, macroeconomic factors (interest rates, exchange rates, inflation, gross domestic product (GDP)), international stock market and economic events, as well as reactions to market fluctuations and volatility, have been

examined to determine its influence on individual investor risk tolerance behaviour. This study also aims to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

1.3 OBJECTIVES OF THE STUDY

The following objectives were formulated for this research study:

1.3.1 Primary objective

The primary objective of this research study was to construct a model that will assist to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

1.3.2 Theoretical objectives

In order to facilitate the achievement of the primary objective, the following theoretical objectives were formulated:

- Provide an in-depth theoretical analysis of risk tolerance and risk behaviour.
- Contextualise a theoretical framework pertaining to individual investment decision-making.
- Examine the theoretical theories and previous studies relating to the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions.

1.3.3 Empirical objectives

In order to facilitate the achievement of the primary objective, the empirical portion of the study tends to the following objectives:

- Report on the risk tolerance behaviour of individual investors in the sample.
- Determine individual investors' phase in the investor life cycle.
- Identify the behavioural finance biases that drive individual investment decisions.
- Identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour.
- Identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour.
- Construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

1.4 RESEARCH DESIGN AND METHODOLOGY

This research study comprises a literature review and an empirical study to elucidate how the research was designed and the methodology applied. This research study comprises a descriptive research design, whereby a positivist research paradigm was implemented. A descriptive research design was followed as it is used to explain the characteristics, attitudes, perceptions and behaviours of individuals and to establish the differences between numerous groups (Malhotra *et al.,* 2017:73). Positivism presumes that only reliable knowledge, based on experience and attained through scientific methods, is considered to be truthful knowledge. Positivism attends to human behaviour that is passive, controlled and determined by the external environment, based on reality (Dudovskiy, 2016a:1). According to Creswell (2003:7), the positivist research paradigm commences with the process of theory, the collection of data that supports or rejects the theory and accordingly, the implementation of the necessary amendments before additional tests are performed. Furthermore, a quantitative research approach, using a self-administered questionnaire, was followed. The quantitative research approach is reliant on the collection and analysis of numerical data to illustrate, describe, predict or control variables and phenomena of interest (Williams, 2007:66; Plano Clark & Ivankova, 2016:5).

As demonstrated in Figure 1-2, the quantitative research process employed in the research study included conceptualising the study, planning the study, conducting the study and communicating the results.

Figure 1-2: Quantitative research process employed in the study
Source: Author compilation

1.4.1 Literature review

The literature study concentrated on establishing a comprehensive literature review with the focus on risk tolerance, risk behaviour and the individual investment decision-making process. The theoretical theories and previous studies relating to the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions were also contemplated. Information and research regarding this study were accessed and acquired through a range of secondary sources, which comprised publications (for example journal articles), textbooks, websites, magazine articles and newspapers.

1.4.2 Empirical study

The empirical portion of the research study encompassed the following methodology elements:

1.4.2.1 Target population

As stated by Stagnor (2015:112), it is of significant importance that the target population should be chosen carefully and selectively by reason of that researchers make conclusions about the entire population based on the selected sample. Skewed and inaccurate results will initiate if the target population is not selected carefully and correctly, as the true characteristics of the population will not be displayed. The target population for this research study consisted of individual investors from an investment company within the South African context.

1.4.2.2 Sampling frame, sampling method and sample size

The sampling frame of this study comprised a purposive sample of individual investors from an investment company in South Africa. By following a purposive sampling method, individuals that have other products, for example, insurance products, but no investments were eliminated from the sample frame. Purposive sampling, as a non-probability sampling method, entails the most characteristic and representative elements of the population that are most valuable for the study (Grinnell & Unrau, 2008:153; Babbie, 2010:193). The inclusion criteria for individual investors were as follows:

- Older than 18 years;
- a current investor (a screening question was asked); and
- lives in Gauteng.

Every individual investor chosen to partake in the study was selected with a purpose to make a valuable contribution to the study (Babbie, 2010:193; Quinlan, 2011:213). The questionnaire was electronically distributed to 2 000 individual investors in the database of the South African investment company. Taken into consideration the response rates, costs and time constraints, 1 059 responses were received back from the database of the investment company. For the purpose of this study, given that the sample was selected using purposive sampling, a sample size of 463 individual investors was selected, whereby all the inclusion criteria were met to obtain the representative sample. This sample size is in line with the sample sizes utilised in comparable studies, namely Eckel and Grossman (2002); Grable and Joo (2004); Strydom *et al.* (2009); Sages and Grable (2010); Olweny *et al.* (2013); Shusha (2017); Dickason and Ferreira (2018c), as well as Abdillah *et al.* (2019). Moreover, the selected sample size of this study was efficient for the analysis of the study, as it sufficiently met all the requirements for the statistical analysis employed

that facilitated the investigation of the underlying phenomena and achievement of the empirical objectives.

1.4.2.3 Measuring instrument and data collection method

The primary quantitative data were collected using a self-administered questionnaire that was distributed electronically to the individual investors in the database of the South African investment company. The questionnaire, which consisted of five sections, commenced with a covering letter to introduce and describe the importance and underlying phenomenon of the study, as well as the beneficence of the participation of the respondents. The primary objective of a self-administered questionnaire is to obtain facts and opinions concerning an underlying phenomenon from individuals who are acquainted with the given matter (Delport & Roestenburg, 2011a:186).

The questionnaire comprised of the following sections:

1.4.2.3.1 Section A: Demographical and socio-cultural information

Demographical information refers to the statistical data of the socio-economic characteristics of a population, such as age, gender, ethnicity, income, education and marital status (Merriam-Webster Dictionary, 2020:1). Socio-cultural information refers to the differences between groups of individuals in relation to the social class and society in which they live (Cambridge Dictionary, 2020:1). Section A of the questionnaire consisted of demographical and socio-cultural questions. Demographical questions, namely age, gender, ethnicity, marital status, education, employment status, income, net worth, homeownership, household size and number of financial dependants, were included in the questionnaire. Furthermore, socio-cultural questions regarding religious beliefs, financial and investment knowledge, and health awareness were included in the questionnaire (Rossini & Maree, 2005:45).

As established in previous studies, demographical factors are found to be some of the most significant factors in research that influence the propensities of individual investors to take risks (Wallach & Kogan, 1961:26; McInish, 1982:125; Morin & Suarez, 1983:1211; Hawley & Fujji, 1993:197; Roszkowski *et al.,* 1993:225; Sung & Hanna, 1996:12; Grable & Joo, 2004:81; Grable *et al*., 2009:4; Yao *et al*., 2011:883; Dickason, 2017:216; Van den Bergh, 2018:178; Shah *et al*., 2020:220). Although most studies mainly focus on the influence of demographical factors on the risk tolerance of individual investors, researchers such as Irwin (1993:7), Hammitt *et al.* (2009:130) and Yao *et al.* (2011:885) also examined certain socio-cultural factors and found them to have a significant influence on the risk tolerance of individual investors. Therefore, it was of significant importance to include demographical and socio-cultural factors in this research study. The inclusion of demographical and socio-cultural factors in this research study were essential to

identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour, as well as to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

1.4.2.3.2 Section B: Self-report on investor life cycle

Section B of the questionnaire focused on the self-report on investor life cycle. This section consisted of a 12-item scale in which participants were asked to indicate, based on a set of statements, where they would describe themselves to be in the investor life cycle. A self-report measure is a test, measure or survey that is dependent on an individual's personal report on their behaviours, beliefs, attitudes or intentions. Self-report data are primarily acquired through questionnaires or interviews (Pedneault, 2020:1). The questions were derived from theory to determine where individual investors would describe themselves to be in the investor life cycle (Marx *et al.,* 2010:266; Reilly & Brown, 2012:33; Harty, 2014:1). The self-report on investor life cycle also formed an integral part to identify and analyse the effect of the investor life cycle, as an endogenous factor, on individual investor risk tolerance behaviour. Lastly, the self-report on investor life cycle also assisted with the attainment of the primary objective to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors. The self-report on investor life cycle was measured on a six-point Likert scale (1 = strongly disagree, 6 = strongly agree).

1.4.2.3.3 Section C: Self-report on risk tolerance behaviour

Section C of the questionnaire focused on the self-report on risk tolerance behaviour and consisted of a 20-item scale. Self-reported risk tolerance is a measurement of the willingness of an individual to take risks (Hanna *et al*., 2001:53). This section included financial risk events derived from theory and existing risk scales, namely the Grable and Lytton's risk tolerance scale (GL-RTS), the Survey of Consumer Finances (SCF) and the domain-specific risk-taking (DOSPERT) scale, where individual investors were asked to indicate the amount of financial risk they are willing to take when making an investment decision (Yao *et al.,* 2004:250; Blais & Weber, 2009:34; Gilliam *et al.,* 2010:40; Discovery, 2019b:1; Liberty, 2019:1; AMP, 2020:1; Sanlam, 2020:2). This approach allowed the researcher to examine the level of risk tolerance individual investors are willing to take and how they behave towards risk in different financial risk events by asking a combination of questions from existing theory and risk scales.

The GL-RTS considers various facets of financial risk tolerance (Gilliam *et al.,* 2010:40). The SCF, which is a single-question measure, is utilised to determine the perceptions of individual investors towards financial risk tolerance (Kuzniak *et al.,* 2015:179). It is only a direct measure for

investment choice attitudes and experiences, since it does not incorporate all the variables of financial risk tolerance (Grable & Lytton, 2001:43). The DOSPERT scale is a psychometric scale developed to measure individual differences in risk attitudes, namely the self-reported degree of risk-taking and perceived attitudes, which is the trade-off between perceived risk and benefits (Blais & Weber, 2009:34). However, only the financial domain of the DOSPERT scale was included in the self-report on risk tolerance behaviour scale. The self-report on risk tolerance behaviour was measured on a six-point Likert scale (1 = strongly disagree, 6 = strongly agree).

1.4.2.3.4 Section D: Behavioural finance

Sewell (2010:1) described behavioural finance as the examination of the impact of psychology on the behaviour of financial practitioners and the consequent outcome on financial markets. Behavioural finance is the field of finance attending to the repercussions of investor reasoning mistakes regarding investment decisions and market prices (Massol & Molines, 2015:14). Section D of the questionnaire consisted of a nine-item scale with statements to illuminate upon the behavioural finance biases that drive individual investors' investment decisions. The extent to which the behavioural finance biases drive individual investors' investment decisions was measured using a six-point Likert scale (1 = strongly disagree, 6 = strongly agree). Furthermore, the behavioural finance scale formed an integral part to identify and analyse the effect of behavioural finance biases, as endogenous factors, on individual investor risk tolerance behaviour. Lastly, the behavioural finance biases also assisted with the attainment of the primary objective to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

1.4.2.3.5 Section E: The external environment

Section E of the questionnaire comprised a 45-item scale that consisted of six sections regarding events occurring in the external environment, namely political-legal, technological, tax implications, macroeconomic factors (interest rates, exchange rates, inflation and GDP), international stock market and economic events, as well as reactions to market fluctuations and volatility (Rossini & Maree, 2005:45). Participants were asked to indicate the likelihood that these events are to influence their investment decisions, which was measured on a six-point Likert scale (1 = very unlikely, 6 = very likely). Furthermore, these events pertaining to the external environment were of essential importance to identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour. It also assisted with the attainment of the primary objective to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

Since a Likert scale is viewed as a psychometric response scale which measures attitudes, beliefs and perspectives, it was utilised in various sections of the questionnaire to acquire individuals' preferences or level of agreement with a set of statements (LaMarca, 2011:1).

1.4.3 Statistical analysis

The statistical package, IBM Statistical Package for the Social Sciences (SPSS), Version 26 for Microsoft Windows® (IBM SPSS, 2020), was employed to analyse the quantitative data. The following statistical methods were utilised to attain the empirical objectives of the research study:

1.4.3.1 Descriptive statistics

Fouché and Bartley (2011:251) stated that descriptive statistics are utilised to report on the distribution of a sample or population across a wide range of variables. Quinlan (2011:399) asserted that descriptive statistics are utilised to describe variables from the data collected, for example, age, gender, ethnicity, education and income, by using frequencies and percentages, measures of central tendency (mean, mode and median), measures of dispersion (range, variance and standard deviation) and measures of shape (kurtosis and skewness). In this research study, descriptive statistics, such as frequencies and percentages, measures of central tendency and measures of dispersion were implemented.

1.4.3.2 Inferential statistics

Inferential statistics are utilised to obtain data from a sample of a population to make predictions and inferences about the population (Urdan, 2011:3; Quinlan *et al.,* 2015:361). It is utilised to infer, based on a sample study of a population, what the total population may think or do and is utilised in quantitative data analysis for prediction (Quinlan, 2011:399). Inferential statistics comprises main measures, such as t-tests, analysis of variance (ANOVA), correlation, linear regression and logistic regression. In this research study, inferential statistics, namely t-tests, ANOVA and correlation analysis were implemented. T-tests are utilised to test if the arithmetic means of two groups are statistically different from one another, while ANOVA is utilised to tests if the arithmetic means of numerous groups are statistically different from one another (Marczyk *et al.,* 2005:198; Babbie, 2010:429). Moreover, correlation analysis was utilised to determine the strength and direction of a relationship between two variables and also measures the extent to which changes in one variable are associated with changes in another variable (Quinlan *et al*., 2015:362; Pallant, 2020:135).

1.4.3.3 Factor analysis

Factor analysis is a technique that is employed to minimise a large number of variables into a smaller and more manageable number of factors (Pallant, 2007:178; Statistic Solutions, 2020b:1). Field (2009:431) stated that it entails the analysis of various processes with the intention to reduce and summarise data. In addition, factor analysis enables researchers to perform exploratory analysis of underlying variables and to test particular models (Plucker, 2003:20). Accordingly, there are two main approaches to factor analysis, namely exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Plucker, 2003:22; Pallant, 2013:178; Statistic Solutions, 2020b:2).

1.4.3.3.1 Exploratory factor analysis

EFA is based on the assumption that any variable may be allied with any factor (Statistic Solutions, 2020b:2). EFA minimises data by examining the relationship between interrelated variables by means of grouping the variables into a few principal factors (Malhotra *et al.*, 2012:774). EFA is the most basic factor analysis employed by researchers and is not founded on any previous theory (Statistic Solutions, 2020b:2). Plucker (2003:22) stated that EFA does not test a model of the factor structure. However, it rather investigates the underlying data set for statistically vindicated factors.

1.4.3.3.2 Confirmatory factor analysis

Urdan (2011:177) stated that CFA is a multifaceted set of techniques employed to verify a particular hypothesis or theories regarding the structure underlying a set of variables. CFA is utilised to determine the factor and factor loading of the measured variables, as well as to verify what is expected based on previous theory. It is assumed by CFA that each factor is allied with a particular subset of measured variables (Statistic Solutions, 2020b:2). Plucker (2003:27) indicated that CFA can be used to test a model of factor structure and enables researchers to correlate errors and test if a particular model is equivalent across data from different groups.

1.4.3.4 Structural equation modelling

Structural equation modelling (SEM) is regarded as a multivariate statistical analysis technique that is a combination of different statistical techniques, such as factor analysis and multiple regression analysis, and is employed to examine structural relationships (Statistic Solutions, 2020c:1). Hardy and Bryman (2004:436) stated that SEM is based on the theoretical relationship between numerous variables or constructs. According to Urdan (2011:182), this statistical analysis method allows researchers to identify how a set of variables ought to be structured and subsequently, tests

and investigates how well the particular model fits with the observed data. Figure 1-3 demonstrates the six-step process to conduct SEM.

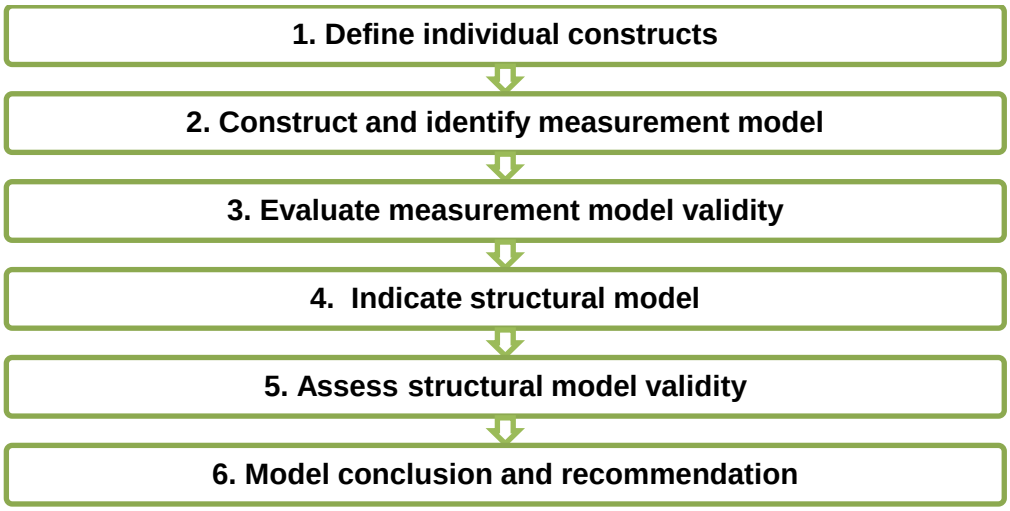

Figure 1-3: The six-step process of SEM
Source: Weston and Gore (2006:719); Malhotra *et al.* (2012:870); Statistic Solutions (2020c:2)

1.4.4 Outline of the statistical techniques utilised in the research study

Table 1-1 outlines the statistical techniques employed in the research study to facilitate the attainment of the empirical objectives.

Table 1-1: Outline of the statistical techniques utilised in the research study

Empirical objectives	Methods
1. Report on the risk tolerance behaviour of individual investors in the sample.	Descriptive Factor analysis Reliability analysis
2. Determine individual investors' phase in the investor life cycle.	Descriptive Factor analysis Reliability analysis Correlation
3. Identify the behavioural finance biases that drive individual investment decisions.	Descriptive Correlation
4. Identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour.	Descriptive T-tests ANOVA Correlation
5. Identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour.	Descriptive Factor analysis Reliability analysis Correlation
6. Construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.	SEM

Source: Author compilation

1.5 CONTRIBUTION OF THE STUDY

Although numerous studies, such as Grable *et al.* (2009); Larkin *et al.* (2013); Mutswenje (2014); Baghani and Sedaghat (2016); Kuzniak and Grable (2017); Hemrajani and Sharma (2018); Dickason and Ferreira (2019), as well as Lawrenson (2020), have been conducted to investigate the factors that influence the risk tolerance of individual investors when making investment decisions, there is no evident studies that examined the influence of a multitude of both endogenous and exogenous factors on individual investor risk tolerance behaviour within South Africa or internationally. Furthermore, previous research studies have not focused on and addressed the deficiencies of existing and conventional risk assessment forms used by practitioners in the financial industry.

This study contributes significantly towards academia and the financial industry by addressing worldwide deliberations regarding the deficiencies of existing and conventional risk assessment forms. It will assist in the enhancement of existing and conventional risk assessment forms by addressing the shortcomings and taking into consideration the endogenous and exogenous factors that influence investor risk tolerance behaviour, which is not currently incorporated into existing risk assessment forms. By incorporating the correct questions with a wider range of possible outcomes, risk assessment forms will be more comprehensive and will lead to the more practical, executable and objective risk profiling of individual investors over their life cycle.

The development of a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors will enable financial planners and investment companies to establish the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors. It will assist financial planners with the more accurate profiling of the risk tolerance behaviour of individual investors and the successful implementation of investment strategies. Lastly, it will also assist researchers and practitioners in the fields of risk management, as well as financial and investment planning, that focus on enhancing the risk profiling and more successful implementation of investment strategies of individual investors.

Given the establishment of the significant influence of endogenous and exogenous factors on individual investor risk tolerance behaviour, it is of considerable importance for financial planners and investment companies to take endogenous and exogenous factors and accordingly, the risk profiling model into consideration when assessing individual investors' risk tolerance behaviour not only within South Africa but also internationally. This will bring about more successful financial and investment planning and will reform and enhance how the risk tolerance behaviour of individual investors is profiled when making investment decisions.

1.6 ETHICAL CONSIDERATIONS

This research study conformed to the ethical guidelines and principles of the North-West University (NWU, 2020:19). Accordingly, to ensure the execution of the research study in an ethical manner, the necessary permission was acquired from the designated investment company. However, only the designated investment company screening the participants and collecting the data had access to their client database. The researcher did not know the client database, thereby ensuring that the identity and contribution of all the participants remained anonymous and confidential consistently throughout the research study. The participants were instructed not to leave any identifying marks on the questionnaire. No participants were obligated to partake in the research study, because the participation was entirely voluntary. Only raw data were received from the designated investment company and were only utilised for the research study. As a result, the information provided by the participants was treated as highly confidential, as only the researcher had access to the information. The designated investment company also advised that the data may be published without any concerns, provided that they always remain anonymous. The research study also has received ethical clearance from the Economic and Management Sciences Research Ethics Committee of the North-West University, with the following ethics clearance number: NWU-00770-19-A4.

1.7 CLASSIFICATION OF CHAPTERS

This research study consists of the following chapters:

Chapter 1 Introduction and background to the study: Chapter 1 introduces the subject matter of this research study. Risk tolerance, risk behaviour and individual investment decision-making were introduced. The problem statement, motivation and aim of the research study were discussed. The primary, theoretical and empirical objectives of the research study were formulated and stipulated to fulfil the purpose of the research study. A brief overview of the research design and methodology, contribution, ethical considerations and classification of chapters of the research study were also provided.

Chapter 2 Individual investor risk tolerance: Chapter 2 presents a thorough analysis of the theory of risk tolerance and risk behaviour. This chapter aspires to describe the literature review by defining and elucidating risk tolerance and risk behaviour. The theoretical theories and previous studies relating to the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions are also reviewed. The first section of the theoretical framework of the research study is encompassed in this chapter.

Chapter 3 Individual investor investment decision-making: Chapter 3 concentrates on the investment decision-making of individual investors. This chapter aspires to provide an overview and comprehension of the important investment decisions that should be made by individuals when investing. This chapter elucidates the individual investor life cycle theory, investment objectives and constraints, as well as the risk profiling categories of individual investors. A summary of the traditional and non-traditional asset classes is also provided. This chapter further elaborates on the role of behavioural finance in individual investment decision-making. The theoretical theories relating to the investor life cycle and behavioural finance biases, as endogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions, are also reviewed. This chapter encompasses the final section of the theoretical framework of the research study.

Chapter 4 Research design and methodology: Chapter 4 provides an outline of the quantitative research process that was applied in the study. Comprehensive discussions about the research design, research approach, sampling procedure, measuring instrument and data collection method, and the data collection procedure employed for the empirical portion of the study are provided. The statistical analysis of the quantitative data applied to attain the empirical objectives of the research study is also discussed.

Chapter 5 Analysis and interpretation of empirical results: Chapter 5 presents the empirical results and findings of the research study. The data collected from the questionnaire are analysed and interpreted in this chapter. Accordingly, the results and findings of the statistical methods employed to perform the analysis of the quantitative data are presented. The empirical results and findings of the research study are conferred in such a manner to ensure that all the empirical objectives, as well as the primary objective, of the research study are achieved.

Chapter 6 Conclusion and recommendations: Chapter 6 provides a final synopsis of the research study, whereby a summary on the achievement of the primary, theoretical and empirical objectives are presented. The results acquired and inferences made in accordance with the empirical objectives of the research study are also summarised. Furthermore, it presents the general conclusions drawn and the contribution of the research study. Finally, the limitations and implications of the research study are also highlighted to make ensuing recommendations and contribute towards possibilities for future research endeavours.

CHAPTER 2: INDIVIDUAL INVESTOR RISK TOLERANCE

2.1 INTRODUCTION

Risk is omnipresent in individuals' lives on a daily basis as a result of the unpredictability and uncertainty of the future. When risk is present in a situation, there subsists a loss probability that brings about uncertainty (Vaughan & Vaughan, 2008:3). In general investment terms, Van den Berg (2004:238) refers to risk as the uncertainty regarding prospective losses or returns. Crouhy *et al.* (2014:1) further stated that risk transpires from the uncertainty and incapability to accurately forecast market prices. In investing, the main goal is to provide the greatest attainable risk-adjusted returns (Leinberger, 2017:11). Investment theory encloses that there exists a direct relationship between risk and return. The theory holds that the greater the risk associated with an investment, the greater the potential returns will be (Isaacs, 2014:16). The theory further holds that due to the fact that investors are rational, their required rate of return will increase as their level of risk increases (Marx *et al.,* 2010:35). The general point of view is that when individuals select investments that hold more risk, they naturally expect to earn greater returns. However, in reality, individuals obtain skewed information and the simplified relationship does not exist (Holton, 2004:22; Rachev *et al.*, 2011:5). Isaacs (2014:16) further stated that even if individuals have flawless information and analysis, a greater degree of risk associated with an investment does not ensure greater future returns.

Despite the fact that risk can be explained in theoretical terms, the perception and understanding individuals hold regarding the relationship between risk and return is somewhat refined by their experiences in life (Crouhy *et al.,* 2014:5). The willingness and ability of individual investors to tolerate risks will be different and unique to every individual and will change during the different phases of the investor life cycle in relation to their investment goals and objectives (Old Mutual, 2014:7). Therefore, it is essential for individual investors and financial practitioners to comprehend and accurately determine the risk-taking propensities of individual investors (Larkin *et al*., 2013:1). The accurate measurement of individuals' willingness to tolerate risks will assist with the most appropriate asset allocation in their investment portfolios according to their investment objectives and goals (Hallahan *et al*., 2004:57). However, Trone *et al*. (1996:5) stated that measuring individual investors' risk tolerance can be complex. For this reason, risk tolerance, which is considered to be a multidimensional attitude, can be affected by a number of influential factors (Grable & Joo, 2004:73).

It is essential to consider the various factors that are likely to affect the willingness and abilities of individual investors to take risks and accordingly, how they behave towards risk (Finke & Huston,

2003:233). The willingness of individual investors to take risks is affected by everyday challenges and financial choices (Old Mutual, 2014:7). Risk tolerance ought to be measured in view of emotional risk tolerance and financial risk tolerance, which are directly allied with the financial well-being of an individual (Louw, 2017:23). Moreover, risk tolerance and risk perception can autonomously contribute to risk-taking behaviour, even though they are related and at times mystified constructs. Risk perception is considered to be a cognitive activity entailing the precise evaluation of internal and external situations, whereby risk tolerance is conceptualised as a personality trait (Roszkwoski & Davey, 2010:43).

With reference to the above-mentioned discussions, this chapter aspires to describe the theory relating to the risk tolerance of individual investors. The theoretical objective to provide an in-depth analysis of risk tolerance and risk behaviour is achieved in this chapter. The literature is examined by defining and explaining risk tolerance (Section 2.2) and risk behaviour (Section 2.3). Individual investors and financial practitioners ought to comprehend the concepts of risk tolerance and risk behaviour since there are gaps between perceived risk and actual risk. This chapter also introduces the theoretical objective to examine the theoretical theories and previous studies relating to the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions. A summary of previous research conducted on risk tolerance is provided (Section 2.4), which is followed by the examination of the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors (Section 2.5). The endogenous factors, namely demographical and socio-cultural factors, are discussed in detail in this chapter (Section 2.5.1). However, the theoretical aspects of the investor life cycle and behavioural finance biases, as endogenous factors influencing risk tolerance behaviour when making investment decisions, are attended to and discussed comprehensively in Chapter 3. Lastly, the exogenous factors pertaining to the external environment, namely political-legal, technological, tax implications, macroeconomic factors, international stock market and economic events, as well as reactions to market fluctuations and volatility, are discussed comprehensively in this chapter (Section 2.5.2). The first section of the theoretical framework of the study is discussed in this chapter.

2.2 RISK TOLERANCE

The term, risk tolerance, is a prominent concept applied in the financial industry that should be considered when planning the investment strategies of individual investors (Rutgers, 2014:1). Decker (2015:10) stated that individual investors should be acquainted with their risk tolerance to assist with the development, implementation and fulfilment of successful investment planning.

Therefore, the evaluation of risk tolerance is considered to be a requirement to ensure successful investment planning (Roszkwoski & Davey, 2010:42).

Risk tolerance is defined and utilised in numerous manners. In general, risk tolerance is the willingness to partake in a risky behaviour where there is a possibility that the expected outcome may be unfavourable (Irwin, 1993:7; Davey & Resnik, 2008:2; Grable, 2017:2). In the financial industry, risk tolerance can be briefly defined as an individual's attitude towards risk (Sahin & Yilmaz, 2009:2). Financial risk tolerance is defined by Grable (2000:625) as the highest level of uncertainty or volatility in investment returns that individuals are prepared to tolerate when making an investment decision. Grable (2017:26) further stated that financial risk tolerance is the trade-off that an investor is willing to make between the perceived risk and expected return of different investment choices. This definition is derived from a psychological understanding of the traditional portfolio theory framework (Markowitz, 1952:78). It views risk tolerance as an attitude towards risk and differentiates this attitudinal variable from the perceptions of risk and return (Weber & Milliman, 1997:124).

Cordell (2002:32), as well as Boone and Lubitz (2003:57), stated that from the viewpoint of financial planners, risk tolerance is referred to as a combination of both risk attitude (amount of risk an investor wants to take) and risk capacity (amount of risk an investor can afford to take). However, these two elements of risk tolerance are fundamentally diverse. Risk attitude is regarded as a psychological and personality characteristic (Weber *et al.,* 2002:222), whereas risk capacity is regarded as a financial characteristic (Lucarelli & Brighetti, 2011:2). Hanna and Chen (1997:17) posited that risk tolerance consists of two components, namely subjective and objective risk tolerance. Subjective risk tolerance is founded on the economic theory of risk aversion, while objective risk tolerance is founded on Malkiel's notion of the objective financial situation of a household, which includes the investment horizon of every goal. Malkiel (1996:401) affirmed that individuals' abilities to take risks are reliant on the complete financial situation of an individual, which comprises all categories and sources of income, not including income earned from investments.

Measuring risk tolerance can be difficult as subjectivity plays a part when taking risks. According to Hanna *et al.* (2001:53), a subjective measure is employed to determine the emotional and financial capabilities of individual investors to tolerate losses. Hanna *et al.* (2001:53) further asserted that risk tolerance can be measured using four approaches, which include establishing the investment choices of individual investors, asking a combination of investment and subjective questions, assessing actual behaviour and evaluating particular scenarios by asking hypothetical questions. Accordingly, the willingness of individual investors to tolerate risks can be measured through risk assessment forms. Risk assessment forms are utilised by financial planners to measure the risk

tolerance of their clients, with the intention of matching the risk profile of the client with a selection of suitable investments (Coronation Fund Managers, 2013:83). However, these forms are not comprehensive enough to consider all the factors that could influence the willingness of individual investors to tolerate risks. The measurement of risk tolerance is multifaceted and surpasses the completion of a simple risk assessment form. Individual investors and financial planners need to apply four factors when constructing investment strategies, namely financial circumstances, financial needs, risk capacity, and risk appetite. The relations between these four frequently contradictory factors are astonishingly multifaceted (Coronation Fund Managers, 2018:101).

Individual investors are required to make important financial and investment decisions over their lifetime, which have been attributed to risk tolerance. The willingness of individual investors to take risks is affected by everyday challenges, financial choices, and investment objectives and constraints (Fredman, 1996:25; Hanna & Chen, 1997:17). Risk tolerance is essential to establish the most suitable allocation of assets in the investment portfolios of individual investors proportionate to their required level of risk and return (Gilliam *et al.,* 2010:40). Given that all asset classes perform differently proportionate to risk and return, a good balance ought to be maintained for investment portfolios to produce the rates of return required by individual investors relative to their abilities to tolerate risks (Decker, 2015:10).

As investment companies operate within a broad risk appetite, the investment managers' inabilities to accurately determine the risk of each individual investor can bring about similarities among investment funds (Massol & Molines, 2015:2). The willingness of individual investors to tolerate risks varies from individual to individual, as well as to that of investment companies. Therefore, individual investors need to decide on the degree of risk they are willing to take and in which company they want to invest as they may incur fund manager risk (Goodall, 2005:7). If there is an inconsistency between the success of fund managers to attain their mandates and the rates of returns required by individual investors proportionate to their willingness to tolerate risks, the risk profile of an individual investor is not essentially the reason for the inconsistency, if the fund managers do not attain their mandate (Koller, 2011:65; Massol & Molines, 2015:2).

According to Sahin and Yilmaz (2009:2), a significant aspect that promotes successful decision-making is to understand and determine the risk attitude of individual investors in uncertain circumstances. It is imperative for individual investors and financial practitioners to recognise what drives risk tolerance, as it has a main effect on the portfolio allocation of individual investors and brings about variations in their risk tolerance levels. Financial practitioners will be able to identify the circumstances that influence individual investors' inclination towards risky assets if they have the knowledge, competency, and tools to identify such factors (Guillemette & Nanigian, 2014:207).

It is imperative to accurately determine individual investors' abilities to tolerate risks and the factors associated therewith to make successful investment decisions (Sahin & Yilmaz, 2009:2).

When individual investors and financial practitioners comprehend individual investors' willingness to tolerate risks, consideration should also be given to the risk-taking behaviour of individual investors. Since the willingness of individual investors to take risks is affected by everyday challenges and financial choices, their evaluation and willingness to tolerate risks differ from individual to individual when making investment decisions (Grable *et al.,* 2008:3). Consequently, there exists a gap between how individual investors perceive risk and the actual risk taken, as individuals make investment decisions based on their perceptions of risk, rather than the actual risk involved (Davey, 2012:19). Accordingly, the risk behaviour of individual investors is discussed in the following section (Section 2.3).

2.3 RISK BEHAVIOUR

Traditional economic and financial theories argue that individuals employ unemotional judgements to determine the attitudes that influence financial decisions and behaviour (Kahneman, 2003:699). However, psychologists have theorised that individuals' attitudes and behaviours are not constantly consistent with efficient market theory (Warneryd, 1999:25). Every individual's attitude and capacity for taking risks with their capital is different. The risk attitude of an investor is considered to be a stable psychological characteristic. However, risk behaviour is considered to be a variable characteristic that changes investors' perceptions of risk based on factors such as age, recent market events, and life experiences (Weber & Klement, 2018:4). As behaviour varies, actions bring about positive and negative outcomes (Kannadhasan, 2015:175).

Sitkin and Pablo (1992:11) stated that risk-taking behaviour can be described as the degree of risk allied with a decision made. The riskiness of a decision is based on the uncertainty of the expected outcomes, the difficulty to achieve the decision goals and consequences of the potential outcomes. Sitkin and Pablo (1992:15) proposed a mediated model of the determinants of risk behaviour, which indicated that risk propensity and risk perception are the main factors that influence risk-taking behaviour. Sitkin and Weingart (1995:1573) asserted that the relationship between risk propensity and risk behaviour is mediated by risk perception. Figure 2-1 illustrates the relationship between risk propensity, risk perception and risk behaviour.

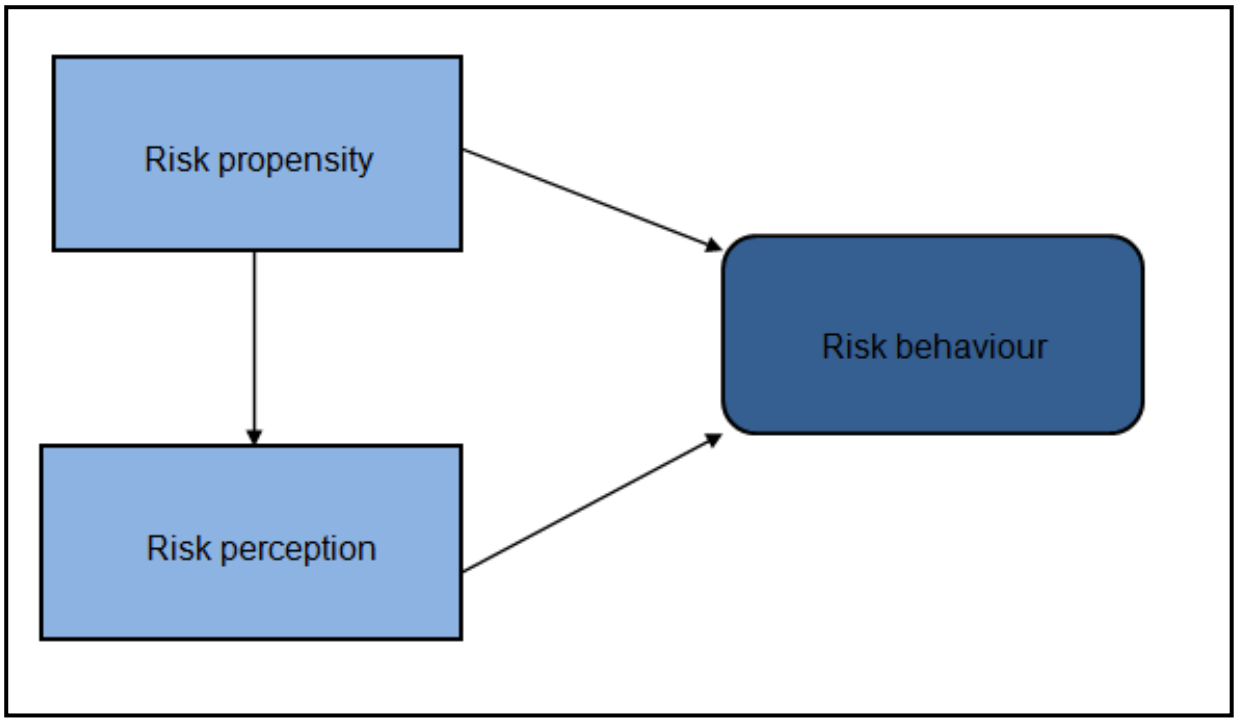

Figure 2-1: The relationship between risk propensity, risk perception and risk behaviour
Source: Sitkin and Pablo (1992:15); Sitkin and Weingart (1995:1573); Hamid *et al*. (2013:137)

As shown in Figure 2-1, risk propensity (willingness/tendency to take risks) and risk perception (the way risk is perceived) are significant factors that need to be taken into consideration when examining risk-taking behaviour. In a study conducted by Hamid *et al.* (2013:143), they also established that both risk propensity and risk perception influence an investor's risk behaviour. However, the effect of risk propensity on an individual investor's risk-taking behaviour is partly mediated by risk perception. This is because individual investors that partake in risky situations have a behavioural incentive to forecast risky behaviour. Therefore, the inclination to partake in risky behaviours is more psychological in nature (Sitkin & Weingart, 1995:1573). Risk propensity (Section 2.3.1) and risk perception (Section 2.3.2) are discussed in the following subsections.

2.3.1 Risk propensity

Risk propensity, which is conceptualised as individuals' risk-taking tendencies, is defined as an individual's tendency to take or avoid risks. Risk propensity is regarded as an individual characteristic that can vary over time due to experience (Sitkin & Pablo, 1992:12; Sitkin & Weingart, 1995:1575). MacCrimmon and Wehrung (1990:432) identified that measures of risk propensity are derived from three different factors, namely the behaviour of investors in hypothetical risky situations, revealed risk attitudes initiating from behaviour in natural risky situations and self-reported attitudes of risk. Wang *et al.* (2015:166) asserted that risk propensity is

regarded as a situational-specific variable, which indicates that the willingness of individual investors to take risks varies in numerous situations.

The willingness of individual investors to take or avoid risks has a noteworthy influence on their investment decision-making (Sitkin & Weingart, 1995:1576). The investment decisions of individual investors are affected by their different risk attitudes that subsist separately from their circumstances (Dickason, 2017:24). Changes in individual investors' risk propensity and risk-taking behaviour can occur when they gain knowledge from their interaction with factors in the external environment (Sitkin & Weingart, 1995:1576). Numerous studies found that individual investors' willingness to take or avoid risks influences their risk-taking behaviour (Brockhaus, 1980:511; MacCrimmon & Wehrung, 1990:432; Sitkin & Pablo, 1992:15; Hamid *et al.*, 2013:144).

2.3.2 Risk perception

According to Sitkin and Pablo (1992:12), risk perception is regarded as an individual's evaluation of the risk inherent in a situation. Slovic (1987:283) and Fischhoff *et al*. (1978:133) identified two main qualitative dimensions that drive individuals' perceptions of risk, namely unknown risk and dread risk. Unknown risk relates to hazards that are unexplored, imperceptible, and new, which bring about uncertainty. Dread risk relates to hazards with significant, negative consequences, and a large likelihood of loss that brings attention to negative outcomes. Unknown risk is concerned with the fact that anything can happen, while dread risk is concerned with the fact that something unfavourable can happen (Long *et al.,* 2018:475). Risk perception can be influenced by both emotional and cognitive characteristics since risk perception is mainly viewed as a subjective measure instead of an objective measure (Mertz *et al*., 1998:391; Linciano & Soccorso, 2012:9).

Individual investors' evaluation of risk differs from individual to individual when making investment decisions. The risk perceptions of individual investors may vary as certain categories of cognitive biases cause individuals to perceive different levels of risk (Simon *et al.,* 2000:119). Wang *et al.* (2015:166) asserted that when individuals encounter the same situations, the situations are perceived by some individuals as very risky, while others regard it as low risk situations. Roszkowski and Davey (2010:44) indicated that individuals are willing to take different degrees of risk in different situations. This is attributed to the fact that different risk levels are perceived in different situations. Although some individuals may be considered to be risk-averse, there is a high likelihood that individuals who perceive low levels of risk may engage in risky situations (Wang *et al.,* 2015:166).

According to Roszkowski and Davey (2010:44), since the measurement of risk entails a perception of the situation, there is some interpretation of the objective reality. Previous research indicated

that risk perception is more a function of instinctive beliefs of risk, for example, the probability of loss, rather than that of a technical measure of risk, for example, standard deviation, beta or variance (Roszkowski & Davey, 2010:45). Hence, individuals will make investment decisions based on their perceptions of risk, rather than the actual risk involved (Davey, 2012:19). For that reason, risk perception forms an essential part of the individual investment decision-making process (Hoffmann *et al.,* 2015:100).

Koonce *et al.* (2005:222) stated that early research asserted that probabilities and outcomes are considered to be two main factors that affect risk perception in investment decision-making. Risk perception involves a degree of uncertainty that is associated with decision outcomes (Williams & Noyes, 2007:82). However, with the development of research, proof of behavioural influences was found and researchers affirmed that individual investors' risk perceptions cannot be fully explained by only taking decision-theory variables (decision outcome based on goal-directed behaviour) into account (MacGregor *et al.,* 1999:70; Sachse *et al*., 2012:439). Nguyen (2015:23) asserted that when individual investors are given sound and informative investment advice, their perception of risk can change and accordingly, influence their investment decision-making.

Subsequent to the description of the theoretical aspects of risk tolerance (Section 2.2) and risk behaviour (Section 2.3), a summary of prior research conducted on risk tolerance is provided in the following section (Section 2.4).

2.4 SUMMARY OF PREVIOUS RESEARCH CONDUCTED ON RISK TOLERANCE

Previous research on risk tolerance is widespread and has attracted the interest of researchers in different fields of study, such as behavioural and cognitive psychology, social sciences, finance and economics. Thus far, researchers have focused on four primary aspects, namely how to determine risk tolerance, which factors drive individuals' risk tolerance, how to explain human decision-making and investors' behaviour towards risk and lastly, how to describe/forecast human behaviour when making portfolio choices and realising performances (Lucarelli & Brighetti, 2010:5). Table 2-1 presents a summary of previous research studies conducted on risk tolerance, together with the objectives and main findings of each study.

Table 2-1: Previous research on financial risk tolerance

Author(s)	Objective of the study	Main conclusions
Sung and Hanna (1996)	To examine the impact of financial and demographic factors on risk tolerance.	Significant factors associated with high risk tolerance levels: time horizon of 30 years and more to retirement, non-Hispanic Whites, high educational levels, self-employed, male-headed households, and non-investment income. Age,

Author(s)	Objective of the study	Main conclusions
		occupation, household size and homeownership are insignificant factors. Differences in risk tolerance according to demographic factors may be attributed to different conceptions regarding the nature of risk.
Wang and Hanna (1997)	To examine the impact of age on risk tolerance.	As individuals age, their risk tolerance levels increase.
Grable (2000)	To examine the impact of demographic, socio-economic and attitudinal factors on risk tolerance.	Factors significantly related to high risk tolerance levels: age (older individuals), gender (males), marital status (married), employment status (professional), income (higher income levels), education (higher educational levels), financial knowledge and positive economic outlook.
Yip (2000)	To examine the stability of risk tolerance as a psychological characteristic.	Risk tolerance is regarded as a steady psychological characteristic over time and an event that varies from individual to individual. In addition, males are more willing to take higher risks than females.
Eckel and Grossman (2002)	To examine the impact of gender differences on risk tolerance.	Males have greater risk-taking propensities than females.
Weber *et al.* *(*2002)	To develop a scale to evaluate risk tolerance in five domains, namely financial decisions, health/safety, recreational, ethical and social.	Individuals' risk tolerance levels are highly domain-specific. Individuals are not constantly risk-averse or risk-seeking across all content domains. Women are less risk-tolerant in all domains, except at social risk. A regression analysis of risk tolerance on expected benefits and perceived risk indicated that gender and content domain differences apparent in risk tolerance are linked to differences in perceptions of activities' benefits and risk, and not linked to differences in attitudes towards perceived risk.
Hallahan *et al*. (2003)	To examine the relationship between a range of demographical factors and subjective risk tolerance.	There is a concave relationship between risk tolerance and income across all age categories, irrespective of gender. Marital status and financial dependants are insignificant drivers of risk tolerance.
Grable *et al.* (2004)	To examine how the projection bias may shape risk tolerance attitudes.	Gender, income and stock market price changes assist to explain risk attitude. Risk tolerance occurs to be an elastic and changeable attitude. Recent changes in stock market prices have a strong effect on risk tolerance attitudes and behaviours.

Author(s)	Objective of the study	Main conclusions
Yao *et al.* (2004)	To examine variations in risk tolerance over a period of time.	The risk tolerance levels of individual investors are influenced by the latest events and changes in the stock market. The bias of overweighting events that most recently occurred should be conquered by providing investors with financial education.
Yao *et al.* (2005)	To examine the effect of race and ethnicity on risk tolerance.	Africans and Hispanics have smaller propensities to take some financial risk, but greater propensities to take substantial financial risk compared to Whites, subsequent to the consideration and management of other factors.
Corter and Chen (2006)	To examine a new instrument designed to assess risk tolerance.	Individuals with high levels of risk tolerance have a greater propensity to hold riskier investment portfolios. Individuals with relatively more investment experience are likely to be more risk-tolerant and have higher risk portfolios than individuals with less experience.
Hanna and Lindamood (2007)	To examine the sequence of risk tolerance between 1992 and 2007 using SCF.	Changes in the risk tolerance of individual investors are not attributable to the gains in the stock market or real estate bubble in 2007. In 2004 and 2007, risk tolerance levels remained lower than in 1998. Lastly, SCF is not a reliable measure related to risk aversion. Conversely, it is an attitude indicating anticipation.
Grable *et al.* (2008)	To examine a conceptual model to identify mechanisms that influence individuals' susceptibility to risky financial behaviour.	Environmental and biopsychosocial factors are valuable to describe and predict financial risk-taking behaviour. Interrelationships were found among environmental and biopsychosocial factors, financial risk tolerance (as a precipitating factor) and risk behaviour. The level of affluence was found to provide protection against situations that can bring about negative financial behaviour.
Grable *et al*. (2009)	To examine how employed individuals across different age categories estimate their propensity for taking risks.	Younger employed individuals tend to overestimate their risk tolerance compared to older employed individuals. Even though middle-aged employed individuals tend to underestimate their risk tolerance compared to the youngest employed individuals, the findings were not significant.
Strydom *et al.* (2009)	To examine the relationship between demographical factors and risk tolerance in South Africa.	Gender, race and religion are significant factors associated with risk tolerance. Income is not a significant factor associated with risk tolerance; this can be ascribed to the deficiency of data. There were similarities in the age, marital status and education samples, which placed limitations on the

Author(s)	Objective of the study	Main conclusions
		research study.
Roszkowski and Davey (2010)	To examine risk perception and risk tolerance changes during the 2008 economic crisis.	Risk tolerance was found to be a relatively stable trait and was not drastically affected by the 2008 economic crisis. However, an apparent change was found in individuals' risk perceptions as indicated by their self-assessment.
Metherell (2011)	To examine the influence of demographical factors on subjective risk tolerance in South Africa.	Age, gender, and certain race and income categories had a significant influence on subjective risk tolerance. Marital status, education and religion did not have a significant influence on subjective risk tolerance.
Yao *et al*. (2011)	To examine the influence of age on the risk tolerance of individual investors.	Period and ageing effects are statistically significant with financial risk tolerance. There is a negative relationship between age and individual investors' willingness to tolerate risks.
Guillemette *et al*. (2012)	To examine risk tolerance questions based on economic theory, prospect theory and individuals' self-assessment to determine portfolio allocation preferences.	Risk tolerance questions based on loss aversion and self-assessment should be employed when determining investment portfolio allocations. Risk tolerance questions based on economic theory are considered to be unpractical when both loss aversion and self-assessment questions are incorporated in risk tolerance questionnaires.
Van de Venter *et al*. (2012)	To examine financial risk tolerance as a personality characteristic.	Financial risk tolerance is a stable personality characteristic and unlikely to fluctuate significantly over the lifetime of an individual.
Van Schalkwyk (2012)	To examine the impact of financial risk tolerance, demographics, behavioural factors and pension plan design and presentation factors on the investment decisions of members of a member-directed defined contribution pension plan.	Investment decisions can be explained to a great degree by the members' extreme aversion and inertia. Statistically significant relationships were found between financial risk tolerance and demographical factors, namely age, gender, race, education, income, wealth, financial knowledge and appointment grade.
Gerrans *et al.* (2013)	To examine individual investors' risk tolerance with the main focus on changes pertaining to the GFC.	The changes in risk tolerance are minor and contrary to the primary perception that risk tolerance is a flexible psychological characteristic considerably affected by current market circumstances. During significant market circumstances, risk tolerance remains reasonably stable over the short term, but may be affected by events more frequently over the long term.

Author(s)	Objective of the study	Main conclusions
Gibson *et al.* (2013)	To examine factors, in addition to demographic factors, associated with risk tolerance.	Individuals that have higher market risk perception are less risk-tolerant. However, individuals with higher income, financial/investment knowledge and positive market outlooks consist of higher risk tolerance levels.
Larkin *et al*. (2013)	To examine the relationship between demographical factors and the risk tolerance of Irish individuals.	Risk tolerance has a significant relationship with age and gender, respectively. However, risk tolerance levels increase with household earnings and education, while it declines with homeownership. During periods of economic downturns, there were substantial decreases in the risk tolerance levels of Irish individuals across all demographical categories.
Grable and Rabbani (2014)	To examine if a reliable and significant risk tolerance portrait can be constructed to determine the willingness of individuals nearing retirement (aged 45–53) to take risks.	Risk tolerance is found to be a generalised attitude and not a domain-dependent attitude held by individuals. Risk tolerance does not differ significantly from one domain to another. It is instead found to be both reliable and useful to determine individuals' willingness to take risks.
Mabalane (2015)	To examine the demographical and cultural differences in risk tolerance.	Cultural differences were found in the risk tolerance levels of participants from South Africa, the United States of America, Australia and the United Kingdom (UK), with South Africa comprising the highest risk tolerance levels. Risk tolerance is positively related to education, income and wealth, and males are more risk-tolerant than females. For all countries, except South Africa, a negative relationship was found between financial risk tolerance and age.
Heo *et al.* (2016)	To examine the role of risk tolerance in mediating investment behaviour.	Financial risk tolerance significantly mediated the effects of gender on investment behaviour and plays a small, but significant mediating role between cohabitation status and investment behaviour.
Dickason (2017)	To model the behaviour of investors by incorporating behavioural finance biases in current risk tolerance measures.	If investors have low- to medium risk tolerance levels, they may be subjected towards the following biases: representativeness, anchoring, availability, overconfidence, gambler's fallacy, mental accounting, loss aversion, regret aversion and self-control. Therefore, these biases may affect the investment decisions of investors and

Author(s)	Objective of the study	Main conclusions
		accordingly, their risk tolerance levels.
Marinelli *et al*. (2017)	To examine the financial risk tolerance gap between subjective (self-assessed) and objective (portfolio composition) risk tolerance.	A financial risk tolerance gap was established due to incorrect self-assessment or incoherent portfolio composition. Individual investors with low financial literacy, no children and high-income levels are more likely to not be consistent in both their subjective and objective financial risk tolerance.
Shusha (2017)	To examine the effect of demographic characteristics on financial risk tolerance among Egyptians.	Age, gender, education and annual income are found to have significant effects on the financial risk tolerance levels of Egyptians. Financial literacy moderates the relationship among individual investors' demographic characteristics and their tendencies to take risks.
Dickason and Ferreira (2018c)	To examine if gender and ethnicity have an effect on risk tolerance within the South African context.	Males are more risk-tolerant than females and African investors are more risk-tolerant than White, Coloured and Asian investors. There is a significant difference between male and female investors of diverse ethnic groups.
Hemrajani and Sharma (2018)	To examine the effect of urgency on financial risk-taking behaviour of individual investors, with financial risk tolerance as a mediating factor.	Individuals that have a higher level of urgency are likely to be more risk-tolerant and accordingly, show evidence of higher financial risk-taking behaviour.
Van den Bergh (2018)	To examine the risk tolerance of South African individual investors throughout the various phases of the life cycle.	Demographical factors significantly related to risk tolerance: age, gender, ethnicity, marital status and yearly income. The subjective risk tolerance of individual investors deviates from their actual risk tolerance. Individual investors also have a greater propensity to take risks when they have an optimistic perception of and attitude towards risk.
Abdillah *et al.* (2019)	To examine the effect of emotional intelligence, locus of control and risk aversion on the intention to invest in a digital risky investment, with financial literacy as a moderating effect.	Emotional intelligence and locus of control have a positive effect on the intention to invest in a digital risky investment. Conversely, risk aversion and financial literacy have a negative effect on the intention to invest in a digital risky investment. Financial literacy does not have a moderating effect on individual psychological factors.
Dickason and Ferreira (2019)	To examine the risk tolerance levels of South African individual investors	Individual investors that have never been married are more risk-tolerant than married and no longer married individual investors. Females also tend to

Author(s)	Objective of the study	Main conclusions
	based on their marital status and gender.	take fewer risks than males.
Lawrenson (2020)	To examine and model the risk tolerance of female individual investors in South Africa.	Individual investors' risk tolerance, personality traits and educational levels have an effect on their risk profiles. They are more apprehensive about their risk aversion than their investment horizons and personality characteristics. Gender has a significant impact on investors' risk tolerance. Investors with lower educational levels are more risk-tolerant than investors with higher educational levels.

Source: Author compilation

It can be inferred from Table 2-1 that there are numerous factors that influence the risk tolerance of individual investors. Accordingly, the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions are discussed in the following section (Section 2.5).

2.5 FACTORS RELATED TO RISK TOLERANCE

It is imperative for individual investors and financial practitioners to comprehend the factors related to risk tolerance as it has a momentous influence on the investment decisions of individuals (Guillemette & Nanigian, 2014:207). The correct assessment of an individual's risk tolerance is a vital component for the development of a comprehensive and appropriate investment plan (Kuzniak & Grable, 2017:316). In view of numerous financial risk tolerance assessment methodologies, there are several factors, for example demographical, socio-economic, attitudinal and psychological factors, that can be of assistance to better comprehend and explain how the risk tolerance of individual investors is influenced (Van de Venter *et al.,* 2012:794; Grable, 2016:25).

The main findings from literature relating to the impact particular individual characteristics have on risk tolerance and the factors assumed to be more risk-tolerant are recapitulated in Table 2-2.

Table 2-2: Factors related to risk tolerance

Individual characteristics	Considered to be more risk-tolerant
Age	Younger individuals
Gender	Males
Marital status	Single individuals
Marital/Gender interaction	Single males
Ethnicity	Non-Hispanic Whites
Income	High
Net worth	High
Financial satisfaction	High
Financial knowledge	High
Education	Bachelor's degree or higher
Employment status	Employed full-time
Occupation	Professional
Income source	Business owner
Income variability	Stable and predictable
Household size	Large
Homeownership	Owner
Religiosity	Less religious
Self-esteem	High
Locus of control	Internal
Personality	Type A
Sensation-seeking	High
Mood	Happy

Source: Irwin (1993)

Figure 2-2 illustrates a conceptual model of the principal factors, namely predisposing biopsychosocial, predisposing environmental and precipitating factors that influence financial risk tolerance. These factors can bring about increases or decreases in risk tolerance levels and accordingly, influence individuals' decisions to initiate, amend or terminate risky behaviours (Grable & Joo, 2004:82; Dickason & Ferreira, 2018a:2).

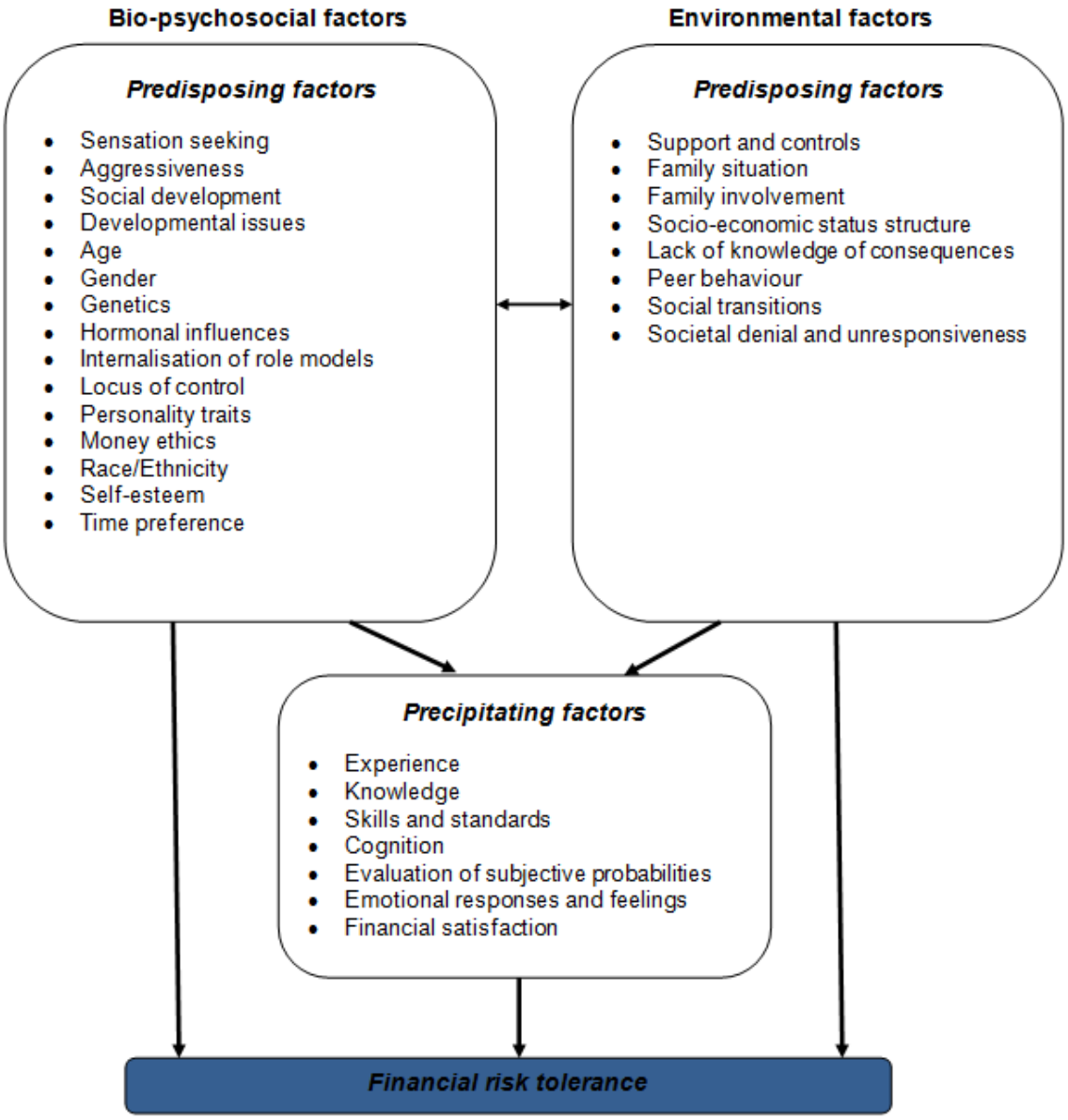

Figure 2-2: Conceptual model of the principal factors that influence financial risk tolerance
Source: Irwin (1993); Grable (2016:26)

The conceptual model, as illustrated in Figure 2-2, is a modification of the original model that was constructed by Irwin (1993) and is derived from the life cycle and adolescent development theory (Grable & Joo, 2004:73). It was established by Irwin (1993) that risk tolerance and risk-taking behaviours are influenced by certain predisposing factors, which can be categorised into two main categories, that is, biopsychosocial and environmental factors. In view of that, biopsychosocial factors are mainly considered to be endogenous, whereas environmental factors are mainly considered to be exogenous (Grable, 2016:26).

Biopsychosocial factors comprise features, namely age, gender, ethnicity, genetics, hormonal influences, beliefs, time preference, personality traits, self-esteem, sensation-seeking qualities, aggressiveness, social development, developmental issues, internalisation of role models, locus of control and money ethics (Grable & Joo, 2004:73; Grable, 2016:27). Irwin (1993) stated that the instigation of risky behaviour is predicted by attitudes, intentions, incentives and perceptions. On the other hand, environmental factors entail support and controls, family situation, family involvement, socio-economic status structure, lack of knowledge of consequences, peer behaviour, social transitions, as well as societal denial and unresponsiveness (Grable, 2016:27).

Predisposing environmental factors are different from predisposing biopsychosocial factors for the reason that environmental factors occur from influences in the social environment, instead of being an intrinsic characteristic unique to an individual (Grable, 2016:28). The predisposing biopsychosocial factors are considered to be endogenous and intrinsic characteristics or personality features over which an individual has little or no control (Grable & Joo, 2004:82). On the other hand, environmental factors may affect financial decisions caused by influences from the social environment. Therefore, Irwin (1993) asserted that the protective role of a supportive environment should be taken into consideration as it forms part of individuals' lives and assists to comprehend and determine risk tolerance behaviour.

As illustrated in Figure 2-2, the environmental factors correlate with the biopsychosocial factors and together these predisposing factors form the precipitating factors and subsequently, financial risk tolerance. Individuals are regularly exposed to precipitating factors before the assessment of and engagement in risky behaviours. Precipitating factors are aspects in the lives of individuals that have an impact on their risk assessment as it influences the decision-making process and bring about amendments in the risk tolerance levels of individuals before they partake in risky behaviours. Precipitating factors entail experience, knowledge, skills and standards, cognition, evaluation of subjective probabilities, financial satisfaction, as well as emotional responses and feelings (Grable, 2016:27).

In addition, Figure 2-3 illustrates a model that was developed by Kuzniak and Grable (2017:315) to establish the role that macroeconomic, predisposing (biopsychosocial and environmental) and social support factors play in shaping changes in financial risk tolerance. The model was developed by taking into account three frameworks of risk-taking, namely macroeconomic theory, the cushion hypothesis and the predisposing factors of Irwin's conceptual model developed in 1993.

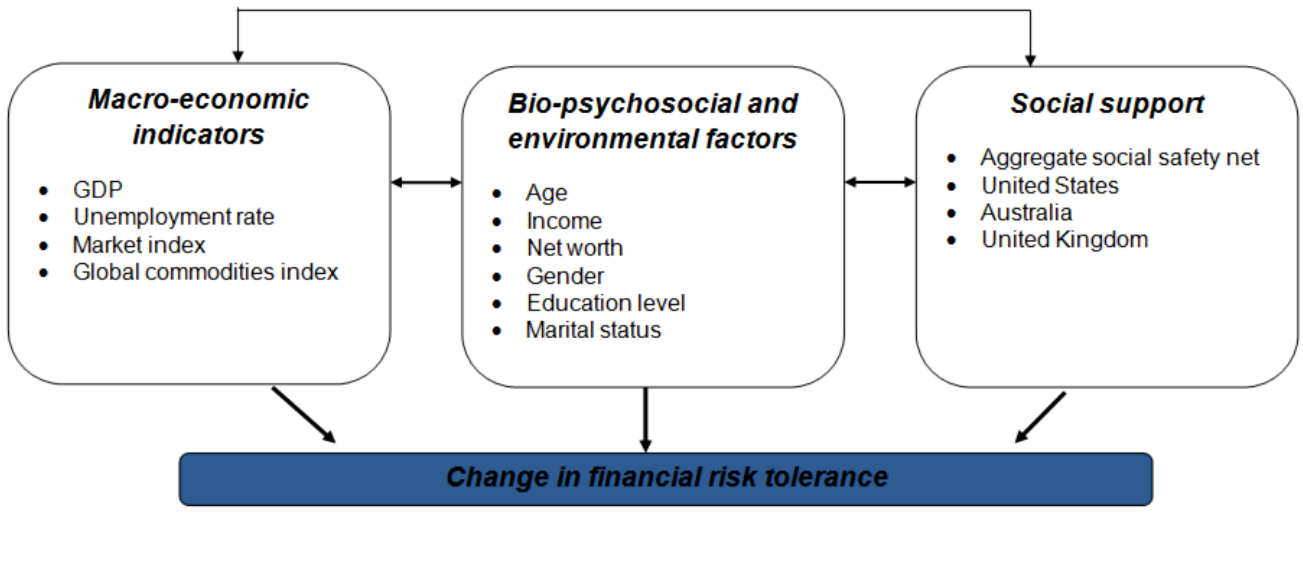

Figure 2-3: Financial risk tolerance model based on changes in financial risk tolerance
Source: Kuzniak and Grable (2017:317)

As shown in Figure 2-3, macroeconomic factors, such as a country's GDP, national unemployment rate, stock market conditions and global commodity prices were utilised to determine the influence of macroeconomic conditions on changes in financial risk tolerance. Macroeconomic factors may influence individuals' financial risk tolerance in two manners. Firstly, negative events may decrease financial capacity and consequently, individuals are less willing to take risks. Secondly, individuals' perceptions rather than the actual impact of macroeconomic conditions and events can affect their willingness to take risks (Kuzniak & Grable, 2017:315).

The second component of the model as illustrated in Figure 2-3, was derived from Irwin's (1993) conceptual model of financial risk tolerance, whereby the predisposing biopsychosocial and predisposing environmental factors were incorporated. This model included biopsychosocial factors, namely age and gender, while the environmental factors consisted of income, net worth, education and marital status. The third component included in the model is social support, which is derived from the cushion hypothesis. The cushion hypothesis states that individuals living in socialist cultures have greater support systems in general and as a result, lessens downside risk when making decisions (Hsee & Weber, 1999:167). Thus, theoretically, it is believed that as social support increases, individuals are willing to take more financial risks at household levels (Kuzniak & Grable, 2017:318). However, Statman (2008:41) asserted that individuals are likely to take risks to grow in life and regardless of low familial and national support in numerous countries; individuals are willing to take greater risks in the hope of attaining greater returns.

In the following subsections, the theoretical aspects of the endogenous factors (Section 2.5.1) and exogenous factors (Section 2.5.2) associated with investor risk tolerance behaviour will be explained.

2.5.1 Endogenous factors

Every individual investor behaves differently when it comes to taking financial risks and have their own levels of risk tolerance that are influenced by numerous endogenous factors, which are considered to be inherent characteristics or personality elements unique to individuals (Grable & Joo, 2004:83). In this study, endogenous factors, namely demographical factors, socio-cultural factors, the investor life cycle and behavioural finance biases are addressed. Demographical factors (Section 2.5.1.1) and socio-cultural factors (Section 2.5.1.2) are discussed in detail in the following subsections. However, the theoretical aspects of the investor life cycle and behavioural finance biases, as endogenous factors influencing risk tolerance behaviour when making investment decisions, are discussed comprehensively in Chapter 3.

2.5.1.1 Demographical factors

Several demographical factors are to be taken into consideration when examining its relation to financial risk tolerance (Sung & Hanna, 1996:11). Demographical factors, namely age (Section 2.5.1.1.1), gender (Section 2.5.1.1.2), ethnicity (Section 2.5.1.1.3), marital status (Section 2.5.1.1.4), employment status (Section 2.5.1.1.5), education (Section 2.5.1.1.6), income and wealth (Section 2.5.1.1.7), homeownership (Section 2.5.1.1.8), as well as household size and number of financial dependants (Section 2.5.1.1.9), and its relation to financial risk tolerance are addressed in this study and accordingly, discussed in the following subsections.

2.5.1.1.1 Age

Age is the most broadly examined demographical factor primarily presumed to be associated with financial risk tolerance (Grable *et al*., 2009:4). It is mainly believed that the willingness of individuals to partake in risky behaviours depends on their age (Kannadhasan, 2015:177). As asserted by Grable (1997:14), investment managers consider age to establish the residual period until the financial assets of individuals are compelled to achieve their goals and objectives, as well as to establish the abilities of individuals to recuperate financial losses.

Risk tolerance varies among individuals according to their age and it is mainly presumed that older individuals are less willing to take risks and engage in risky behaviours compared to younger individuals (Brown, 1990:893; Hawley & Fujii, 1993:197; Grable, 1997:14; Halek & Eisenhauer, 2001:20; Coleman, 2003:45; Grable *et al*., 2009:4; Larkin *et al.,* 2013:3; Brooks *et al.,* 2018:53).

Given that older individuals have less time to achieve their investment goals and objectives and to recuperate financial losses, they are considered to be less risk-tolerant than younger individuals (Grable, 1997:14; Grable & Lytton, 1999a:86). However, younger individuals have longer periods of time to accumulate and protect their capital and to recuperate financial losses (Grable, 1997:38; Kannadhasan, 2015:177).

Table 2-3 shows the findings of several research studies pertaining to the relationship between age and risk tolerance.

Table 2-3: Age and risk tolerance

Studies	Findings	Author(s)
International studies	Risk tolerance increases with age: a positive relationship	Wang and Hanna (1997:30); Grable (2000:628); Bommier and Rochet (2006:731); Summers *et al.* (2006:210); Al-Ajmi (2008:16); Van de Venter *et al*. (2012:799); Shah *et al.* (2020:220)
	Risk tolerance decreases with age: a negative relationship	Wallach and Kogan (1961:26); McInish (1982:125); Morin and Suarez (1983:1211); Brown (1990:893); Irwin (1993); Palsson (1996:772); Bajtelsmit and VanDerhei (1997:66); Grable (1997:38); Halek and Eisenhauer (2001:20); Coleman (2003:45); Hallahan *et.al.* (2003:495); Yao *et al*. (2004:259); Santacruz (2009:37); Yao *et al*. (2011:883); Larkin *et al.* (2013:3); Brooks *et al.* (2018:53)
	No significant relationship between age and risk tolerance	Sung and Hanna (1996:11); Grable and Joo (1999:53); Anbar and Eker (2010:504)
Studies within the South African context	Risk tolerance increases with age: a positive relationship	Dickason and Ferreira (2018b:96)
	Risk tolerance decreases with age: a negative relationship	Metherell (2011:28); Van Schalkwyk (2012:283); Mabalane (2015:102); Dickason and Ferreira (2018b:96); Van den Bergh (2018:175); Ferreira and Dickason-Koekemoer (2019:15)
	No significant relationship between age and risk tolerance	Strydom *et al.* (2009:19); Dickason (2017:217)

Source: Author compilation

Wallach and Kogan (1961:23) originally studied the relationship between age and risk tolerance, whereby choice dilemmas were utilised and indicated older individuals to be less risk-tolerant than younger individuals. As indicated in Table 2-3, most of the international published research studies

that investigated the relationship between age and risk tolerance found a negative relationship between age and risk tolerance, which indicates that risk tolerance decreases with age.

Conversely, as shown in Table 2-3, several international researchers found a positive relationship between age and risk tolerance, which indicates that risk tolerance increases with age. These findings are contrary to the investor life cycle theory as it is believed that the propensities of individual investors to take risks decline as they age (Bodie *et al*., 2010:698; Marx *et al.,* 2010:266). Sultana (2010:30) stated that even though younger individuals tend to be more risk-tolerant, higher risk levels do not always produce higher returns and therefore, eventually bring about lower levels of risk tolerance. Furthermore, as young individuals are presumed to be in the accumulation phase of the investor life cycle, they have a longer time horizon of more than 30 years till they reach retirement, which can lead to lower levels of risk tolerance for the reason that there is no immediate requirement to achieve excessive returns (Yao *et al*., 2011:879).

Table 2-3 also indicates that a number of researchers failed to support or found an insignificant relationship between age and risk tolerance. Grable and Joo (1999:55) asserted that age is an insignificant driver of risk tolerance when all other factors are controlled. Sung and Hanna (1996:14) also found an insignificant relationship between age and risk tolerance, but a relationship was established between risk tolerance and the number of years until retirement.

From a South African point of view, it is not apparent that many research studies have focused on investigating the relationship between age and risk tolerance. Nonetheless, Van Schalkwyk (2012:283) affirmed that younger individuals are more willing to take risks. In addition, Van den Bergh (2018:175) found that the subjective risk tolerance of individual investors specified that older individuals are less risk-tolerant than younger individuals. However, the similarities in the sample of age in the study performed by Strydom *et al.* (2009:19) brought about major limitations to the study. Dickason (2017:217) also did not find any significant relationship between age and risk tolerance. On the other hand, Dickason and Ferreira (2018b:96) found in their study, based on the regression results, that younger individuals have greater risk-taking propensities than older individuals. They also found, based on the cross-tabulation, that older individuals were more likely to take average risks, while the majority of young investors were not willing to take any risk or just average risks.

2.5.1.1.2 Gender

Gender, specifically being male or female, is greatly acknowledged and a studied factor in both financial and social science research. Gender, as a demographical factor, is generally assumed to affect risk tolerance (Grable, 2000:13). Slovic (1966:169) asserted that it is a universal belief that

males are compelled to and do take higher risks than females. Therefore, it is generally presumed that males have greater risk-taking propensities than females when making investment decisions (Grable & Lytton, 1999a:80; Grable *et al*., 2009:4). Roszkowski *et al.* (1993:225) reasoned that this is attributable to a personality trait that refers to males as adventure or sensation seekers.

Women are considered to be less risk-tolerant as they generally engage in less risky or aggressive behaviour and are more risk-averse in various facets of their lives (Eckel & Grossman, 2002:282). Van de Venter (2007:12) referred to two schools of thought providing reasons why females are considered to be less risk-tolerant than males. The first school of thought concentrates on objective limitations and has ascribed females' lower levels of risk tolerance to a lower level of personal investment in human capital. The second school of thought concentrates on subjective limitations and has ascribed females' lower levels of risk tolerance to a lack of confidence and the universal belief that females are more risk-averse and conservative than men when making investment decisions. Estes and Hosseini (1988:577) also affirmed that females have a lack of confidence when making investment decisions, after controlling for other factors, namely age, education, knowledge, experience and holdings in assets. Jianakoplos and Bernasek (1998:625) stated that females generally have less risky investment portfolios than males indicating that they are less likely to engage in risky behaviours.

Table 2-4 shows the findings of several research studies pertaining to the relationship between gender and risk tolerance. As indicated in Table 2-4, international published research studies primarily found that males are more risk-tolerant than females when making investment decisions.

Table 2-4: Gender and risk tolerance

Studies	Findings	Author(s)
International studies	Males are more risk-tolerant than females	Slovic (1966:169); Higbee and Lafferty (1972:249); Cohn *et al.* (1975:610); Blume (1978); Riley and Chow (1992:33); Irwin (1993); Hawley and Fujii (1993:199); Bajtelsmit and Bernasek (1996:7); Sung and Hanna (1996:11); Grable (1997:81); Powell and Ansic (1997:605); Bajtelsmit *et al*. (1999:8); Schubert *et al*. (1999:382); Grable (2000:629); Yip (2000:24); Halek and Eisenhauer (2001:21); Eckel and Grossman (2002:290); Hallanhan *et al*. (2003:498); Moreschi (2004:97); Yao *et al*. (2004:259); Ardehali *et al.* (2005:500); Nairn (2005:384); Schubert (2006:708); Grable and Roszkowzki (2007:801); Anbar and Eker (2010:514); Dohmen *et al.* (2011:549); Faff *et al.* (2011:115); Larkin *et al.* (2013:9); Sharma *et al.* (2017:67); Abdillah *et al.* (2019:131); Shah *et al.* (2020:231)

Studies	Findings	Author(s)
	No significant relationship between gender and risk tolerance	Hanna *et al.* (1998:10); Grable and Joo (1999:54)
Studies within the South African context	Males are more risk-tolerant than females	Antonites and Wordsworth (2009:80); Strydom *et al.* (2009:15); Metherell (2011:129); Van Schalkwyk (2012:285); Mabalane (2015:104); Dickason (2017:217); Dickason and Ferreira (2018b:97); Van den Bergh (2018:176); Dickason and Ferreira (2019:12999); Lawrenson (2020:177)

Source: Author compilation

In a study performed by Grable and Roszkowzki (2007:801), they established that males have greater risk-taking propensities than females and have a greater likelihood to overestimate their propensity for taking risks. Conversely, Hanna *et al*. (1998:11), as well as Grable and Joo (1999:54), did not find gender to be a significant driver of risk tolerance.

From a South African point of view, it is not apparent that many research studies have focused on examining the relationship between gender and risk tolerance. However, as shown in Table 2-4, a number of researchers found that males are more risk-tolerant than females when making investment decisions within a South African context (Antonites & Wordsworth, 2009:80; Strydom *et al.,* 2009:15; Metherell, 2011:129; Van Schalkwyk, 2012:285; Mabalane, 2015:104; Dickason, 2017:217; Dickason & Ferreira, 2018b:97; Van den Bergh, 2018:176; Dickason & Ferreira, 2019:12999; Lawrenson, 2020:177). To the knowledge of the researcher, no published research studies, both internationally and within the South African context, found females to be more risk-tolerant than males.

2.5.1.1.3 Ethnicity

Yao *et al.* (2005:53) asserted that ethnicity could be depictive of both cultural influences and restrictions to access financial markets. Different cultural principles, preferences and experiences may influence the risk tolerance of White and non-White individuals (Zhong & Xiao, 1995:107; Sung & Hanna, 1996:12). Whites and non-Whites have different perceptions as a result of differences in their available choices and cultural belief systems utilised to guide their choices (Nobles, 1978:680).

The main consensus in research infers that Whites generally consist of greater risk-taking propensities than non-Whites (Grable, 1997:15). This may be because Whites have greater admittance to financial institutions, a greater tendency to concentrate on the future, better

investment opportunities and greater self-belief in their analytical and decision-making skills (MacCrimmon & Wehrung, 1986; Zhong & Xiao, 1995:107; Grable, 1997:15).

Table 2-5 illustrates the findings of several research studies that have been conducted to examine the relationship between ethnicity and risk tolerance.

Table 2-5: Ethnicity and risk tolerance

Studies	Findings	Author(s)
International studies	Whites are more risk-tolerant than non-Whites	Lefcourt (1965:767); Hawley and Fujii (1993:199); Irwin (1993); Haliassos and Bertaut (1995:1119); Zhong and Xiao (1995:109); Sung and Hanna (1996:14); Grable (1997:84); Bajtelsmith *et al.* (1999:4); Gutter *et al.* (1999:161); Plath and Stevenson (2000:344); Coleman (2003:43); Yao *et al.* (2005:56); Brown (2007:402)
	Non-Whites are more risk-tolerant than Whites	Leigh (1986:29); Barsky *et al.* (1997:550); Grable and Joo (1999:58); Halek and Eisenhauer (2001:13)
Studies within the South African context	Non-Whites are more risk-tolerant than Whites	Strydom *et al.* (2009:17); Van Schalkwyk (2012:286); Dickason (2017:165); Dickason and Ferreira (2018c:10851); Van den Bergh (2018:176)

Source: Author compilation

The first researcher, Lefourt (1965:767), that investigated the relationship between ethnicity and risk tolerance using a sample of 30 White individuals and 30 African individuals, affirmed that White individuals have greater risk-taking propensities than African individuals. With reference to Table 2-5, international published research studies primarily found that Whites have greater risk-taking propensities than non-Whites when making investment decisions.

Haliassos and Bertaut (1995:1119) asserted that Whites have a greater propensity to hold shares than non-Whites. Moreover, researchers such as Zhong and Xiao (1995:109); Bajtelsmith *et al.* (1999:4); Gutter *et al.* (1999:161); Plath and Stevenson (2000:344) and Brown (2007:402) that examined the asset allocations in the investment portfolios of individuals found that Whites have a greater inclination towards risky assets compared to non-Whites. Studies that employed subjective risk tolerance measures established that non-Whites have lower levels of risk tolerance than Whites (Irwin, 1993; Sung & Hanna, 1996:14; Coleman, 2003:43).

On the contrary, Yao *et al.* (2005:53) found that non-Whites, namely Hispanics and Africans, have smaller propensities to take some financial risk, but greater propensities to take substantial financial risks compared to Whites. However, for the high-risk category, Whites are found to be

more willing to take risks than Hispanics and Africans. Researchers such as Leigh (1986:29); Barsky *et al.* (1997:550); Grable and Joo (1999:58), as well as Halek and Eisenhauer (2001:13), established that non-Whites, such as Africans, Native Americans, Asians and Hispanics, were believed to be considerably more risk-tolerant than Whites.

As seen in Table 2-5, only a few research studies have examined the relationship between ethnicity and risk tolerance within the South African context. It was established by Van Schalkwyk (2012:286) that the willingness of African individuals to endure high levels of risk is greater than that of White, Coloured and Indian individuals. Dickason (2017:165) also established that African individuals are more risk-tolerant than White, Coloured and Asian individuals. In the study of Van den Bergh (2018:176) it is inferred that African individuals have the highest risk tolerance levels followed by Asian, White and Coloured individuals.

2.5.1.1.4 Marital status

Grable (1997:14) asserted that marital status is an important factor to determine individual investors' level of risk tolerance. The main consensus among researchers is that single individuals who have never been married are considered to be more risk-tolerant than married individuals (Yao & Hanna, 2005:85). This is because single individuals have less to lose when taking on greater risks as they have fewer responsibilities towards themselves and especially towards dependants compared to married individuals. Single individuals also have less social risk (probable loss of self-esteem from the perspective of social groups and peers) when undertaking risky investments compared to married individuals. Married individuals are more susceptible to social risk, for instance, if an investment choice results in an increased risk of loss and negative outcomes (Roszkowski *et al.,* 1993:225; Grable, 1997:4; Grable & Joo, 2004:74). Ardehali *et al.* (2005:501) stated that married individuals may believe that a monetary loss, as a result of a financial decision, can have a negative impact on their family and relationships and therefore, will be likely to take fewer risks or avoid risks.

Table 2-6 illustrates the findings of several research studies that have been conducted to examine the relationship between marital status and risk tolerance.

Table 2-6: Marital status and risk tolerance

Studies	Findings	Author(s)
International studies	Married individuals are more risk-tolerant	Masters (1989:151); Mugenda *et al.* (1991:142); Hawley and Fujii (1993:200); Grable (1997:82); Grable (2000:625); Schooley and Worden (2016:274)
	Single individuals are more risk-tolerant	Baker and Haslem (1974:469); Lee and Hanna (1991:139); Irwin (1993); Roszkowski *et al.* (1993:225); Lazzarone (1996:70); Sung and Hanna (1996:15); Grable and Joo (2004:82); Hallanhan *et al*. (2004:58); Yao *et al*. (2004:259); Ardehali *et al.* (2005:501); Yao and Hanna (2005:85); Fan and Xiao (2006:73); Grable and Roszkowski (2007:797); Faff *et al.* (2011:114)
	No significant relationship between marital status and risk tolerance	McInish (1982:127); Haliassos and Bertaut (1995:1121); Grable and Joo (1999:58); Hallahan *et al.* (2003:499); Anbar and Eker (2010:515); Larkin *et al.* (2013:10)
Studies within the South African context	Single individuals are more risk-tolerant	Van den Bergh (2018:176)
	Never married individuals are more risk-tolerant than married and no longer married individuals	Dickason and Ferreira (2019:12999)
	No significant relationship between marital status and risk tolerance	Antonites and Wordsworth (2009:82); Strydom *et al.* (2009:19); Mabalane (2015:105); Dickason (2017:177)

Source: Author compilation

As illustrated in Table 2-6, the majority of international published research studies primarily found single individuals to have greater risk-taking propensities than married individuals when making investment decisions. Chaulk *et al*. (2003:279) theorised that the risk tolerance levels of married individuals decline because of a leading desire to preserve capital intended for the future when responsibilities towards financial obligations and dependants increase. Grable *et al.* (2009:9) established that married individuals have a tendency to underestimate their abilities to tolerate financial risks. Consequently, married individuals may misconstrue household and macroeconomic events that may bring about financial losses.

On the contrary, it is asserted that married individuals have greater propensities to tolerate risks as they have better abilities to recover from negative outcomes (Hallahan *et al.,* 2003:484). This is supported by research and shown in Table 2-6, as there are several international published

research studies that found married individuals to have greater risk-taking propensities than single individuals when making investment decisions. Additional studies also considered the effect of marital status and gender on financial risk tolerance. Yao and Hanna (2005:70) found that single females have lower risk tolerance levels than married females, married males and lastly, single males. In addition, as shown in Table 2-6, a few international researchers did not find any significant relationship between marital status and risk tolerance.

With reference to Table 2-6, few research studies have been conducted to examine the relationship between marital status and risk tolerance from a South African standpoint. Van Schalkwyk (2012:289) established that widowed/divorced females, married females, single females, widowed/divorced males and married males, respectively, are less willing to tolerate risks compared to single males. Van den Bergh (2018:176) found that the subjective risk tolerance of individual investors specified that single individuals have greater risk-taking propensities compared to married and previously married individuals. Dickason and Ferreira (2019:12999) found individuals that have never been married to be more risk-tolerant than married and no longer married individuals. Strydom *et al.* (2009:19); Mabalane (2015:105) and Dickason (2017:217) did not find any significant relationship between marital status and risk tolerance.

2.5.1.1.5 Employment status

Employment status is also believed to affect risk tolerance. It is mainly believed that individuals who are employed are more likely to engage in risky behaviours than individuals who are unemployed since employed individuals have higher income levels (Irwin, 1993; Larkin *et al*., 2013:5).

Table 2-7 demonstrates the findings of several research studies that have been conducted to examine the relationship between employment status and risk tolerance.

Table 2-7: Employment status and risk tolerance

Studies	Findings	Author(s)
International studies	Employed individuals are more risk-tolerant than unemployed individuals	Irwin (1993); Anbar and Eker (2010:515)
	Salaried employed individuals are more risk-tolerant	Halek and Eisenhauer (2001:13); Schooley and Worden (2016:274)
	Self-employed individuals/entrepreneurs are more risk-tolerant	Meyer *et al.* (1961:571); MacCrimmon and Wehrung (1986); Masters (1989:153); Leonard (1995:91); Sung and Hanna (1996:15); Grable (1997:38); Stewart and Roth (2001:149); Hartog *et al.* (2002:22); Yao

Studies	Findings	Author(s)
		et al. (2004:259); Colombier *et al.* (2008:793)
Studies within the South African context	Employed individuals are more risk-tolerant than unemployed individuals	Antonites and Wordsworth (2009:82)
	Self-employed individuals/entrepreneurs are more risk-tolerant	Antonites and Wordsworth (2009:82)

Source: Author compilation

As shown in Table 2-7, international researchers such as Irwin (1993), as well as Anbar and Eker (2010:515), established that employed individuals have higher levels of risk tolerance than unemployed individuals. Table 2-7 further indicates that most international published research studies affirmed that entrepreneurs or self-employed individuals have higher levels of risk tolerance than salaried employed and unemployed individuals. Stewart and Roth (2001:149) asserted that self-employed individuals also have a high preference for liquidity. Conversely, Halek and Eisenhauer (2001:13), as well as Schooley and Worden (2016:274), found self-employed and unemployed individuals to be less risk-tolerant than salaried employed individuals. Masters (1989:153) affirmed that professional and retired individuals are more willing to partake in risky behaviours than non-professional individuals. This is not because non-professional individuals have less capital to invest, but they may employ different approaches when making investment decisions. Furthermore, Faff *et al.* (2011:116) asserted that the relationship between employment status and risk tolerance may also be associated with a possible non-linear relationship between wealth and risk tolerance.

From a South African perspective, Antonites and Wordsworth (2009:82) found entrepreneurs to have higher risk tolerance levels than full-time employed, part-time employed or unemployed individuals.

2.5.1.1.6 Education

Education is considered to be a factor that influences the risk tolerance of individual investors (Grable, 2016:25). It is generally believed that education is positively related to risk tolerance and that higher accomplished levels of education are believed to increase individuals' abilities to evaluate and tolerate risks (Grable, 1997:15). MacCrimmon and Wehrung (1986) stated that individuals with higher educational levels are more encouraged to take greater risks.

Table 2-8 shows the findings of several research studies that have been conducted to examine the relationship between education and risk tolerance.

Table 2-8: Education and risk tolerance

Studies	Findings	Author(s)
International studies	Individuals with higher educational levels are more risk-tolerant	Hammond *et al.* (1967:406); Baker and Haslem (1974:476); MacCrimmon and Wehrung (1986); Masters (1989:154); Lee and Hanna (1991:138); Hawley and Fujii (1993:197); Irwin (1993); Haliassos and Bertaut (1995:1110); Zhong and Xiao (1995:113); Shaw (1996:642); Sung and Hanna (1996:14); Grable (1997:85); Grable and Joo (1999:58); Grable and Lytton (1999a:86); Grable and Lytton (1999b:169); Grable (2000:628); Halek and Eisenhauer (2001:15); Chang *et al.* (2004:53); Grable and Joo (2004:82); Hallahan *et al.* (2004:59); Yao *et al*. (2004:259); Fan and Xiao (2006:74); Al-Ajmi (2008:17); Grable (2008:17); Gilliam and Chatterjee (2011:48); Larkin *et al.* (2013:9); Kannadhasan (2015:181); Schooley and Worden (2016:274); Sharma *et al.* (2017:67); Shah *et al.* (2020:220)
	No significant relationship between education and risk tolerance	Hallahan *et al.* (2003:499)
Studies within the South African context	Individuals with higher educational levels are more risk-tolerant	Van Schalkwyk (2012:294); Mabalane (2015:106); Ferreira and Dickason-Koekemoer (2019:15)
	Individuals with lower educational levels are more risk-tolerant	Lawrenson (2020:178)
	No significant relationship between education and risk tolerance	Metherell (2011:131)

Source: Author compilation

As indicated in Table 2-8, the majority of international published research studies primarily found individuals with higher levels of education to be more risk-tolerant when making investment decisions than individuals with less education. It is concluded that higher educated individuals have greater proficiencies to evaluate risks than less educated individuals (Grable, 1997:15). More specifically, Halek and Eisenhauer (2001:22), as well as Grable (2016:25), found that individuals with a bachelor's degree or higher are assumed to be the most risk-tolerant, while individuals with a high school diploma or less are assumed to be the least risk-tolerant. Cole and Shastry (2009:2) affirmed that individuals with an academic qualification in finance do not necessarily tolerate more risks than individuals with academic qualifications in other fields of study.

As shown in Table 2-8, it is not evident that many research studies have focused on examining the relationship between education and risk tolerance from a South African standpoint. Van Schalkwyk (2012:294) affirmed that South African individuals with bachelors, honours, masters or doctoral degrees are more willing to tolerate risks than South African individuals with lower educational levels, such as Grade 12 or diplomas. On the other hand, Lawrenson (2020:178) found that individuals with lower educational levels (Grade 12 or diplomas) are more willing to tolerate risks than individuals with higher educational levels (undergraduate or postgraduate degrees). However, the majority of the sample consisted of investors with lower levels of education.

2.5.1.1.7 Income and wealth

Income and wealth, which are considered to be two interconnected components, are believed to have a positive relationship with risk tolerance. Therefore, individuals who have higher levels of income and wealth are assumed to be more risk-tolerant than individuals with lower levels of income and wealth (Massol & Molines, 2015:13). According to Kannadhasan (2015:178), individuals generally aspire to invest a portion of their income to increase their wealth. O'Neil (1996:4) asserted that individuals who have higher income levels have sufficient resources to meet required obligations and have better abilities to take risks as they invest their excess capital. Irwin (1993) also affirmed that individuals who receive a stable and predictable income have a greater propensity to tolerate risks than individuals that have variability in their income.

Table 2-9 and Table 2-10 demonstrates the findings of several research studies that have been conducted to examine the relationship between income and risk tolerance, as well as wealth and risk tolerance. Most published research studies primarily found that individuals with higher levels of income and wealth are more risk-tolerant when making investment decisions than individuals with lower levels of income and wealth.

Table 2-9: Income and risk tolerance

Studies	Findings	Author(s)
International studies	Higher income individuals are more risk-tolerant	Friedman (1974:210); Cohn *et al.* (1975:614); Blume (1978); MacCrimmon and Wehrung (1986); Riley and Chow (1992:33); Hawley and Fujii (1993:200); Irwin (1993); Schooley and Worden (1996:95); Shaw (1996:627); Sung and Hanna (1996:13); Grable (1997:83); Grable and Lytton (1999a:85); Grable and Lytton (1999b:172); Grable (2000:628);Yip (2000:25); Grable and Lytton (2001:50); Hartog *et al.* (2002:23); Chaulk *et al*. (2003:277); Chang *et al.* (2004:58); Grable and Joo (2004:82); Grable *et al.* (2004:145);

Studies	Findings	Author(s)
		Hallahan *et al.* (2004:61); Yao *et al*. (2004:259); Ardehali *et al.* (2005:509); Nairn (2005:385); Fan and Xiao (2006:72); Al-Ajmi (2008:21); Sages and Grable (2010:63); Gibson *et al.* (2013:45); Sharma *et al.* (2017:68); Shah *et al.* (2020:232)
	No significant relationship between income and risk tolerance	Samuelson (1969:239); Schoemaker (1980); Kannadhasan (2015:181)
Studies within the South African context	Higher income individuals are more risk-tolerant	Van Schalkwyk (2012:290); Mabalane (2015:106); Dickason (2017:217); Van den Bergh (2018:177); Ferreira and Dickason-Koekemoer (2019:15)
	No significant relationship between income and risk tolerance	Strydom *et al.* (2009:19)

Source: Author compilation

As indicated in Table 2-9, international published research studies primarily found that individuals with higher income levels are more risk-tolerant than individuals with lower income levels. Hallahan *et al.* (2003:485) established that there is a concave relationship between income and risk tolerance, specifying that risk tolerance has a tendency to rise up to the highest income level and subsequently, falls. Massol and Molines (2015:13) stated that individuals with high-income levels are more exposed to the risk of experiencing a loss due to higher risks taken in investments. However, international researchers such as Samuelson (1969:239), Schoemaker (1980) and Kannadhasan (2015:181) found no significant relationship between income and risk tolerance.

Only a small number of research studies studied the relationship between income and risk tolerance from a South African standpoint. As seen in Table 2-9, most researchers within the South African context found a positive relationship between income and risk tolerance, indicating that individual investors with higher levels of income have a greater propensity to take higher risks than individuals with lower income levels. It is affirmed by Van den Bergh (2018:177) that the perception and attitudes of South African individual investors towards risk signify that the more income they earn on an annual basis, the greater their propensity for taking higher risks. Strydom *et al.* (2009:19) found an insignificant relationship between income and risk tolerance, but it may be as a result of the lack of data.

Table 2-10: Wealth and risk tolerance

Studies	Findings	Author(s)
International	Wealthier individuals are	Cohn *et al.* (1975:614); Lee and Hanna (1991:136); Riley and Chow (1992:33); Irwin

Studies	Findings	Author(s)
studies	more risk-tolerant	(1993); Shaw (1996:647); Sung and Hanna (1996:13); Grable and Lytton (1999a:85); Grable and Lytton (1999b:172); Grable and Lytton (2001:50); Hartog *et al.* (2002:23); Chaulk *et al*. (2003:277); Chang *et al.* (2004:58); Grable and Joo (2004:82); Grable *et al.* (2004:145); Yao *et al*. (2004:259); Fan and Xiao (2006:72); Al-Ajmi (2008:21); Sages and Grable (2010:63); Griesdorn *et al.* (2014:38); Sharma *et al.* (2017:68)
	Wealthier individuals are less risk-tolerant	Hawley and Fujii (1993:197); Hallahan *et al.* (2003:499)
Studies within the South African context	Wealthier individuals are more risk-tolerant	Mabalane (2015:107)

Source: Author compilation

As shown in Table 2-10, most international published research studies primarily found that wealthier individuals are more risk-tolerant than less wealthy individuals. Cohn *et al.* (1975:614) asserted that when there is an increase in the wealth of individual investors, they also have a greater propensity to invest in riskier assets. Conversely, Hawley and Fujji (1993:197) affirmed that there is a negative relationship between wealth and risk tolerance. Hallahan *et al.* (2003:499) found that very wealthy individuals are more cautious when investing, as they are more concerned with protecting their wealth, rather than increasing their wealth. From a South African perspective, Mabalane (2015:107) found wealth to be related to income and also found wealth to be positively related to risk tolerance.

2.5.1.1.8 Homeownership

Homeownership is a less frequently studied factor presumed to have an effect on risk tolerance and therefore, has a low level of support in literature (Irwin, 1993; Grable, 2016:25).

Table 2-11 shows the findings of several research studies that have been conducted to examine the relationship between homeownership and risk tolerance.

Table 2-11: Homeownership and risk tolerance

Studies	Findings	Author(s)
International studies	Homeowners are more risk-tolerant	Irwin (1993); Sung and Hanna (1996:17); Olweny *et al.* (2013:142)

Studies	Findings	Author(s)
	Homeowners are less risk-tolerant	Grable and Joo (1999:56); Yang (2004:37); Larkin *et al.* (2013:10)
	No significant relationship between homeownership and risk tolerance	Grable and Joo (2004:82); Yao *et al.* (2004:259)
Studies within the South African context	No significant relationship between homeownership and risk tolerance	Antonites and Wordsworth (2009:82)

Source: Author compilation

Table 2-11 illustrates that international researchers, namely Irwin (1993); Sung and Hanna (1996:17), as well as Olweny *et al.* (2013:142), found homeowners to be more risk-tolerant than non-homeowners. Sung and Hanna (1996:17) affirmed that homeowners with mortgages are more risk-tolerant than homeowners without mortgages and individuals renting homes. However, there is no significant difference among the housing groups when other variables, such as years to retirement are taken into consideration. Olweny *et al.* (2013:146) asserted that when homeowners acquired their homes, they already invested in a risky investment, and therefore, they will be more willing to tolerate risks in other investments than non-homeowners. Homeowners are also likely to have taken out mortgages or loans with the uncertainty of interest rates and therefore, such individuals are willing to take higher risks with the anticipation of higher returns.

On the other hand, with reference to Table 2-11, Grable and Joo (1999:56); Yang (2004:37), as well as Larkin *et al.* (2013:10), found a negative relationship between homeownership and risk tolerance, indicating that individuals' risk tolerance decline when they acquire homes. Grable and Joo (2004:82), as well as Yao *et al.* (2004:259), did not establish any significant relationship between homeownership and risk tolerance. From a South African perspective, Antonites and Wordsworth (2009:82) examined the relationship between homeownership and risk tolerance, but the relationship was found to be insignificant.

2.5.1.1.9 Household size and number of financial dependants

Household size and the number of financial dependants are also considered to be demographic factors that influence risk tolerance. It is generally believed that there is a negative relationship between household size or the number of financial dependants and risk tolerance, indicating that risk tolerance declines when the household size or the number of financial dependants increases (Van Schalkwyk, 2012:32).

Table 2-12 shows the findings of international research studies that have been conducted to examine the relationship between household size and risk tolerance.

Table 2-12: Household size and risk tolerance

Studies	Findings	Author(s)
International studies	Large households are more risk-tolerant	Irwin (1993)
	Large households are less risk-tolerant	Sung and Hanna (1996:15); Kuzniak and Grable (2017:320)

Source: Author compilation

As shown in Table 2-12, it is noticeable that household size is a less widely studied factor. Irwin (1993) asserted that large households are presumed to be more risk-tolerant than smaller households. On the contrary, Sung and Hanna (1996:15) stated when all other variables were controlled, no significant differences were found among different household sizes. However, the actual level of risk tolerance was lower for households with five individuals than for households with less than five individuals. Kuzniak and Grable (2017:320) stated that large households are likely to be less risk-tolerant due to the scantiness of risk capacity or a tendency to be conservative with household resources. From a South African perspective, no published research studies were found to examine the relationship between household size and risk tolerance.

Table 2-13 shows the findings of research studies that have been conducted to examine the relationship between the number of financial dependants and risk tolerance.

Table 2-13: Number of financial dependants and risk tolerance

Studies	Findings	Author(s)
International studies	Individuals with more financial dependants are less risk-tolerant	Jianakoplos and Bernasek (1998:628); Grable and Joo (1999:56)
	No significant relationship between the number of financial dependants and risk tolerance	Hallahan *et al.* (2003:498); Anbar and Eker (2010:515)
Studies within the South African context	No significant relationship between the number of financial dependants and risk tolerance	Antonites and Wordsworth (2009:81); Mabalane (2015:103)

Source: Author compilation

As indicated in Table 2-13, it is also noticeable that few studies have examined the relationship between the number of financial dependants and risk tolerance. Jianakoplos and Bernasek (1998:628), as well as Grable and Joo (1999:56), stated that there is a negative relationship

between the number of financial dependants and risk tolerance. Individuals with more financial dependants were found to be less risk-tolerant than individuals with no financial dependants. Hallahan *et al.* (2003:498), as well as Anbar and Eker (2010:515), did not find any significant relationship between the number of financial dependants and risk tolerance. Antonites and Wordsworth (2009:81), as well as Mabalane (2015:103), also found no significant relationship between the number of financial dependants and risk tolerance from a South African point of view.

2.5.1.2 Socio-cultural factors

Socio-cultural factors, namely religion (Section 2.5.1.2.1), financial and investment knowledge (Section 2.5.1.2.2), as well as health status (Section 2.5.1.2.3), and its relation to financial risk tolerance are attended to in this study and accordingly, discussed in the following subsections.

2.5.1.2.1 Religion

Religion is also a less frequently studied factor presumed to affect risk tolerance. Two main factors, namely religiosity and religious affiliation, should be taken into consideration when examining religion. Religiosity relates to the differences between religious and non-religious individuals, whereas religious affiliation relates to the differences between various religions (Van Dorresteijn, 2017:25).

Table 2-14 shows the findings of international research studies that have been conducted to examine the relationship between religiosity and risk tolerance.

Table 2-14: Religiosity and risk tolerance

Studies	Findings	Author(s)
International studies	Non-religious individuals are more risk-tolerant than religious individuals	Irwin (1993); Miller (2000:17); Hilary and Hui (2003:470); Dohmen *et al.* (2011:545); Noussair *et al.* (2013:167); Mansour and Jlassi (2014:146)

Source: Author compilation

As shown in Table 2-14, international published research studies that investigated the relationship between religiosity and risk tolerance, primarily found non-religious individuals to be more risk-tolerant than religious individuals. Mansour and Jlassi (2014:146) asserted that religious individuals are mainly found to be less risk-tolerant because they are believed to have higher trust levels. Hilary and Hui (2003:471) stated that religious individuals' willingness to tolerate less risk is driven by the social aspects of church memberships and not directly by religious beliefs. According to Noussair *et al.* (2013:172), the risk tolerance of religious individuals is influenced by other church members' risk aversion or individuals that are risk-averse are enticed to religious organisations.

From a South African perspective, no published research studies were found to study the relationship between religiosity and risk tolerance.

Table 2-15 demonstrates the findings of research studies that have been conducted to examine the relationship between religious affiliation and risk tolerance.

Table 2-15: Religious affiliation and risk tolerance

Studies	Findings	Author(s)
International studies	Jews are the most risk-tolerant followed by Catholics, while Protestants are the least risk-tolerant.	Barsky *et al*. (1997:537)
	Christians are more risk-tolerant than Muslims.	Miller (2000:6)
	Catholics and Jews are less risk-tolerant than individuals of other religions.	Halek and Eisenhauer (2001:19)
Studies within the South African context	Hindus followed by Muslims are more risk-tolerant than Christians.	Strydom *et al.* (2009:18)

Source: Author compilation

As indicated in Table 2-15, the discrepancies in the risk tolerance levels of individuals from various religious affiliations can be ascribed to the differences in religious teachings on the subject of gambling. For instance, gambling is regarded as sinful and is opposed by Protestants and Muslims. On the other hand, Catholics make use of the game of chance for fundraising at church events and are, therefore, less opposed to gambling and support moderate levels of gambling (Ozment, 1991; Ellison & Nybroten, 1999:356; Strydom *et al.,* 2009:4; Massol & Molines, 2015:14).

2.5.1.2.2 Financial and investment knowledge

Financial and investment knowledge is considered to be an important determinant of risk tolerance. It is mainly asserted that individuals who are more knowledgeable concerning finances and investments are likely to be more risk-tolerant than less knowledgeable individuals (Grable & Joo, 1999:53).

Table 2-16 shows the findings of several research studies that have been conducted to examine the relationship between financial/investment knowledge and risk tolerance.

Table 2-16: Financial/investment knowledge and risk tolerance

Studies	Findings	Author(s)
International	Individuals with high	Masters (1989:154); Snelbecker *et al.* (1990:392);

Studies	Findings	Author(s)
studies	financial/investment knowledge are more risk-tolerant	Irwin (1993); Cutler (1995:35); Haliassos and Bertaut (1995:1127); Grable and Joo (1997:20); Grable and Lytton (1997:186); Grable and Joo (1999:55); Grable (2000:628); Grable and Joo (2004:82); Jacobs-Lawson and Hershey (2005:338); Sages and Grable (2010:63); Griesdorn *et al.* (2014:36); Marinelli *et al.* (2017:228)
Studies within the South African context	Individuals with high financial/investment knowledge are more risk-tolerant	Antonites and Wordsworth (2009:82); Van Schalkwyk (2012:295)

Source: Author compilation

As indicated in Table 2-16, both international and national published research studies primarily established that individuals with higher financial and investment knowledge are considered to be more risk-tolerant when making investment decisions than individuals with less financial and investment knowledge. Researchers, such as Cutler (1995:35); Haliassos and Bertaut (1995:1127), as well as Grable and Joo (1997:21), affirmed that individuals that have more financial and investment knowledge are likely to have a common psychological personality that enables them to tolerate higher levels of financial risks. Haliassos and Bertaut (1995:1128) further stated that individuals invest too conservatively because of a lack of financial and investment experience.

As indicated in Table 2-16, not many research studies within the South African context have concentrated on examining the relationship between financial/investment knowledge and risk tolerance. Antonites and Wordsworth (2009:82) asserted that individuals who reported their financial and investment knowledge as excellent or above-average have greater risk-taking propensities than individuals who reported their financial/investment knowledge as average or below average. Van Schalkwyk (2012:294) found that individuals with high financial and investment knowledge have significantly higher risk tolerance levels than individuals with average or low financial and investment knowledge. Besides, no international or national published research studies found individuals with less financial and investment knowledge to be more risk-tolerant than individuals with more financial and investment knowledge.

2.5.1.2.3 Health status

Health and its effect on risk tolerance are less frequently studied in academic literature and research studies. However, comprehending the influence of health on financial risk tolerance is

important in investment decision-making. Brooks *et al.* (2018:62) stated that it is an unfortunate reality of life that old age is generally associated with a greater probability of poor health. It is expected that individuals with poor health are more likely to encounter future medical expenses, a reduced possibility of employment, and the probability of a shorter life expectancy, all of which would be likely to lessen individuals' abilities to tolerate risks.

Table 2-17 illustrates the findings of several research studies that have been conducted to examine the relationship between health status and risk tolerance.

Table 2-17: Health and risk tolerance

Studies	Findings	Author(s)
International studies	Healthier individuals are more risk-tolerant	Yao *et al.* (2004:259); Yao *et al.* (2005:57); Hammit *et al.* (2009:117); Yao *et al.* (2011:885); Schurer (2015:492); Brooks *et al.* (2018:62)

Source: Author compilation

As indicated in Table 2-17, international published research studies that investigated the relationship between health status and risk tolerance, primarily found health to have a significant positive relationship with risk tolerance. Thus, indicating that healthier individuals are found to be more risk-tolerant. Schurer (2015:492) compared the life cycle patterns in the risk tolerance levels of individuals that were diagnosed with depression at least once in their life with healthy individuals. It was found that even though individuals that were diagnosed with depression are likely to report lower risk tolerance levels at any age, the divergence between healthy and less healthy individuals remains relatively stable over the life cycle. Yao *et al.* (2011:885) found that individuals with good health are more likely to take high and some financial risks. However, no significant difference was found in individuals' willingness to take high risks that have fair and poor health. Brooks *et al.* (2018:62) not only found healthier individuals to have higher risk tolerance levels, but also incorporated the influence of smoking in their study. The effect of smoking was found not to reduce individuals' expected investment term or risk tolerance levels. From a South African perspective, no published research studies were found to examine the relationship between health status and risk tolerance.

2.5.2 Exogenous factors pertaining to the external environment

Financial markets are typified by fluctuations and changes. Individual investors, financial planners and investment companies should be attentive to changes in the external environment and the effect these changes may have on investment decision-making. Having knowledge of the external environment will assist individual investors, financial planners and investment companies to draw on opportunities and to prepare for future challenges or threats (Rossini & Maree, 2015:45).

Exogenous factors pertaining to the external environment, namely political-legal (Section 2.5.2.1), technological (Section 2.5.2.2), tax implications (Section 2.5.2.3), macroeconomic factors (Section 2.5.2.4), international stock market and economic events (Section 2.5.2.5), as well as reactions to market fluctuations and volatility (Section 2.5.2.6), and its relation to financial risk tolerance are addressed in this study and accordingly, discussed in the following subsections. However, few international and national published research studies have examined exogenous factors pertaining to the external environment and its influence on individual investors' risk tolerance behaviour.

2.5.2.1 Political-legal factors

It is imperative for individual investors and financial practitioners to take political-legal factors into consideration as it should not be ignored or underestimated. Political-legal risks are taking on new and different shapes (Rossini & Maree, 2015:46). Governments are confronted with income inequalities and high levels of sovereign debt in advanced economies. The effective management of political-legal events and risks will enable individual investors and financial practitioners to enter and navigate new markets. Political-legal events cannot be shunned away from, however, it can be managed (Culp, 2012:1).

Generally, investment companies adjust their investment strategies according to the current political-legal events at that particular point in time. De Kock (2014:4) stated that politics and elections are of less importance and have less impact on financial markets over the long term. Since the first South African democratic elections in April 1994, elections were found to have little impact on the financial markets. De Kock (2014:4) further asserted that elections are argued to be predictable political events. However, it is the unpredictable political events that are more likely to have major impacts on the financial markets.

Antelme (2018b:7) stated that the highly unequal distribution of land ownership in South Africa is broadly acknowledged as a main inheritance of the past and that directly led to more extensive problems of wealth, power concentration, and embedded rural poverty. All through history and across the world, individuals' attachment to the land is directly related to their cultural characteristics, as well as economic situations, and is often filled with periods of turmoil. In South Africa, the government's approach to the expropriation of land without compensation is complicated by the colonial and apartheid history (Antelme, 2018b:6). The land reform in South Africa requires strong leadership, clear principles, as well as competent and steady implementation with accountability. However, due to the lack of these above-mentioned aspects, land restoration is highly improbable. In many circumstances, financial agreements are the only manner to compensate individuals and this compensation can only come from the government. The

implementation of land reform also requires respect and sensitivity among South African individuals of diverse backgrounds to reach mutual understandings (Antelme, 2018b:8).

Globally, the general worldwide consensus was that the UK would not vote to exit the European Union (EU). The UK's referendum vote on 24 June 2016 to exit the EU was a surprise to the world. The decision and its effect with regard to the movements in the currencies and equity markets were instantaneous and brutal (Chester, 2016:6). This event brought about new complexities into the global political environment and economic outlook (Antelme, 2018a:13). The global political environment has also changed significantly since the GFC and subsequently, there has been rising support for political parties on the extremes of the political continuum (Antelme, 2016:4).

De Kock (2014:5) asserted that certain political-legal events have an impact on the financial markets over the short term. However, individual investors should focus on and remain with their long-term investment goals and investment decisions. Financial markets are full of uncertainty and unusual and unpredictable political-legal events will occur at times. Individual investors and financial planners should have the knowledge to remain calm and make rational investment decisions during times of uncertain political-legal circumstances (Chester, 2016:7).

No international or national published research studies were found to examine the relationship between political-legal factors and risk tolerance. Therefore, the examination of political-legal factors and its influence on individual investor risk tolerance behaviour will contribute significantly to the financial and investment research fields and the financial industry.

2.5.2.2 Technological factors

Rossini and Maree (2015:49) emphasised that the financial industry has changed since 2010 as technological advances have been at the heart of the financial industry and imperative for financial companies to exceed and improve client services. The rise and the increasing importance of technology will be the most competitive trend in the financial industry. Technological advances will allow financial advice to be presented more strategically and in a professional and compliant manner. Technology offers new enhanced communication and distribution channels between financial planners and individual investors and enables financial planners to obtain more insight into their clients' needs and preferences. Technology further allows investors to access investment information through a number of channels, for example, mobile devices, computers and televisions, whereby they remain informed with the most recent news in the financial markets (Rossini & Maree, 2015:50).

Pertaining to the development of robo-advisers, the automated online investment adviser services are set to disrupt the financial industry in manners that financial planners have never considered.

Robo-adviser services vary from online investing services to subscription services and offer a combination of human and online services that provide financial services, together with investing services (Rossini & Maree, 2015:51). The main facet of most robo-adviser services is that they offer low costs, with some platforms offering free services or charging a fraction of the costs asked by financial planners. However, robo-advisers have the challenge to earn investors' trust and faithfulness over the long term (Rossini & Maree, 2015:52).

According to Rossini and Maree (2015:53), younger investors find robo-adviser services more appealing and are more likely to trust online platforms and invest with them. In a recent study, Woodyard and Grable (2018:56) examined the characteristics of American investors who exclusively make use of robo-adviser services and how they are different from American investors who exclusively make use of financial planners. It was found in the study that younger investors that have more confidence in their abilities to manage their financial matters find robo-adviser services more appealing. Investors that rely on robo-adviser services have significant levels of subjective financial knowledge and market confidence.

Interestingly, Woodyard and Grable (2018:64) also established that certain individuals are less likely to rely on financial planners due to perceived fraud in the financial industry or past negative experiences, either directly or indirectly through a relative or acquaintance, with a financial professional. As a result, individual investors' confidence in their abilities and the assistance of highly sophisticated tools make robo-adviser services more attractive. Woodyard and Grable (2018:65) affirmed that the distinction between individuals' confidence in their abilities to manage their own financial matters and overconfidence, pertaining to objective financial knowledge, holds implications for individual investors making use of robo-adviser services. As younger investors may be looking for high-quality advice and guidance in the financial industry, traditional financial planners may be faced with the challenge to improve their quality of advice and provide value-added services.

In another study by Van de Venter *et al.* (2012:799), they examined if individuals' financial risk tolerance will increase if they terminate their services with financial planners. Thus, a positive relationship was found indicating that individuals who terminated their services with financial planners had an increase in their financial risk tolerance levels. On the contrary, Bernasek and Shwiff (2001:350) found an increase in the risk tolerance levels of individuals' savings for retirement after they sought advice from a financial planner.

Marais (2014:12) stated that numerous investors do not have the time, knowledge or experience to invest successfully on their own. Therefore, the role of financial planners will always remain significant as to assist individual investors to make the correct financial and investment decisions

according to their needs, objectives and circumstances, as well as to circumvent the risks of investing on their own. When a good relationship, built on the foundation of trust, is established between a financial planner and an individual investor, financial planners also serve to minimise individual investors' doubts in volatile times, as well as to assist them to make rational instead of emotional decisions. Even though financial planners may be more costly, if they can provide high-quality financial advice and services, especially at an early point in individuals' investment lives, their value can be momentous (Marais, 2014:14).

2.5.2.3 Tax implications

Rossouw (2017:17) stated that individual investors have particular annual tax benefits available through their retirement funds and tax-free investment (TFI) accounts. At the end of each financial year, individual investors are given the opportunity to take full advantage of tax incentives that have been made available by the South African government to promote savings.

Individual investors can make pre-tax contributions to their retirement funds up to certain limits depending on the specific tax brackets and limits in the particular financial year. Given current legislation in South Africa, as from 1 March 2016, pension, provident and retirement annuity (RA) fund contributions are deductible, but limited to 27.5 per cent of the individual's higher remuneration or taxable income (exclusive of lump sums and severance benefits, before the deduction for donations), capped at R350 000.00 per year, and further limited to taxable income not including capital gains (Sanlam, 2019:21; SARS, 2019:6). If individuals have not taken full advantage of the benefit, they have the opportunity to make an additional lump sum contribution to their RA or pension fund. If individuals have retirement funds provided by their employers, they can make an additional voluntary contribution or begin to contribute to an RA in their personal capacity (Rossouw, 2017:17).

With regard to TFIs, the South African government provides individual investors with the opportunity to invest a certain amount per year (and up to a certain maximum over the individual's lifetime) of after-tax money into a TFI account and as a result, can profit from growth, free of dividend tax, income tax on interest and capital gains tax (Rossouw, 2017:17). Given current South African legislation, as from 1 March 2015, natural persons can invest R33 000.00 per year (up to a maximum of R500 000.00 over the individual's lifetime) tax-free into approved saving instruments (Sanlam, 2019:16). TFI accounts include approved saving instruments, such as unit trusts (collective investment schemes), fixed deposits, real estate investment trusts, certain endowment policies issued by long-term insurers, linked investment products and exchange-traded funds that are classified as collective investment schemes (SARS, 2018:1).

Individuals should consider taking advantage of the benefits of both retirement funds and TFIs as they fulfil different objectives and when used in combination, they can provide superior results (Sanlam, 2019:6). The key difference between retirement funds and TFIs are that retirement funds offer tax savings now, whereas TFIs offer less tax savings and are capped at the lower amount. However, TFIs are less restricted than retirement funds and allow individuals to withdraw their money any time (Rossouw, 2017:19).

Besides from deferring tax in a retirement fund, the South African government provides individuals with the opportunity to have additional savings by paying a lower average tax rate on the benefits withdrawn from their retirement funds at and after retirement. Since 1 March 2014 and given current South African legislation, individuals are allowed to withdraw the first R500 000.00 of the lump sum amount tax-free at retirement (SARS, 2019:4). However, the remaining funds of the individual's retirement fund should be transferred to an income-providing product at retirement. This tax incentive provides individuals with further opportunities to save through retirement vehicles (Loots, 2014:66).

No international or national published research studies were found to examine the relationship between tax implications and investor risk tolerance. For that reason, the examination of tax implications and its influence on individual investor risk tolerance behaviour will contribute significantly to the financial and investment research fields and the financial industry.

2.5.2.4 Macroeconomic factors

Kuzniak and Grable (2017:317) asserted that macroeconomic factors may influence the willingness of individual investors to take financial risks in two manners. Firstly, negative events may lessen individuals' financial capacity bringing about a negative shift in financial risk tolerance and causing individuals to be less likely to tolerate risks. Secondly, individual investors' perceptions, instead of the actual impact of macroeconomic factors and events, can influence individuals' willingness to take financial risks.

Macroeconomic factors, namely interest rates (Section 2.5.2.4.1), exchange rates (Section 2.5.2.4.2), inflation (Section 2.5.2.4.3) and GDP (Section 2.5.2.4.4), are discussed in the following subsections.

2.5.2.4.1 Interest rates

Marx *et al.* (2009:29) define interest rates as the compensation rate agreed upon between lenders and borrowers of money. Commercial banks operate as mediators between depositors (savers) and borrowers. Commercial banks need to comply with legislation and are required to retain some

funds in cash in order to fulfil the demands for payments by depositors. Therefore, they cannot lend out all their available funds. The central bank, specifically the South African Reserve Bank in a South African context, determines the percentage of cash to be retained by commercial banks. The money supply of a country is controlled by the monetary policy of the central bank. The central bank operates as a lender to commercial banks and manipulates interest rates by increasing or decreasing the rates at which the central bank loans the money to commercial banks (Fourie & Burger, 2009:352).

Interest rates have a significant influence on the entire economy, as well as on investments, such as interest-bearing investments and shares (Patel, 2019:1). Pettinger (2019:2) stated that investments are financed either by means of current savings or by borrowing. There exists an inverse relationship between bond prices and interest rates. Therefore, as interest rates increase, bond prices decrease, and as interest rates decrease, bond prices increase. The longer the maturity of the bond, the more it will fluctuate in relation to interest rates. Therefore, individuals tend to invest in interest-bearing investments when interest rates are high. When interest rates are low, a lower rate of return is likely to be earned. Furthermore, when interest rates increase, the stock market tends to fall as money is withdrawn out of shares and invested in interest-bearing investments. On the contrary, when interest rates decline, the opposite is true as the stock market tends to rise as money is invested in shares and withdrawn from interest-bearing investments (Patel, 2019:1).

2.5.2.4.2 Exchange rates

Ryan (1988:41) refers to the exchange rate as the rate at which one domestic currency is converted into a foreign currency. Exchange rates can either be fixed or floating. A fixed exchange rate is set at a fixed rate, while a floating exchange rate exists if the value of the currency is established by the market forces, more specifically, the supply and demand in the market (Van der Merwe & Mollentze, 2010:117). Factors such as discrepancies in the growth of income of countries, inflation rate differentials, and adjustments in real interest rates are likely to bring about changes in floating exchange rates (Fourie & Burger, 2009:157). Within a South African context, a high gold price, for example, will increase the value of the rand, while adverse political circumstances, for example, will cause the value of the rand to decline (Marx *et al.*, 2009:33).

Monetary and fiscal policies also influence exchange rates (Fourie & Burger, 2009:163). Firstly, an unforeseen shift to a more expansionary monetary policy leads to a short-term depreciation of a domestic currency because an expansionary monetary policy will bring about accelerated growth in the economy, increased inflation and lower real interest rates. Secondly, a shift to a more restrictive fiscal policy will cause a domestic currency to appreciate as a result of reduced

aggregate demand, a deceleration in the growth of the economy and decreased inflation, or a domestic currency will depreciate as a result of a decline in real interest rates due to reduced government borrowing (Marx *et al.*, 2009:33).

Volatility in the exchange rate influences trade and investment decisions and constrains a country's economic growth. It is important to have a comprehension of what factors contribute to exchange rate volatility to assess whether economic policy can reduce volatility. Mavee and Schimmel-pfenning (2017:1) found macroeconomic shocks to have a limited influence on the rand volatility of South Africa in their study. However, global factors, such as changes in global commodity prices and financial market perceptions mainly cause volatility in the rand. Fundamentally, increased volatility in the prices of the main exported and imported South African commodities and increased global volatility are allied with increased volatility in the rand. National political uncertainty in South Africa was also found to be a significant driver of the rand's volatility. Political uncertainty in South Africa can be influenced directly by domestic policymakers through the manner in which the government develops and implements economic policy, as well as in the manner the economic policy decisions are communicated. Global commodity prices, financial market perceptions and international economic shocks cannot be controlled. However, the South African government can control and influence the perception of political uncertainty (Mavee & Schimmel-pfenning, 2017:2).

2.5.2.4.3 Inflation

Inflation can be described as the sustained increase in the general level of prices (Ryan, 1988:58; Fourie & Burger, 2009:455). Inflation brings about a reduction in the purchasing power of money, given that the value of money is falling as prices are increasing, thereby resulting in a lower demand for products (Marx *et al.*, 2009:30). Inflation can influence investments over the long term. Pettinger (2019:2) stated that high and volatile inflation is likely to generate more uncertainty regarding the cost of investments and investors may fear that high inflation levels could bring about economic uncertainty and future economic downturns. Countries with long-lasting periods of low and stable inflation frequently experienced higher rates of returns on investments.

As stated by Coronation Fund Managers (2019b:29), individual investors should be attentive to inflation over the long term as it can erode investment returns. This is as a result of the investment portfolio returns being less than the inflation rate, individual investors' abilities to acquire goods and services in the future may decline. As a result, it is imperative for individuals to preserve their capital. On the other hand, investment portfolios that significantly outperform inflation are associated with higher risk levels (Newcomb, 2012:2). Growth assets, such as equities and property, which have higher levels of risk and return, provide protection against inflation over the long term. For that reason, the inclusion of riskier assets in investment portfolios is essential for

protection against inflation over the long term. It is also essential that individual investors carefully analyse the trend of inflation in the economy and foreseeable future, as well as its impact on the return of investment portfolios (Money Matters, 2019:2).

2.5.2.4.4 Gross domestic product

GDP is described as the total market value of final goods and services produced domestically in a country during a particular time period, excluding invisibles, such as income and dividends, earned out of the country. Accordingly, GDP reflects the overall performance of a country's economy (Ryan, 1988:54; Marx *et al.*, 2009:28). A country's GDP does not continuously grow at all times. Countries experience recessions at times, which if not managed correctly through monetary and fiscal policy, could bring about a depression (Marx *et al.*, 2009:28). On the other hand, a healthy growth rate in the GDP of a country, indicating good economic performance, brings about an increase or positive effect on a country's stock market. As a result, individual investors have a more positive economic outlook and are more likely to invest in riskier assets or the stock market (Money Matters, 2019:2).

Kuzniak and Grable (2017:333) examined the relationship between the financial risk tolerance of individual investors and the GDP of a country. It was found that individual investors that live in countries with a high GDP are more likely to tolerate higher levels of risk, than individual investors living in countries with a lower GDP. Brandt and Wang (2003:1459) found that individual investors have high levels of risk aversion during periods of economic recessions. However, individual investors have a greater propensity to tolerate high levels of risk during periods of economic growth. Researchers such as Sung and Hanna (1996:17); DeVaney and Su (1997:169); Grable and Lytton (1997:184), as well as Grable (2000:628), found that individual investors with greater and positive economic expectations are more risk-tolerant than individual investors with lower and negative economic expectations.

2.5.2.5 International stock market and economic events

The risk tolerance levels of individual investors are likely to be strongly affected by recent news about major stock market and economic events (Yao *et al*., 2004:251; Hanna & Lindamood, 2007:1). Miller and Campbell (1959:8) asserted that when individuals are provided with two opposing sets of information, individuals are more influenced by the information most recently received, either positive or negative, if time has passed between the first and second set of information and the decision is made right away after the second set of information is presented.

Historically, the stock market crash, which took place on 19 October 1987, is considered to be the most significant one-day market crash when the Dow Jones Industrial Average fell by 22.6 per cent

(Bernhardt & Eckblad, 2013:1). Consequently, this event had an effect on financial markets worldwide, which led investors to sell their stocks (Colombo, 2012:1). Yao *et al*. (2004:251) asserted that this event could have negatively influenced the risk tolerance of investors for several years thereafter. In the study of Yao *et al*. (2004:249), they found that the risk tolerance of individual investors declined from 1983 to 1989, remained unchanged from 1989 to 1992, increased in 1995 and 1998 and decreased in 2001. In the years prior to 1998, stock market returns were high, which could have resulted in several individual investors' increased willingness in 1998 to take higher risks to attain higher returns. However, the willingness of individual investors to take risks was negatively affected by the unfavourable returns that transpired in 2000 and 2001, accompanied by the negative three-year moving average of real returns on the stock markets in 2001.

Real estate prices in the United States increased significantly in the years that led up to 2007. When real estate prices continued to rise far above the fair market value, it resulted in a property bubble. The previous strong economic growth cycle came to an end when the debt supercycle started to deteriorate with the subprime crisis and ultimately ended suddenly with the collapse of the Lehman Brothers in September 2008. This led to the start of the GFC that brought about pandemonium in the financial markets (Neethling, 2014:20; De Kock, 2016:17). Numerous individuals who were actively invested in the financial markets during the GFC knew instinctively that the overall economy has some effect on how individuals make investment decisions. Even though it is rather expected that the risk tolerance levels of individual investors declined after the GFC, the degree to which it declined is not definite (Kuzniak & Grable, 2017:318).

The effect of the GFC on the financial risk tolerance levels of individual investors was studied by numerous researchers as it provided them with a rare opportunity to examine risk-taking behaviour in real time. The GFC and its effect on individuals' perception of risk and risk tolerance were studied by Roszkowski and Davey (2010:51) and they established that the change prior to and subsequent to the GFC was rather small and that risk tolerance only slightly declined. Individual investors' perceptions of risk and investment decisions changed more dramatically. Gerrans *et al.* (2013:1) established that changes in the risk tolerance of individual investors, as a result of the GFC, were small and contrary to the notion that risk tolerance is an adaptable attitude, which is robustly affected by prevailing market conditions. With the occurrence of major negative events, risk tolerance is considered to be a reasonably stable factor that does not bring about substantial fluctuations over the short term, although it has a greater tendency to be affected over the long term. Hoffmann *et al.* (2015:94) found in their study that individual investors' investment perceptions fluctuated significantly during the GFC, with risk tolerance and risk perceptions being less volatile than return expectations.

Yip (2000:22) affirmed that financial risk tolerance remains steady over time and is not influenced by major crashes in the stock market. Nonetheless, Shefrin (2002:27) stated that individuals are not consistent in their risk tolerance, as it is reliant on numerous factors of which one is recent experiences, when confronted with risks. Individual investors' reactions to negative events in the financial markets tend to be much more emotional (Schooley & Worden, 2016:267).

2.5.2.6 Market fluctuations and volatility

Haugen (1987:456) stated that financial markets are not strictly efficient or strictly inefficient. In addition, Lintner (1988:8) asserted that individual investors base their investment decisions on prediction, market timing and financial performance. However, when individual investors make irrational investment decisions it can bring about inefficiencies in the financial markets.

Even though risk tolerance has been found to be a relatively stable trait over time, individual investors may show signs of fluctuations in their risk tolerance levels over the short term (Schooley & Worden, 2016:266). In a study conducted by Grable *et al.* (2004:143), they established that financial risk tolerance is an adaptable and changeable attitude and is not affected by stock market price statistics. On the other hand, Guillemette and Finke (2014:44) established that the risk tolerance levels of individual investors tend to be affected by recent stock market movements and fluctuations over the short term. However, the risk tolerance levels of individual investors were found to be relatively stable over the long term. Furthermore, individual investors' risk tolerance levels increased as stock market valuations increased and decreased throughout market downturns.

Moreover, individual investors' willingness to tolerate risks has a propensity to change in reaction to market returns. Studies found that individual investors' risk tolerance levels are likely to increase when market returns increase and decrease when market returns decrease (Yao *et al.*, 2004:249; Yao & Curl, 2011:532). MacKillop (2003:62), as well as Pan and Statman (2010:1), established in their studies that the risk tolerance levels of individual investors fluctuate as financial markets rise and fall. MacKillop (2003:62) further concluded that individual investors become more risk-tolerant when the financial markets are rising and less risk-tolerant when the financial markets are falling.

In addition, Malmendier and Nagel (2011:415) established that the risk tolerance of individual investors is affected by macroeconomic shocks experienced throughout their lifetime. Individual investors who encountered a stock market boom throughout their life cycle were regarded as more risk-tolerant than those who did not encounter a boom in the stock market. In addition, individual investors who encountered a constant bull market had a greater propensity to hold shares and a larger portion of wealth in the form of shares.

2.6 SYNOPSIS

Investing provides individuals with a great opportunity to enhance their wealth and build a foundation for the life they desire to establish for themselves. However, investing comes with risks, since all investments hold a specific degree of risk. Therefore, it is essential to have a complete comprehension of risk tolerance and risk behaviour as the misinterpretation and underestimation of these concepts in practice can have momentous ramifications for investing. Therefore, this chapter aspired to elucidate the theory relating to the risk tolerance of individual investors.

The theoretical objective to provide an in-depth analysis of risk tolerance and risk behaviour is achieved in this chapter. Firstly, the theory of risk tolerance (Section 2.2) and risk behaviour (Section 2.3) are explained. The investment decisions of individual investors are primarily affected by their willingness and abilities to tolerate risks. Accordingly, the risk tolerance levels of individual investors should be measured accurately, since the classification of their risk tolerance establishes their asset allocation decision-making. This chapter further introduced the theoretical objective to examine the theoretical theories and previous studies relating to the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions. In view of that, a summary of prior research conducted on risk tolerance was provided (Section 2.4). The endogenous and exogenous factors that are likely to influence the risk tolerance behaviour of individual investors have also been reviewed (Section 2.5). It is imperative to have a comprehensive understanding of the factors that are likely to influence the tendencies of individual investors to invest, as their willingness to take risks is influenced by everyday challenges and financial choices. Each individual has different inherent characteristics or personality traits unique to themselves. Therefore, every individual behaves differently when it comes to taking financial risks and has their own level of risk tolerance.

Accordingly, this study focuses on endogenous factors, namely demographical factors, socio-cultural factors, the investor life cycle and behavioural finance biases. Demographical factors, namely age, gender, ethnicity, marital status, employment status, education, income and wealth, homeownership, as well as household size and the number of financial dependants, were discussed in detail in this chapter (Section 2.5.1.1). Socio-cultural factors, namely religion, financial and investment knowledge, as well as health status, were also discussed in this chapter (Section 2.5.1.2). The theoretical aspects of the investor life cycle and behavioural finance biases, as endogenous factors influencing risk tolerance behaviour when making investment decisions, are discussed comprehensively in Chapter 3. Given that financial markets are characterised by volatility and fluctuations, individual investors and financial practitioners should be attentive to changes in the external environment and the effect these changes may have on individual

investors' risk tolerance behaviour. Exogenous factors pertaining to the external environment, namely political-legal, technological, tax implications, macroeconomic factors, international stock market and economic events, as well as reactions to market fluctuations and volatility, were discussed in this chapter (Section 2.5.2). This chapter encompassed the first section of the theoretical framework of the study.

Subsequently, individual investors' investment decision-making, which also entails the investor life cycle and behavioural finance biases as endogenous factors influencing risk tolerance behaviour when making investment decisions, are analysed in Chapter 3.

CHAPTER 3: INDIVIDUAL INVESTOR INVESTMENT DECISION-MAKING

3.1 INTRODUCTION

Individual investors are required to make significant investment decisions during their lifetime regarding the construction and management of their investment portfolios (Leinberger, 2015:5). Individual investors must be acquainted with their phase in the investor life cycle as changes in their personal circumstances and needs cause them to make different investment decisions throughout the phases of the investor life cycle (Reilly & Brown, 2012:32). The investment objectives and constraints of individual investors ought to be determined in accordance with their personal circumstances and need to facilitate the construction and implementation of an efficient investment plan (Coronation Fund Managers, 2018:102). The risk tolerance of individual investors is the main component that influences their investment decisions and the construction of their investment portfolios, and as a result, should be determined before the development of an investment strategy. Therefore, it is imperative to establish the willingness of individual investors to tolerate risks through risk profiling to facilitate the accurate and most appropriate asset allocation selection for their investment portfolios to attain the required rates of return (Yook & Everett, 2003:48).

Furthermore, Kannadhasan (2006:2) stated that behavioural finance is a fundamental component in the investment decision-making process of individual investors, as it largely influences investment performance. Behavioural finance research revealed numerous systematic deviations in individual investment decision-making from the principle of rationality based on traditional finance theories (Klement, 2015:3). Derived from traditional finance theories, it is mainly asserted that individual investors behave rationally and take into consideration all available information when making investment decisions (Mutswenje, 2014:93). Also, it is presumed that individual investors make investment decisions to take advantage of available opportunities and to maximise their wealth (Joo & Durri, 2015:11). However, individual investors do not behave rationally and markets are not efficient at all times (Chaudhary, 2013:85). Consequently, market inefficiencies and the difficulties traditional finance experienced when individual investors acted irrationally brought about the existence of behavioural finance (Thaler & Johnson, 1990:645). Psychologists theorised that individual investors' attitudes and behaviours are not constantly rational because their investment decisions are influenced by cognitive and psychological errors. Therefore, behavioural finance

takes into account how numerous psychological traits influence the manner individual investors make their investment decisions (Joo & Durri, 2015:11).

This chapter aspires to provide an overview of the important investment decisions that should be made by individuals when investing. The theoretical objective to contextualise a theoretical framework pertaining to individual investment decision-making is achieved in this chapter. The theoretical objective to examine the theoretical theories relating to the endogenous factors, namely demographical factors, socio-cultural factors, the investor life cycle and behavioural finance biases, that influence the risk tolerance behaviour of individual investors when making investment decisions is finalised in this chapter. The endogenous factors, namely demographical and socio-cultural factors were discussed in detail in Chapter 2 (Section 2.5.1). Therefore, the theoretical aspects of the investor life cycle and behavioural finance biases are attended to and discussed comprehensively in Chapter 3. In the first section of this chapter, the theory relating to the individual investor life cycle is explained (Section 3.2). This is followed by the examination of individual investors' objectives and constraints (Section 3.3) together with the risk profiling categories of individual investors (Section 3.4). A summary of the traditional and non-traditional asset classes is also provided (Section 3.5). In the second section of this chapter, the role of behavioural finance in individual investment decision-making is discussed (Section 3.6). Attention is given to the behavioural finance biases (investment decision-making biases) and the relationship between risk tolerance and behavioural finance based on individual investor risk profiling. Lastly, a discussion is provided to establish if the application of life cycle investing in practice is relevant and conforms to the individual investor life cycle theory by considering the findings of previous research conducted on the individual investor life cycle (Section 3.7). The final section of the theoretical framework of the study is enclosed in this chapter by reviewing the theoretical aspects relating to the investment decision-making of individual investors.

3.2 INDIVIDUAL INVESTOR LIFE CYCLE THEORY

The individual investor life cycle signifies the investment behaviour of individual investors over the different phases of their lives given their age and time horizon (Cocco *et al.*, 2005:492; Shaikat, 2020:1). A heuristic belief according to the life cycle theory is that individual investors' risk-taking abilities decline with age given that they consist of less time to recuperate probable losses (Marx *et al.*, 2010:266). The individual investor life cycle is described by Harty (2014:1) as the numerous phases of investment ownership, starting with the first purchase to the sale of an investment. When constructing an investment plan, an accurate evaluation of the individuals'

phase in the investor life cycle needs to be conducted. Given that the individual investor life cycle establishes the scope and time frame of an investment, it also assists individual investors and financial planners with a broad indication of the risk and return preferences from which the objectives and constraints of individual investors can be inferred (Bodie *et al*., 2010:698).

Individual investors have different investment needs and preferences at each phase of the investor life cycle. However, certain common traits influence most individual investors over the investor life cycle (Goodall, 2005:3). The investment strategies and asset allocation decisions of individual investors will also change over time because of changes in their net worth and risk tolerance. The review and adjustment of individual investors' investment strategies and decisions will ensure that their investment goals and objectives are attained and that their investment portfolios are managed effectively (Bodie *et al*., 2010:699). Hence, as illustrated in Figure 3-1 and discussed in the following section, individual investors can be categorised into one of the four phases of the life cycle at a given point in their lifetime, that is, the accumulation phase (Section 3.2.1), consolidation phase (Section 3.2.2), spending phase (Section 3.2.3) and gifting phase (Section 3.2.4) (Reilly & Brown, 2012:33). The spending phase and gifting phase are shown as concurrent in Figure 3-1. The movement in the net worth of individual investors throughout the different phases of the investor life cycle over their lifetime is also illustrated in Figure 3-1.

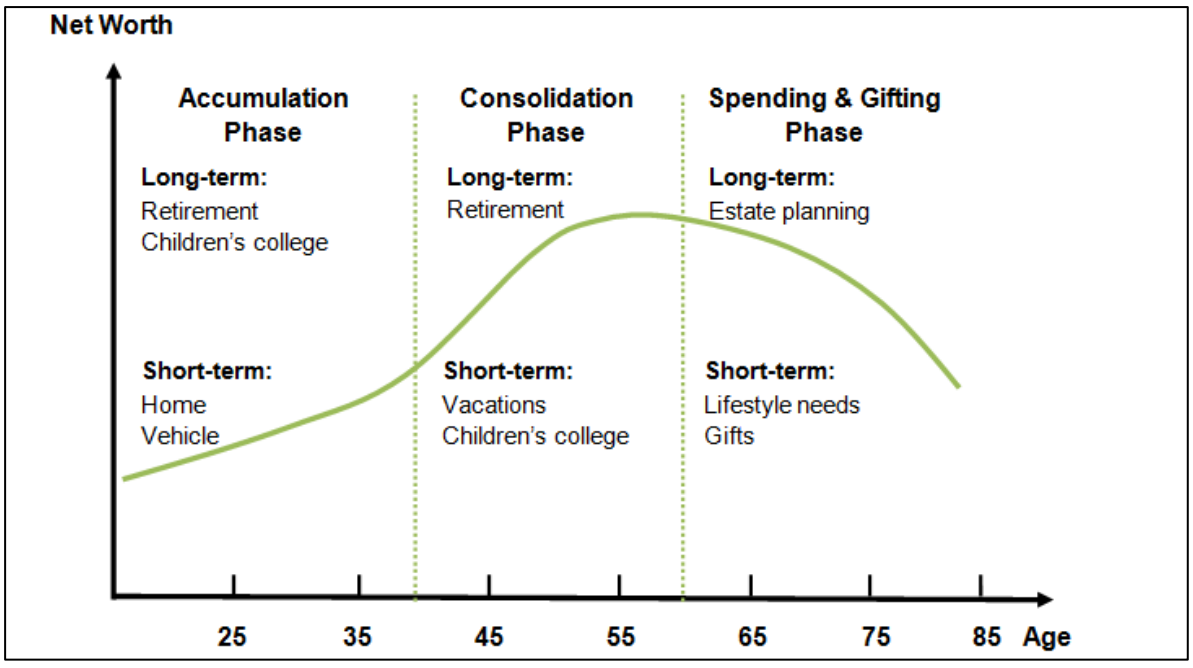

Figure 3-1: The individual investor life cycle
Source: Reilly and Brown (2012:33)

3.2.1 Accumulation phase

The accumulation phase comprises individuals who are in the early to middle years of their working careers. Normally, the majority of individuals will also start with families during this phase (Reilly & Brown, 2012:33). Short-term goals are a priority as individuals are accruing assets to assure their immediate needs, which include the acquisitions of homes, vehicles, furniture and appliances. Assets are also accumulated to meet long-term goals, such as putting funds aside for children's educational needs and retirement provision (Yao *et al.,* 2004:253). Harty (2014:1) asserted that it is vital for individuals to start saving and investing money regularly in this phase to achieve their long-term goals. However, individual investors generally have a small net worth and a great amount of debt from past student loans, vehicle loans or down payments on homes. Given that the debt on most of the long-term assets purchased is large relative to the net worth of individuals, debt management is crucial in this phase (Marx *et al.*, 2010:267; Reilly & Brown, 2012:33).

Nonetheless, individuals in the accumulation phase consist of long investment horizons and great earning abilities. As a result, individuals have greater tendencies to take high levels of risk and make high risk investments, consisting of growth, high risk assets such as national and international equities, to earn above-average returns as they have the ability and time to recover from volatility and financial losses (Hanna & Chen, 1997:17; Sheldon, 2018:1).

3.2.2 Consolidation phase

The consolidation phase comprises individuals who are past the midpoint of their working careers. The income earned by individuals is greater than their expenses and they have accumulated more financial assets. Most or all of their outstanding debt, as well as children's tuition fees, have been paid off (Reilly & Brown, 2012:34). As a result, individuals are able to put aside and invest a larger portion of their income to make provision for future retirement and estate planning (Harty, 2014:1).

Individuals in the consolidation phase also have a rather long time horizon with a period of 20 to 30 years. Individuals are focused on the growth of their retirement portfolios and moderately high risk investments become more attractive. However, individuals become less willing to take substantially high risks, because their residual time until retirement lessens risk control and the protection of capital becomes necessary (Marx *et al.*, 2010:267; Kuzniak & Grable, 2017:321). Concerning the asset allocation of individuals' investment portfolios, a good balance should be maintained to ensure growth as some individuals may still have a long lifespan (Sheldon,

2018:1). Their investment portfolios are likely to consist of a combination of assets classes, namely cash, bonds, property and equities, with a higher inclination towards growth, high risk assets, such as equities and property (Goodall, 2005:210).

3.2.3 Spending phase

The spending phase comprises individuals who have reached retirement and consist of a shorter time horizon. They are financially independent and their costs of living are paid by means of income earned from investments, for example, retirement plans (Reilly & Brown, 2012:34). When individuals reach retirement age, the active reinvestment of lump sums or pension funds regularly occurs. Capital protection of the individuals' investment portfolios becomes a priority and individuals have greater tendencies to make low risk investments, which consist of defensive, low risk assets, such as cash and bonds (Marx *et al.*, 2010:267).

According to Yao *et al.* (2004:253), the decline in individuals' willingness to take risks is attributable to the shorter time horizon, a decline in the relative amount of human wealth and a rise in the size of the investment portfolios. Even though the overall investment portfolio of individuals in this phase is less risky than in the consolidation phase, they should still take some degree of risk and invest in growth, high risk assets, such as equities and property to safeguard themselves against a decline in the real value of their savings due to inflation (Reilly & Brown, 2012:34; Sheldon, 2018:1).

3.2.4 Gifting phase

The gifting phase is similar to and concurrent with the spending phase. Marx *et al.* (2010:267) describe the gifting phase as the advanced spending phase that individuals initiate if they have accumulated more assets than they will ever require. Individuals believe that they have adequate income and assets to cover their expenses while keeping a reserve for uncertainties. The size of their investment portfolios may decline as excess assets are utilised to offer financial support to relatives, friends or charitable organisations. Individuals can also establish trusts, as an estate planning tool, to reduce estate taxes (Reilly & Brown, 2012:34; Kuzniak & Grable, 2017:321).

The primary notion of the investor life cycle is that as individuals pass through the different phases; the asset allocation of individuals' investment portfolios should be adjusted to facilitate the attainment of their objectives at each phase of the life cycle (Bodie *et al*., 2010:698). The investment objectives of individual investors ought to be established as it is of assistance in the

accurate composition and asset allocation of investment portfolios. Nonetheless, individual investors are also faced with investment constraints that restrict the inclusion of particular assets in their investment portfolios (Marx *et al.*, 2010:268). Thus, the investment objectives and constraints of individual investors are discussed in the following section (Section 3.3).

3.3 INVESTMENT OBJECTIVES AND CONSTRAINTS

The establishment of individual investors' investment objectives and constraints is the foundation of any investment plan (Goodall, 2005:5). Even though individual investors behave similarly towards risk in particular situations, their investment portfolios will still vary as they find themselves in diverse circumstances. Therefore, before an investment plan can be constructed, the investment objectives and constraints of individual investors ought to be established (Bodie *et al.*, 2010:698). The investment objectives (Section 3.3.1) and investment constraints (Section 3.3.2) of individual investors are discussed in the following sections.

3.3.1 Investment objectives

Borad (2018:1) stated that investment objectives relate to the goals that individual investors seek to achieve within their investment portfolios. Constantin (2007:179) asserted that investment objectives should be articulated in terms of both risk and return. As stated by Alexander and Sharpe (1989:9), individual investors cannot only seek to earn great returns on their investment portfolios. Given the positive relationship between risk and return, a fitting objective for individual investors can be to earn great returns on their investment portfolios, but at the same time to acknowledge that great losses may occur. The investment objectives of individual investors can be categorised into four main categories, namely capital preservation (Section 3.3.1.1), capital appreciation (Section 3.3.1.2), current income (Section 3.3.1.3) and total return (Section 3.3.1.4), which are discussed in the following subsections (Reilly & Brown, 2012:42).

3.3.1.1 Capital preservation

Hallman and Rosenbloom (2009:214), as well as Bodie *et al.* (2010:699), asserted that with capital preservation, individual investors seek to protect the real value of their investment portfolios and as a result, seek to minimise their risk of loss. Given that the main intent of this objective is to preserve the purchasing power of investments, the return on their investment portfolios should at least be equal to the inflation rate. Capital preservation is appropriate for individual investors who are strongly risk-averse or who require funds to meet their short-term

goals, for instance, a down payment on a home or payment of tuition fees (Reilly & Brown, 2012:42). Since individual investors primarily want to preserve the funds in their investment portfolios, they do not essentially require growth in their investment portfolios (Marx *et al.*, 2010:267). Nonetheless, individual investors who have a long time horizon and who aspire to only spend income received from investments ought to hold a combination of spendable income and also sustain the probability for moderate growth in their investment portfolios (Goodall, 2005:50).

3.3.1.2 Capital appreciation

Reilly and Brown (2012:42) asserted that in contrast with capital preservation that is focused on the preservation of remaining capital, capital appreciation seeks to increase the value of investment portfolios in real terms over a period of time to facilitate the fulfilment of long-term goals. Provided that the main intent of this objective is the growth in the real value of individual investors' investment portfolios through capital gains, the returns achieved on their investment portfolios should exceed the inflation rate. This investment objective is appropriate for individual investors who are more aggressive or who have a longer time horizon aspiring to achieve long-term goals, for instance, provision for retirement or educational needs (Marx *et al.,* 2010:267).

3.3.1.3 Current income

Marx *et al.* (2010:267) asserted that with current income as an investment objective, individual investors seek to construct investment portfolios focused on income generation in preference to capital gains. Hence, this investment objective is not to accumulate funds for long-term goals or future needs, but rather to maintain an existing lifestyle. This investment objective is fitting for retired individual investors who no longer receive a salary through employment and who are reliant on income generated by investments to pay for their costs of living and other needs (Reilly & Brown, 2012:42; Witz & Zemon, 2017:27).

3.3.1.4 Total return

As asserted by Reilly and Brown (2012:42), total return as an investment objective is comparable to capital appreciation. However, the total return objective aspires to augment returns from capital appreciation to increase the value of individual investors' investment portfolios by way of both capital gains and the reinvestment of income generated by investments. Since this investment objective comprises capital gains and income components,

the risk exposure of this objective is positioned between that of the capital appreciation and current income investment objectives (Harbour, 2016:1; Witz & Zemon, 2017:27).

3.3.2 Investment constraints

Investment constraints should also be considered by individual investors and financial planners when constructing investment plans. However, individual investors and financial planners do not always consider investment constraints. Investment constraints are just as important as investment objectives in the construction and management of investment plans (Wilson, 2010:1). Investment constraints place certain limitations on the inclusion of particular assets or investment options in an investment portfolio. Investment constraints can be unique to a specific individual or general to numerous individuals (Constantin, 2007:179). The investment constraints of individual investors can be classified into five main categories, namely liquidity needs (Section 3.3.2.1), time horizon (Section 3.3.2.2), tax considerations (Section 3.3.2.3), legal and regulatory factors (Section 3.3.2.4), as well as unique needs and preferences (Section 3.3.2.5), which are discussed in the following subsections (Reilly & Brown, 2012:43).

3.3.2.1 Liquidity needs

Liquidity is defined by Marx *et al*. (2010:268), as well as Witz and Zemon (2017:27), as the ability to convert an asset into cash at its present market price. Coronation Fund Managers (2018:106) also refers to liquidity as the amount of cash in an investment portfolio. Most individual investors are confronted with liquidity as an investment constraint (Wilson, 2010:1). This investment constraint acknowledges individual investors' need for cash or liquidity when unanticipated circumstances, for example, tax obligations, ongoing expenses or retrenchment transpire (Brooks *et al.,* 2018:59). Although individual investors have primary long-term, high priority goals, various short-term goals, for example, the purchase of a vehicle, down payments on a house or tuition fees, may necessitate the immediate availability of funds. Investments designed to accomplish long-term goals, for example, retirement, are not required to be as liquid as emergency funds in general (Reilly & Brown, 2012:43). Individual investors should ensure that cash is preserved to cover costs on anticipated and unanticipated future events (Old Mutual, 2018:59).

3.3.2.2 Time horizon

Time horizon is defined by Bodie *et al.* (2010:704) as the settlement date of an investment. Time horizon constraints generate a timeline over which investment returns are expected to

attain the specific needs and objectives of individual investors. The amount of time for which an investment can be made assists individual investors to establish the type of investments that may be most appropriate for their investment portfolios. Time horizon should also be considered when individual investors ought to choose between assets of different maturities. According to Reilly and Brown (2012:43), an almost perfect relationship subsists between individual investors' time horizon, the need for liquidity, and the ability to tolerate risks.

As stated by Hanna and Chen (1997:20), the abilities of individual investors to tolerate risks are mainly affected by their time horizons. Individual investors who consist of longer time horizons have greater risk-taking abilities because they have more time to recuperate any losses. Less liquidity is required by individual investors with long time horizons as funds are needed for long-term goals, instead of short-term goals (Harbour, 2016:1). On the other hand, individual investors with shorter time horizons have lower risk-taking abilities because they have less time to recuperate any losses. In addition, individual investors with short time horizons require more liquidity as funds are required for short-term goals (Borad, 2018:1).

3.3.2.3 Tax considerations

According to Marx *et al.* (2010:268), it is essential to consider the tax positions of individual investors when constructing investment plans. Proper tax planning is required to make the correct investment decisions since governments worldwide employ different strategies to tax investments. Old Mutual (2018:41) asserted that the investment that generates the highest return is not necessarily always the best investment. The tax implications of individual investors vary depending on the type of investment chosen (Wilson, 2010:1).

Mayo (2000:885) affirmed that there are several taxes such as personal income taxes with reference to capital gains tax, taxes on interest-bearing income, dividend taxes and estate duty taxes that influence the investment planning process. These taxes can significantly decrease the returns received from investments. Individual investors who fall in high tax brackets ought to invest in tax-deferred investments to reduce the effect of immediate taxes on their investment returns (Fischer & Gallmeyer, 2016:1849). Financial planners must possess comprehensive knowledge about the different taxes applicable to investments to give appropriate advice when constructing investment plans. Individual investors should also educate themselves to obtain basic knowledge regarding tax implications on investments (Witz & Zemon, 2017:27). To conclude, the after-tax returns on investments play an imperative role in the selection of the

most suitable investments. Therefore, individual investors should be focused on investment goals that maximise their after-tax returns and not their gross returns (Wilson, 2010:1).

3.3.2.4 Legal and regulatory factors

Reilly and Brown (2012:45) asserted that financial markets and the investment process are highly regulated and subject to numerous laws. Legal and regulatory factors may constrain the investment decisions of both individual and institutional investors by imposing restrictions on the allocation of certain assets, access to certain funds and the prohibition of certain investments. However, the investment decisions of institutional investors are more likely to be affected (Wilson, 2010:1). Marx *et al.* (2010:268) affirmed that South African individual investors are constrained by only a few regulatory controls over investments, aside from exchange controls relevant to offshore investments. Conversely, institutional investment portfolios, for example, pension funds, are subject to stricter rules to ensure the preservation of capital (Marx *et al.*, 2010:268).

As asserted by Bodie *et al*. (2010:704), the management of trusts by an appointed fiduciary, also known as a trustee, is also restricted by law to a trust policy statement. The investment decisions made by a fiduciary should be in line with the owner's requirements as stipulated in the trust policy statement. A fiduciary must comply with the prudent investor rule, which requires a fiduciary to restrict investments to certain assets that would have been approved by a prudent investor. Lastly, laws applicable to insider trading prohibitions also ought to be considered and transpires when information regarding the purchase or sale of securities is not publicly known and employees of a specific company are lawfully not authorised to act on such information (Van Osselaer, 2017:400; Borad, 2018:1).

3.3.2.5 Unique needs and preferences

According to Marx *et al.* (2010:268), some individual investors may seek to prohibit particular types of investments and assets from their portfolios as a result of personal preferences or social and environmental concerns. For instance, some individual investors may shun away from investing in companies that fabricate alcohol, smoking substances, or environmentally harmful products. This may be based on individual investors' religion, health consciousness, social concerns or environmental concerns. Other unique needs and preferences may entail certain family needs or individuals' phase in the investor life cycle (Borad, 2018:1). Certain individual investors also do not have the time and expertise to manage their investment portfolios and therefore, prefer to obtain professional advice and assistance from financial

planners. To conclude, unique needs and preferences specify individual investors' concerns unique to themselves (Reilly & Brown, 2012:46).

After the investment objectives and constraints of individual investors have been established, the willingness of individual investors to tolerate risks proportionate to their required levels of return should be determined to facilitate the achievement of their investment needs and objectives in line with their willingness to tolerate risks (Coronation Fund Managers, 2019a:95). Accordingly, the risk profiling of individual investors is discussed in the following section (Section 3.4).

3.4 INDIVIDUAL INVESTOR RISK PROFILING

Goodall (2005:198) stated that there are different types of individual investors since they have differing attitudes towards risk. Individual investors are classified into different risk profiling categories according to their risk-taking propensities. The willingness of individual investors to tolerate risks should be determined and carefully considered when constructing investment plans. This will assist individual investors and financial planners with the selection of the most appropriate asset allocation for the investment portfolios of individual investors (Klement, 2015:2).

According to Pompian (2016:1), the current standard process to determine the risk profiles of individual investors is through risk assessment forms (also known as risk profile questionnaires). Certain risk assessment forms concentrate exclusively on risk tolerance, while others also aspire to measure the risk capacity of individual investors. Risk assessment forms enable financial planners to establish what type of investors individuals are according to their risk tolerance, investment horizon and investment knowledge. It also assists to match the risk profiles of individual investors with an assortment of suitable investments. Even though individual investors aspire to receive the greatest potential returns for a given level of risk, each investor perceives risk in a different way. Therefore, the risk profiles of individual investors ought to be established in terms of both risk tolerance and risk capacity (Coronation Fund Managers, 2014:89).

Goodall (2005:199), as well as Coronation Fund Managers (2018:102), affirmed that the risk profiles of individual investors comprise three main categories, namely aggressive, moderate (or balanced) and conservative. As illustrated in Figure 3-2, it can also be classified into five broad categories, which also include moderately aggressive (or growth) and moderately conservative (or cautious).

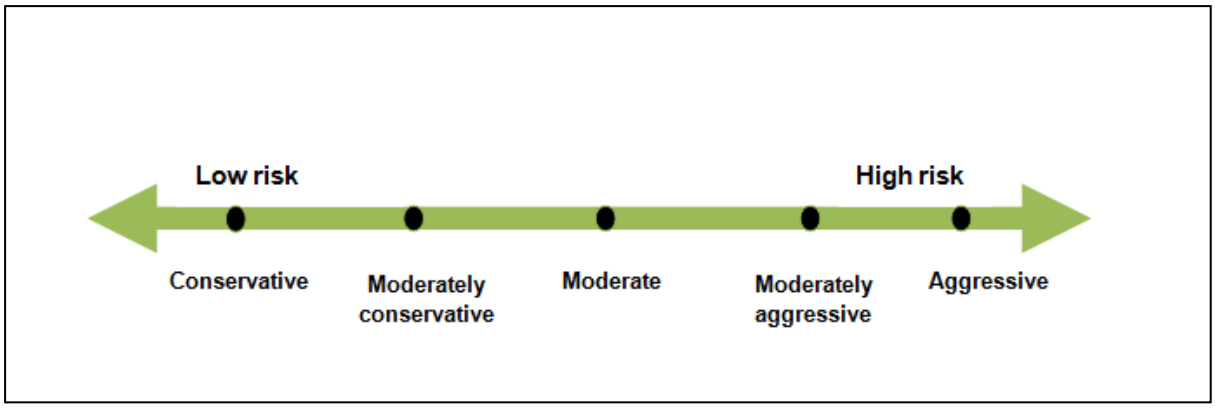

Figure 3-2: Risk profiling of individual investors
Source: Goodall (2005:200); Coronation Fund Managers (2018:102)

The five risk profiling categories of individual investors that are discussed in the following subsections (Section 3.4.1–Section 3.4.5) recapitulate how investment risk is perceived by individual investors, as well as the degree of risk they are willing to tolerate when fluctuations transpire in the financial markets (Goodall, 2005:200).

3.4.1 Aggressive

According to Discovery (2019a:3), substantial fluctuations in returns can be tolerated by aggressive individual investors over the short term with the anticipation of attaining the highest possible returns over the long term with a period of ten years or more. Since aggressive individual investors seek to increase the real value of their investment portfolios, their main investment objective is capital appreciation (Marx *et al.,* 2010:267). Young individuals in the early years of their working careers and accumulation phase of the investor life cycle are primarily considered to be aggressive individual investors. This is because they have a greater propensity to tolerate substantial risks to outperform financial markets and intend to invest large sums of money in their investment portfolios over a period of time (Tools for Money, 2018:1). Since aggressive individual investors are willing to tolerate substantial levels of risks, with the exception of a minimum required level of cash for liquidity needs, their investment portfolios mainly consist of growth, high risk assets, such as national and international equities. Given that aggressive individual investors have long time horizons of ten years or more, they can recover from financial losses if any transpire (Goodall, 2005:210).

3.4.2 Moderately aggressive (growth)

Discovery (2019a:3) stated that above-average risks and fluctuations in returns can be tolerated by moderately aggressive (growth) individual investors over the short term with the anticipation of attaining higher returns over the long term with a period of five to ten years. Moderately aggressive individual investors do not necessitate an income and do not have liquidity preferences. However, their main objective is the appreciation of capital as they aspire to increase the real value of their investment portfolios (Australian Investors Association, 2020b:3). According to Goodall (2005:210), the investment portfolios of moderately aggressive individual investors comprise a combination of asset classes, but will primarily comprise higher risk investments with an inclination towards equities.

3.4.3 Moderate (balanced)

As stated by Tools for Money (2018:4), most individual investors are categorised into the moderate (balanced) risk profiling category. Moderate risks and fluctuations in returns can be tolerated by moderate individual investors over the short term with the anticipation of attaining higher returns over the long term with a period of five or more years. Similar to aggressive and moderately aggressive individual investors, they are also concerned with capital appreciation as they seek to increase the real value of their investment portfolios (Discovery, 2019a:4). Moderate individual investors tend to be in the accumulation or consolidation phase of the investor life cycle. They have medium- to long-term goals and do not necessarily require an income, but the need for liquidity may arise (Australian Investors Association, 2020b:4). As indicated by Goodall (2005:211), the investment portfolios of moderate individual investors comprise a larger portion of growth, high risk assets, entailing a combination of property and equities, with a smaller portion of defensive, low risk assets, such as cash and bonds.

3.4.4 Moderately conservative (cautious)

Bridges (2020:2) stated that moderately conservative (cautious) individual investors have an investment horizon of three or more years. They tend to tolerate slightly more risk than conservative individual investors, but are still opposed to significant downside risks. These individual investors are nearing retirement or are retired and necessitate stable growth, a moderate level of income and have a greater need for liquidity. Their main investment objective is capital preservation as they seek to preserve the real value of their investment portfolios and minimise their risk of loss. Given the lower risk of loss, they are also willing to accept lower returns (Hallman & Rosenbloom, 2009:214). As asserted by Goodall (2005:212), the investment

portfolios of moderately conservative individual investors are diversified and consist of a larger portion of defensive, low risk assets, such as cash and bonds, and a smaller portion of growth, high risk assets, such as property and equities, to provide partial protection against tax and inflation. These individual investors are comfortable with a little exposure to equities so that higher returns can be generated over the long term (Tools for Money, 2018:4).

3.4.5 Conservative

Discovery (2019a:4) stated that conservative individual investors have an investment horizon of three years or less. They tend to tolerate less risk or are not able to tolerate any risk, and as a result, tend to accept lower returns to preserve the real value of their investment portfolios. Therefore, similar to moderately conservative individual investors, their main investment objective is capital preservation. According to Coronation Fund Managers (2017:106), conservative individual investors tend to be in the spending or gifting phase of the investor life cycle. They have retired, can no longer work and have short life expectancies. For that reason, they do not have sufficient time to recuperate any losses. They require stable growth, a high level of income and have great liquidity preferences as they need access to their investments within three years (Australian Investors Association, 2020b:4). As asserted by Goodall (2005:213), the investment portfolios of conservative individual investors mainly consist of defensive, low risk assets, such as cash, bonds and unlisted property. The mainstream of conservative individual investors wants their investment portfolios to produce inflation-adjusted income streams to compensate their living expenses (Tools for Money, 2018:4).

The risk profiles of individual investors vary over their lifetime and should, therefore, be reviewed periodically, as numerous situations and their phase in the investor life cycle can alter their risk profiles. In addition, the risk-taking propensities of individual investors relative to their required levels of return should be established to facilitate the selection of the most appropriate asset allocation for their investment portfolios (Klement, 2015:2). Accordingly, a summary of the traditional and non-traditional asset classes is provided in the following section (Section 3.5).

3.5 TRADITIONAL AND NON-TRADITIONAL ASSET CLASSES

After the establishment of individual investors' phase in the investor life cycle, investment objectives and constraints, and risk profile, individual investors along with their financial planners must start with the selection of the most appropriate asset allocation for their investment portfolios (Australian Investors Association, 2020a:1). Vanguard (2013:14) asserted that asset allocation relates to the decision-making on how the funds of individual investors will

be diversified among the various asset classes and how much of each asset class individual investors aspire to incorporate in their investment portfolios.

Coronation Fund Managers (2014:105) stated that investments can be categorised into five main asset classes, namely cash, bonds, property, equities and collectables. These five main asset classes are further subdivided into traditional and non-traditional asset classes. Cash, bonds, property and equities are considered to be traditional asset classes, while collectables, also known as exotics, are considered to be a non-traditional asset class. All of these asset classes contain different features that make them suitable for various investment objectives (Old Mutual, 2018:55). When decisions are made regarding the selection of the most appropriate asset allocation for an investment portfolio, it is essential that the investment horizon, liquidity, volatility, risk and return trade-off, as well as advantages and disadvantages of the asset classes are comprehended (Coronation Fund Managers, 2019a:114). Figure 3-3 represents the five main asset classes, as well as the risk and reward trade-off of each asset class.

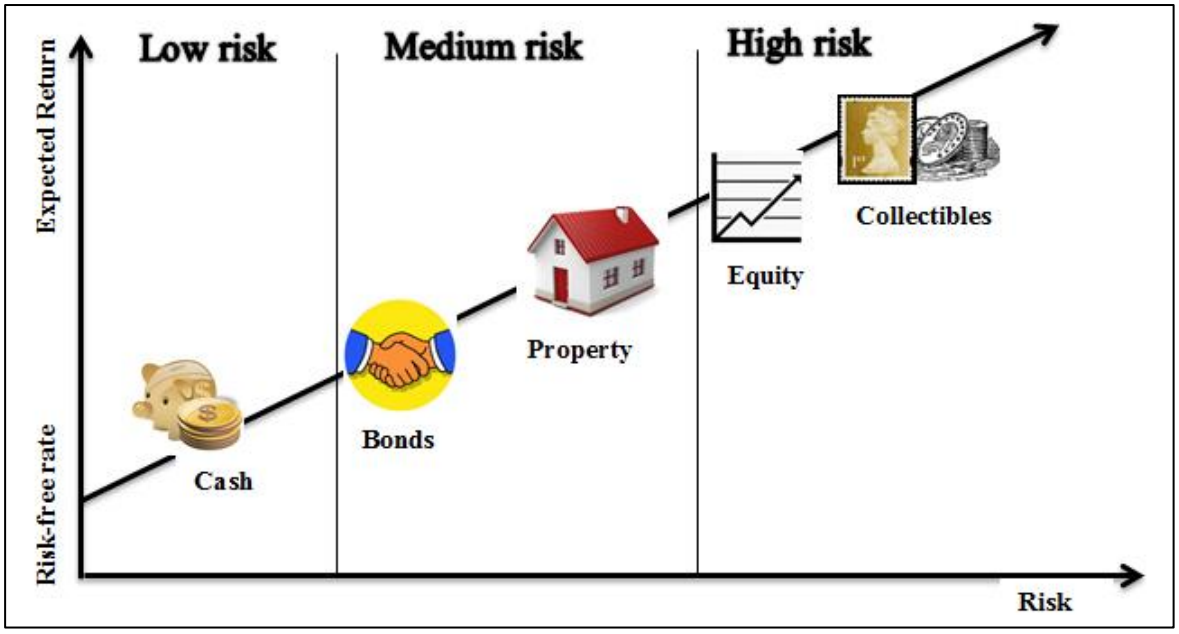

Figure 3-3: The risk and reward trade-off of the main asset classes
Source: Adapted from Discovery (2012:4) and Old Mutual (2018:55)

The traditional (Section 3.5.1) and non-traditional (Section 3.5.2) asset classes comprising the five main asset classes are discussed in the following sections.

3.5.1 Traditional asset classes

The traditional asset classes, namely cash (Section 3.5.1.1), bonds, (Section 3.5.1.2), property (Section 3.5.1.3) and equities (Section 3.5.1.4) in South Africa are attended to in this section. The main characteristics, as well as some of the advantages and disadvantages of investing in each of these asset classes, are summarised in the following subsections.

3.5.1.1 Cash

Prudential Investment Managers (2016b:2) and Coronation Fund Managers (2018:119) affirmed that cash is considered to be the safest asset class and consists of interest-bearing instruments (for example money market funds, fixed deposits, notice deposits, call deposits and negotiable certificates of deposits) and discount instruments (for example treasury bills and promissory notes). Cash-based investments are regarded as short-term investments with less than one year to maturity and consist of a low degree of risk. These investments present individual investors with the most liquidity among all of the asset classes as it can easily be exchanged in financial markets. Consequently, cash-based investments tend to provide high returns and outperform other investments over the short term, however, not over the long term. Therefore, cash-based investments are utilised to save funds for emergencies or short-term goals (Vanguard, 2013:19).

As stated by Prudential Investment Managers (2016b:3), individual investors who are not willing to tolerate high risks and seek to protect the real value of their investment portfolios can invest a large portion of their funds in cash-based investments and thereafter diversify into riskier asset classes. As illustrated in Figure 3-3, individual investors who invest in cash-based investments are willing to tolerate a low degree of risk and accordingly, low rates of returns are likely to be earned. Despite this, it is considered to be the least volatile among all the main asset classes (Australian Investors Association, 2020a:1). Given that cash-based investments are considered to be the safest investments, it is applied to set the benchmark for other investments. For that reason, other investments become more attractive when the returns on cash-based investments are low (South African Savings Institute, 2020:1).

Lastly, Table 3-1 summarises the main characteristics, as well as the advantages and disadvantages of cash as a traditional asset class.

Table 3-1: Main characteristics, advantages and disadvantages of cash

	Description
Investment horizon	Short-term investment horizon of less than one year.
Liquidity	The most liquid investments offered to individual investors.
Volatility	Fluctuations occur due to changes in interest rates. Least volatile of all the main asset classes.
Risk and return trade-off	Low degree of risk and consequently, lower rates of returns.
Suitable for	Short-term investors with an investment horizon of less than one year.
Advantages	Considered to be the safest investment. Guaranteed to not lose nominal value and accordingly, ensure capital protection in investment portfolios.
	Most liquid investments available to individual investors in financial markets.
	Provide foreseeable and stable income streams through regular interest payments.
	While deciding where excess funds should be invested it can be held in cash-based investments.
	Outperform the other asset classes over the short term.
Disadvantages	Due to the low risk level, a lower rate of return is attained over the long term, compared to the other asset classes.
	There is no hedge against inflation. Cash-based investments can lose value if the interest rate cannot keep up with the inflation rate and as a result, the rate of return earned is below the inflation rate.
	Since returns are reliant on interest rates, if there is a recession in the economy, interest rates decline and lower returns are likely to be earned.

Source: Compiled from Loungani and Sheets (1997:385); Vanguard (2013:19); Prudential Investment Managers (2016b:3); Old Mutual (2018:56); Coronation Fund Managers (2019a:114); Australian Investors Association (2020a:1); Blackrock (2020:2); South African Savings Institute (2020:1)

3.5.1.2 Bonds

Bonds can be described as long-term loans or debt-financing instruments with fixed interest payments (Marx *et al.*, 2010:207). Bonds in South Africa are traded on the Johannesburg Stock Exchange (JSE) debt market (previously, the Bond Exchange of South Africa, acquired by JSE

Limited in 2009) and can be issued by the government, corporate or private entities (Coronation Fund Managers, 2019a:123). The issuer of the bond borrows money from investors to raise funds by issuing bonds. In return, the issuer of the bond repays the holder of the bond through interest (coupon) payments as stipulated by the contract, with the principal investment amount (face value of the bond) to be reimbursed at the maturity date. Given that bonds are traded on the stock market, it can be sold at any time before the maturity date. However, depending on the type of bond, it can be redeemed before or on the specified maturity date (Bodie *et al*., 2008:30; Mazzucato *et al*., 2010:78).

There are various types of bonds that are different from each other based on their features and the requirements of the issuer and holder of the bond. For example, with vanilla (basic) bonds, the issuer of the bond repays the holder of the bond through fixed coupon payments with the principal investment amount to be reimbursed at a specified maturity date. However, with zero-coupon bonds, no coupon payments are made, only the principal investment amount is to be reimbursed at the maturity date (Marx *et al.*, 2010:211). Callable bonds provide the issuer of the bond with the right to redeem (call back) the bond before the maturity date at a predetermined price. On the other hand, puttable bonds provide the holder of the bond with the right to sell the bond back to the issuer at a predetermined price before the maturity date (Borad, 2020:3). In addition, convertible bonds consist of an additional feature that enables the bondholder to turn the bond back to the issuer in exchange for a number of equity shares of the company. Lastly, extendable bonds provide the bondholder with the right to extend the maturity date of the bond if required (Reilly & Brown, 2012:860).

Bonds consist of different maturity dates and the prices of bonds fluctuate in response to interest rate movements in the economy. There is an inverse relationship between bond prices and interest rates. If interest rates decline, the value of bonds increases, and on the contrary, if interest rates increase, the value of bonds decreases (Mayo, 1988:175). However, the volatility in bond prices is influenced by its principal (face) value, its coupon, the number of years to maturity and prevailing market interest rates (Reilly & Brown, 2012:633). When prevailing market interest rates increase above the coupon rate of a bond, the bond becomes less attractive and as a result, the bond price declines to compensate for the less attractive yield. On the other hand, when prevailing market interest rates decrease below the coupon rate of a bond, the bond becomes more attractive and the bond price increase. Therefore, the higher the coupon rate, the less the value of the bond will change in response to changes in interest rates (Thorp, 2012:12). Bonds with longer maturities are more sensitive to changes in interest rates

and experience larger fluctuations in bond prices as it will take longer for investors to recover their principal investment amount (Spaulding, 2020:2).

Vanguard (2013:14) asserted that bonds are suitable for individual investors with short-, medium- or long-term investment horizons. It provides individual investors with stable and reliable income streams with the opportunity for capital growth, and in general offers higher interest rates than cash-based investments. Bonds are regarded as low to medium risk investments and consequently, low to medium rates of returns are likely to be earned (Mayo, 1988:177; South African Savings Institute, 2020:1). As illustrated in Figure 3-3, bonds consist of a higher degree of risk and return than cash, but a lower degree of risk and return than property, equities and collectables (Discovery, 2012:4). Given that there tends to be a low correlation between bonds and equities, the inclusion of bonds in the investment portfolios of individual investors can assist to keep investment returns stable and offset some of the volatility when equities are not performing well.

Lastly, Table 3-2 summarises the main characteristics, as well as the advantages and disadvantages of bonds as a traditional asset class.

Table 3-2: Main characteristics, advantages and disadvantages of bonds

	Description
Investment horizon	Short-, medium- or long-term investment horizon. Minimum suggested investment horizon of one to three years.
Liquidity	Bonds can be sold at any time before the maturity date at its current market price in the stock market. However, depending on the type of bond, it can be redeemed before or on the specified maturity date.
Volatility	The volatility in bond prices is influenced by its principal (face) value, its coupon, the number of years to maturity and prevailing market interest rates. More volatile than cash, but less volatile than property, equities and collectables.
Risk and return trade-off	Low to medium degree of risk and consequently, low to medium rates of returns are likely to be earned.
Suitable for	Short-, medium- or long-term investors.
Advantages	Bonds, as an interest-bearing investment, provide a higher rate of return than cash.
	Bonds, i.e. vanilla (basic) bonds, provide a steady and fixed-income stream with an opportunity for capital growth. Investors that hold bonds in their investment portfolios are entitled to an annual/a

	Description
	semi-annual cash interest-payment that is predetermined at the purchase date.
	Protect against stock market crashes and assist to offset some of the volatility of equities.
Disadvantages	Even though bonds consist of lower risk, they offer lower returns than property, equities and collectables.
	Susceptible to interest rate changes. If interest rates increase during the time to maturity, bond prices are negatively affected.
	There is no hedge for bonds against inflation unless the bond is linked to inflation, i.e. inflation-linked bonds.
	The issuer of the bond could go into bankruptcy, might be unable to reimburse the bond in full and accordingly, investors can lose their money.
	When prevailing market interest rates decrease below the coupon rate, the investor is exposed to call risk and/or reinvestment risk, as there is a probability that the issuer of the bond may call back (redeem) the bond, i.e. callable bond.

Source: Compiled from Mayo (1988:177); Goodall (2005:230); Bodie *et al*. (2008:30); Marx *et al.* (2010:207); Mazzucato *et al*. (2010:78); Coronation Fund Managers (2013:102); Vanguard (2013:14); Monevator (2016:5); Australian Investors Association (2020a:1); South African Savings Institute (2020:1); Zurich (2020:2)

3.5.1.3 Property

As stated by Hirt and Block (1986:500), as well as Coronation Fund Managers (2019a:122), property, or real estate, include direct investments in residential, industrial and commercial properties, as well as indirect investments in listed property vehicles, such as real estate investment trusts (REITs) and real estate unit trust funds (UTREFs). Investors can invest in property individually, as part of a limited partnership real estate association or through listed property shares or property unit trust funds. Returns on direct investments or physical properties are generated through rental income and the appreciation in the value of the physical property. However, returns on listed properties are generated from the movements in the value of the shares, as well as income generated by property management companies (Discovery, 2012:3; Monevator, 2016:9).

Vanguard (2013:14) asserted that property investments are appropriate for individual investors with a medium- to long-term investment horizon of five or more years and who necessitate high-income returns as well as protection against volatility in the stock market. Property consists of a medium to high degree of risk and accordingly, medium to high rates of returns are likely to be earned (Mayo, 1988:180). As exemplified in Figure 3-3, property comprises a higher degree of risk and return than cash and bonds, but a lower degree of risk and return than equities and collectables (Discovery, 2012:4). Compared to interest-bearing investments, higher returns are generated by property investments over the medium to long term. There tends to be a low correlation between property and interest-bearing investments because the property market is negatively affected by increases in interest rates (South African Savings Institute, 2020:1).

Lastly, Table 3-3 summarises the main characteristics, as well as the advantages and disadvantages of property as a traditional asset class.

Table 3-3: Main characteristics, advantages and disadvantages of property

	Description
Investment horizon	Medium- to long-term investment horizon of five years or more.
Liquidity	Direct investments in property are considered to be illiquid and consequently, individuals are not able to sell their physical properties as rapidly as they seek to. However, listed property vehicles, such as REITs and UTREFs, are more liquid. Property is less liquid than the other asset classes, bringing about a longer minimum recommended investment horizon.
Volatility	More volatile than cash and bonds, but less volatile than equities and collectables. Property bubbles can take place resulting in large financial losses. Listed property prices tend to be reasonably volatile and are affected by unfavourable international and national economic and stock market changes.
Risk and return trade-off	Medium to high degree of risk and accordingly, medium to high rates of returns are likely to be earned.
Suitable for	Medium- to long-term investors with an investment horizon of five years or more.
Advantages	Safe investment that can deliver high rates of returns over the long term and provides protection against stock market volatility.
	The appreciation in the value of property provides a great hedge against inflation.
	Offers noteworthy tax benefits through interest payments and augmented

	Description
	depreciation.
	Provides diversification in investment portfolios.
Disadvantages	Property is regarded as an illiquid asset class.
	Property bubbles can transpire and bring about considerable losses.
	The entry and exit costs to invest in property are significantly higher.
	Direct property investments necessitate devotion over the long term.

Source: Compiled from Hirt and Block (1986:501); Mayo (2000:832); Discovery (2012:5); Vanguard (2013:14); Blau *et al.* (2015:239); Monevator (2016:10); Coronation Fund Managers (2017:132); Cautero (2019:2); Australian Investors Association (2020a:1); South African Savings Institute (2020:1); Zurich (2020:2)

3.5.1.4 Equities

As stated by Alexander and Sharpe (1990:403), as well as Prudential Investment Managers (2016a:2), equities (also known as stocks or shares) signify a share of ownership in a public limited company and are traded on the stock market. The fund managers of the particular funds can also invest in shares on behalf of individual investors in a public limited company. When investing in equities, individual investors are rewarded by means of capital gains through increases in share prices or by means of revenue through dividend payments (Mazzucato *et al*., 2010:85; Coronation Fund Managers, 2018:125).

As asserted by Vanguard (2013:14) and Prudential Investment Managers (2016a:4), equities are suitable for individual investors that consist of an investment horizon of at least five to seven years in order to fully benefit from their equity holdings. Individual investors who invest in equities require higher rates of returns and therefore, are willing to take higher levels of risks. As illustrated in Figure 3-3, equities are viewed as the riskiest of the four traditional asset classes, not including collectables. There is no assurance that equities will produce capital growth, because the value of equities fluctuates in accordance with the prevailing market conditions on a daily basis (Monevator, 2016:7; Blackrock, 2020:1). However, the riskiness of investing in equities can be reduced by maintaining a well-established investment plan, to invest regularly, invest in companies in diverse sectors and of different sizes, as well as to invest both nationally and internationally (Old Mutual, 2018:57; Coronation Fund Managers, 2019a:119). Even though equities are the riskiest of the four traditional asset classes, they also tend to generate the

highest rates of returns. Historically, all the other asset classes have been outperformed by equities over the long term (Bodie *et al*., 2008:4; Australian Investors Association, 2020a:3).

Lastly, Table 3-4 summarises the main characteristics, as well as the advantages and disadvantages of equities as a traditional asset class.

Table 3-4: Main characteristics, advantages and disadvantages of equities

	Description
Investment horizon	Medium- to long-term investment horizon with a minimum of five to seven years.
Liquidity	Mostly regarded as a liquid asset class as it is traded on the stock market and shares can be bought and sold daily. However, the level of liquidity can vary among the different types of equities.
Volatility	Considered to be the most volatile asset class because the value of equities fluctuates in line with the prevailing market conditions on a daily basis.
Risk and return trade-off	A high degree of risk and accordingly, high rates of returns are likely to be earned.
Suitable for	Medium- to long-term investors with an investment horizon of at least five to seven years.
Advantages	Historically, all the other asset classes have been outperformed by equities over the long term.
	The most influential asset class in the investment portfolios of individual investors.
	Equities are capable of outperforming inflation.
	Equities held for greater periods tend to bring about the attainment of investment objectives.
Disadvantages	Equities are subject to high volatility over the short term and as a result, it can bring about significant losses. Therefore, equities require a medium- to long-term investment horizon.
	Significant losses can often transpire at any time and continue for long-lasting periods.
	Depending on the type of equities, some equities can be illiquid as they are traded on the rationale of supply and demand. When there is no demand for particular equities, it can sometimes be difficult to sell the shares if you want to exit the investment.
	Fluctuations in the value of equities can bring about irrational behaviour when greed and fear begin to play a role.

Source: Compiled from Goodall (2005:7); Bodie *et al*. (2008:4); Vanguard (2013:14); Monevator (2016:7); Prudential Investment Managers (2016a:4); Cautero (2019:3); Coronation Fund Managers (2019a:119); Australian Investors Association (2020a:3); JSE (2020:2); South African Savings Institute (2020:1); Zurich (2020:2)

3.5.2 Non-traditional asset classes

According to Reilly and Brown (2012:76), non-traditional asset classes consist of collectables, for instance, antiques, arts, diamonds, gold, coins and stamps. Most non-traditional asset classes have poor liquidity and high transaction costs since there is no national market for these investments. Dealers of collectables should be compensated for the additional carrying costs and for finding buyers or sellers. However, this is for example not applicable to the Krugerrand (a South African gold coin), since there does exist a national market for this investment and therefore, it consists of high liquidity, low transaction costs and there is low to no maintenance on the investment (JSE, 2019:3). Even though collectables are likely to produce significant rates of returns, they are regarded more as leisure pursuits than investments (Reilly, 1989:44). One of the main reasons for investors to invest in collectables is because they derive pleasure from these assets. Given that the pleasure investors derive from collectables cannot be quantified, it is unfeasible to establish the real rates of returns earned on these assets (Campbell *et al.,* 2008:5).

Mayo (2000:818) asserted that the substantial rates of returns earned on collectables result from the prospective appreciation in their value. The value of collectables is established by their scarceness proportionate to their demand. Internal factors, such as the prominence of the artist, the excellence of the artist's work and intrinsic worth of the work also establishes the value of collectables. The value of collectables is also determined by external factors that entail the state of the work, the sellers and prior owners of the collectables, and museums or shows where the collectables were previously exhibited (Campbell *et al.,* 2008:5). As illustrated in Figure 3-3, collectables, as a non-traditional asset class, comprises a higher risk and reward trade-off than all the traditional asset classes. Therefore, individual investors investing in collectables tend to tolerate substantial levels of risk to earn substantial rates of returns (Old Mutual, 2018:58).

Lastly, Table 3-5 summarises the main types of collectables, as well as the advantages and disadvantages of collectables as a non-traditional asset class.

Table 3-5: Main types of collectables, as well as the advantages and disadvantages of collectables

Type of collectables	Description
Antiques	Dealers that purchase antiques at estate sales or auctions to restore them and sell at a profit are likely to earn substantial returns. Serious collectors earn substantial returns if the value of antiques is determined based on prices settled at large public auctions. However, investors who own a small number of antiques for home decorations are highly unlikely to earn substantial returns. The high transaction cost and illiquidity related to antiques are likely to erode any revenue investors anticipate to receive from selling their antiques.
Arts	Certain arts, such as paintings, provide investors with substantial rates of returns due to the appreciation in their value. In order to invest in paintings, investors should have substantial knowledge of arts, adequate capital to acquire arts and the ability to cover expenses related to high transaction costs. Arts are considered to be rewarding investments for investors who derive pleasure from it and have adequate capital to acquire arts. However, for the average investor, it is not easy to earn returns that remunerate them for the risks related to the uncertainty, high transaction costs and high illiquidity.
Coins and stamps	Coins and stamps are collected by numerous individuals for the satisfaction derived from it and accordingly, for investment purposes. The market for coins and stamps is fragmented compared to the stock market. Nonetheless, coins and stamps consist of better liquidity than arts and antiques. Investors can get widely recognised grading specifications on coins and stamps. Once coins or stamps have been graded, it can be sold rapidly by making use of dealers. The bid-offer spread for coins and stamps are likely to be significantly larger than that of bonds and equities.
Diamonds	Historically, diamonds were viewed as sufficient investments. However, investors should bear in mind that diamonds are highly illiquid, the grading process is rather subjective, it necessitates considerable amounts of capital and no positive cash flow is produced during the holding period. During the holding period, investors must cover expenses related to insurance, storage costs and assessment costs before the diamonds can be sold.
Advantages	Collectables can provide a hedge against inflation.
	Investors who contain great sentimental value for collectables and who invest in collectables for its leisure pursuits, derive pleasure from collectables.
	The value of collectables is not affected by current conditions in the stock market.
	The potential appreciation in the value of collectables can produce substantial

Type of collectables	Description
	rates of returns.
Disadvantages	Collectables, excluding the Krugerrand, are considered to be highly illiquid and consist of high transaction costs.
	The value of collectables generally appreciates at a slower rate than that of traditional asset classes.
	High illiquidity and high transaction costs tend to erode any profit expected to be earned from selling collectables. This is especially applicable to the average investor, as it is not easy to earn returns that compensate them for the risks related to the uncertainty, high transaction costs and high illiquidity.
	To invest in collectables, investors should have substantial knowledge.
	Investors are subject to bid-ask spread risk.
	Due to the sentimentality of collectables and the pleasure derived from them, it mainly draws the attention of investors in high tax brackets and rewards are mainly provided in the form of consumption.

Source: Compiled from Mayo (1988:564); Alexander and Sharpe (1989:636); Reilly (1989:43); Alexander and Sharpe (1990:787); Mayo (2000:824); Campbell (2008:78); Marx *et al.* (2010:15); Reilly and Brown (2012:76); Wettig (2017:3); Old Mutual (2018:59); Kiesnoski (2019:2); Point Jewellery Exchange (2020:1)

In addition to the individual investor life cycle, investment objectives and constraints, risk profiling and asset allocation decisions, the investment decisions of individual investors are also influenced by a number of behavioural finance biases (investment decision-making biases), which are discussed in the following section (Section 3.6).

3.6 THE ROLE OF BEHAVIOURAL FINANCE IN INDIVIDUAL INVESTMENT DECISION-MAKING

Rossini and Maree (2015:31) asserted that behavioural finance investigates how the unpredictable nature of human psychology has an effect on investment decision-making and occasionally brings about emotionally driven behaviours that result in market anomalies that as a whole may either be speculative bubbles or bad bear markets. Behavioural finance comprises three elements, which are knowledge of finance, economics and cognitive psychology when investment decisions are made by individual investors (Lintner, 1988:8; Zindel *et al.,* 2014:11). The financial decision-making environment is characterised by complexity and uncertainty as financial markets are neither strictly efficient nor strictly inefficient (Fakhry, 2016:459). According

to traditional finance theories, it is believed that individual investors behave rationally, take all available information into account and capitalise on available opportunities to maximise their wealth when making investment decisions. However, in reality, individual investors do not behave rationally and investment decisions are driven by emotions, such as greed and fear (Muhammad, 2009:1). Therefore, numerous systematic deviations in individual investment decision-making from the principle of rationality, based on traditional finance theories, were revealed by behavioural finance research (Klement, 2015:3).

Traditional finance theories are focused on recognising rational solutions for decision problems as a result of investors' behaviour through the development of assumptions and tools (Baker & Nofsinger, 2002:99). On the other hand, behavioural finance comprises finance concepts and cognitive psychology as to comprehend and forecast systematic financial market implications of the psychological process of decision-making (Olsen, 1998:11). While traditional finance theories examine how individuals behave with regard to wealth maximisation, the behavioural finance theory examines how individuals truly behave in a financial environment (Kourtidis *et al.,* 2011:548). De Bondt *et al.* (2008:7) asserted that the behavioural finance theory is not essentially derived from the assumption of rational market participants and efficient markets. It is believed that individual investors behave rationally, but with a limited available set of information. Table 3-6 signifies the fundamental differences between traditional finance and behavioural finance theories.

Table 3-6: Main differences between traditional finance and behavioural finance theories

Traditional finance	Behavioural finance
Unbiased expectations	Biased expectations and limited knowledge of possible outcomes
Make rational investment decisions	Have bounded rationality
Aspire to attain financial objectives	Pursue an emotional approach
Seek optimal financial outcomes	Seek satisfactory financial outcomes

Source: Mazzoli and Marinelli (2011:33); Dickason (2017:40)

Fakhry (2016:460) asserted that traditional finance theories do not provide an accurate representation of financial behaviour. Pompian (2016:2) stated that behavioural finance aspires to comprehend and explain investors' actual behaviour rather than theorising about investor behaviour. It is believed that the investment decision-making and risk-taking behaviour of individual investors are better comprehended by employing models in which individuals are not fully rational. The investment behaviour of individuals is unconsciously influenced by their

thoughts, emotions, personal beliefs or past experiences to the degree that even individual investors with considerable knowledge may diverge from logic and reason. These influences, which can be classified as behavioural finance biases, may affect the manner in which risk is perceived and understood (Curtis, 2004:17). The ability to understand individual investors' bounded rationalities and imperfections, as well as how individual investors and markets behave, provide the possibility to adjust financial behaviours to make better investment decisions and improve economic outcomes (Massol & Molines, 2015:15).

The investment decision-making biases that are relevant to the investment decision-making process are discussed in the following section (Section 3.6.1).

3.6.1 Investment decision-making biases

According to Byrne and Utkus (2013:4), investment decision-making biases, also known as behavioural finance biases, relate to the manner in which information is processed by individual investors and the preferences they have when making investment decisions.

As shown in Figure 3-4, behavioural finance comprises investment decision-making biases that consist of two main components, namely mental and affective processes.

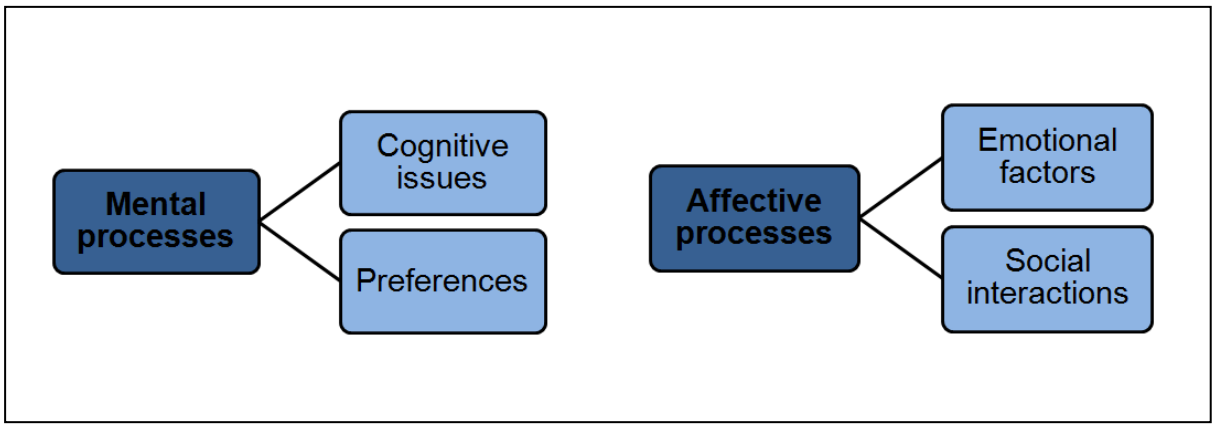

Figure 3-4: Main components of the investment decision-making biases
Source: Mazzoli and Marinelli (2011:34)

As illustrated in Figure 3-4, the first component, mental processes, attend to all cognitive limitations that place limits on the capability to deal with multifaceted information and to make optimal investment decisions, which as a result can bring about judgement errors (Ricciardi, 2008:89). The second component, affective processes, is considered to be external to mental processes. Thus, affective processes incorporate emotional factors and social interactions,

which can affect the final decision-making of individual investors. Emotional factors and social interactions can bring about substandard choices and outcomes. Hence, behavioural finance concentrates on the concerns of emotional factors and social interactions that influence the risk judgement and decision-making of individual investors (Pompian, 2016:3).

A summary of the primary investment decision-making biases to be discussed in the following subsections (Section 3.6.1.1–Section 3.6.1.4) are provided in Table 3-7.

Table 3-7: Investment decision-making biases

Investment decision-making biases	Theories	Biased effects
Cognitive issues	Heuristics: -Availability heuristic -Representativeness	Ease of recall bias Base rate neglect Sample size neglect Gambler's fallacy effect Trend chasing Halo effect
	Framing	Soothing effect Narrow framing Money illusion Preference reversals Context effects
	Overconfidence	Miscalibration Self-attribution bias Hindsight bias Cognitive dissonance Rationalisation Confirmation bias
	Anchoring	Conservatism
	Ambiguity aversion	Familiarity bias
	Perceived control	Locus of control Illusion of control
	Mental accounting	Sequential choices
Preferences	Prospect theory	Utility over gains/losses Risk aversion/seeking over gains/losses

Investment decision-making biases	Theories	Biased effects
		Loss aversion Small probabilities overweighting Certainty effect
Emotional factors	Current feelings and mood Anticipation of future feelings	Misattribution bias Risk/loss aversion House money effect Break-even effect Omission bias Endowment effect Status quo bias
Social interactions	Person-to-person contagion Media contagion	Herding Rigid thinking Fundamental attribution error False consensus effect

Source: Mazzoli and Marinelli (2011:36); Dickason (2017:44)

3.6.1.1 Cognitive issues

Numerous research compiled on behavioural finance originates from the field of cognitive psychology, which is the study of how individual investors think, reason and make investment decisions. Errors in the reasoning of individual investors are referred to as cognitive errors. Hence, cognitive errors result from memory and information processing errors. Therefore, cognitive biases are considered to be judgement errors or mental errors as a consequence of the simplification in the strategy to process information, which regularly leads to a misrepresentation of the manner in which the reality is perceived by individual investors (Zindel *et al.,* 2014:13). Cognitive biases relate to how individual investors process information and evaluate choices (Pompian, 2016:3). The cognitive biases as indicated in Table 3-7 are discussed in the following subsections (Section 3.6.1.1.1–Section 3.6.1.1.7).

3.6.1.1.1 Heuristics

According to Tversky and Kahneman (1974:1124), heuristics are considered to be rules of thumb or mental shortcuts that describe how individual investors make investment decisions, reach judgements and solve problems when faced with multifaceted problems or incomplete

information. With the heuristic decision-making process, individual investors make investment decisions generally by trial and error. Under most circumstances, these rules of thumb or mental shortcuts work efficiently. However, in certain circumstances, it can lead to systematic cognitive biases or errors (Subash, 2012:14). Cognitive issues entail two types of heuristics, namely the availability heuristic and representativeness heuristic (Mazzoli & Marinelli, 2011:37).

The availability heuristic refers to the inclination of individual investors to make investment decisions and estimate the likelihood of an outcome based on how easily it comes to mind (Prast, 2004:12). Individual investors also base their investment decisions on the most recently available information (Kannadhasan, 2006:5). The availability heuristic can lead to the occurrence of the biased effect known as the ease of recall bias. The ease of recall bias transpires when it is easy to recall events or outcomes that are most recent. Outcomes that are easily recalled are considered to be more probable than outcomes that are more difficult to recall or understand (Sadi *et al*., 2011:236). However, it can bring about biased estimates given that not all information and memories are equally retrievable or available. Individual investors also lack historical information and consequently, current information is likely to be interpreted incorrectly (Mazzoli & Marinelli, 2011:37; Pompian, 2012:35).

On the other hand, the representativeness heuristic is defined by Tversky and Kahneman (1974:1126) as the phenomenon that individual investors seek to find a pattern in a series of random events. Individual investors make investment decisions and classify new information based on past experiences or known events (Subash, 2012:27). The representativeness heuristic causes individual investors to make investment decisions based on stereotypes. Consequently, individual investors evaluate events based on superficial characteristics as opposed to underlying probabilities and base their investment decisions on perceptions of patterns that never may have existed (Byrne & Brooks, 2008:1). The utilisation of the representativeness heuristic is considered to be valuable. However, it can lead to the occurrence of biases, such as base rate neglect, sample size neglect, gambler's fallacy effect, trend chasing and the halo effect (Mazzoli & Marinelli, 2011:37). These biases are described in Table 3-8.

Table 3-8: Biased effects of the representativeness heuristic

Biased effect	Description	Author(s)
Base rate neglect	Transpires when individual investors evaluate the estimated likelihood of an assumption without bearing in mind the base rate or previous	Mazzoli and Marinelli (2011:37); Dickason (2017:45)

Biased effect	Description	Author(s)
	likelihood of evidence.	
Sample size neglect	Transpires when individual investors do not know the initial data generation process and consequently assume and make conclusions too hastily based on a small number of data points. It is believed that small numbers are adequate and represent the distribution of outcomes over the long term.	Rabin (1998:12); Rabin (2002:775); Jordan and Miller (2009:282)
Gambler's fallacy effect	Transpires when individual investors inaccurately predict financial market movements based on future trends and fail to outperform the market. Individual investors are also under the perception that errors in random events are self-correcting.	Tversky and Kahneman (1971:105); Kannadhasan (2006:5); Singh (2012:118); Subash (2012:21)
Trend chasing	Transpires when individual investors presume that trends have systematic causes and have a tendency to show casual patterns.	Jordan and Miller (2009:281); Mazzoli and Marinelli (2011:37)
Halo effect	Transpires when a particular positive characteristic of an individual leads to a positive impression about the other characteristics of the same individual.	Nisbett and Wilson (1977:250); Mazzoli and Marinelli (2011:38)

Source: Author compilation

3.6.1.1.2 Framing

Framing is an investment decision-making bias in which individual investors are likely to draw conclusions and make investment decisions based on the format in which the choice or situation was presented (Shefrin, 2002:21). Kahneman and Tversky (1979:264) described framing from two viewpoints: firstly, the environment or context where decisions are made and secondly, the format in which the choices or situations is structured. The manner in which choices or situations is presented is likely to influence individual investors' decision-making and perceptions of risk (Ritter, 2003:33). Framing can lead to the occurrence of biases, such as the soothing effect, narrow framing, money illusion, preference reversals and context effects (Mazzoli & Marinelli, 2011:38). These framing biases are described in Table 3-9.

Table 3-9: Biased effects of framing

Biased effect	Description	Author(s)
Soothing effect	Transpires when individual investors make psychological soothing or satisfying choices instead	Mazzoli and Marinelli (2011:38)

Biased effect	Description	Author(s)
	of choosing the best options.	
Narrow framing	Likelihood of individual investors to make investment decisions individually or one at a time without taking into account the broader perspective or impact.	Sewell (2010:7); Byrne and Utkus (2013:13)
Money illusion	Likelihood of individual investors to think in nominal instead of real monetary values.	Shafir *et al.* (1997:343); Jordan and Miller (2009:277)
Preference reversals	Transpires when individual investors are confronted with a choice between a binary lottery with a high probability and low maximum pay-off as opposed to another with a low probability and higher maximum pay-off.	Mazzoli and Marinelli (2011:39)
Context effects	Transpires when the existence of a non-selected choice alternative influences which alternative is chosen.	Hirshleifer (2001:1539)

Source: Author compilation

According to Slovic *et al.* (1982:483), as well as Mazzoli and Marinelli (2011:39), a main inference of framing is that the manner in which information is presented can be used to amend the risk perception of individual investors. To conclude, slight differences in how risks are presented can have noticeable effects on how risks are perceived.

3.6.1.1.3 Overconfidence

Overconfidence is referred to as the excessive self-belief individual investors have in their innate reasoning, judgements and cognitive abilities (Pompian, 2012:39). The overconfidence bias can be ascribed to individual investors' tendency to overestimate their investment capabilities. Consequently, overconfidence causes individual investors to overestimate their knowledge, underestimate risks and amplify their abilities to manage events (Singh, 2012:118). Overconfidence can lead to the occurrence of biases, namely miscalibration, self-attribution bias, hindsight bias, cognitive dissonance, rationalisation and confirmation bias (Mazzoli & Marinelli, 2011:40). These overconfidence biases are described in Table 3-10.

Table 3-10: Biased effects of overconfidence

Biased effect	Description	Author(s)
Miscalibration	The tendency of individual investors to be extremely confident in their estimate of a parameter and	Pan and Statman (2010:10);

Biased effect	Description	Author(s)
	accordingly, assigning confidence intervals to their quantity estimates that are too narrow.	Marchand (2012:16)
Self-attribution bias	The tendency of individual investors to ascribe success to their own skills and abilities, while blaming failures on situations beyond their control or outside influences, such as bad luck.	Prast (2004:12); Jordan and Miller (2009:282); Pompian (2012:35)
Hindsight bias	The tendency of individual investors to believe that an event was obvious and predictable, but after the actual event occurred.	Sadi *et al*. (2011:237); Subash (2012:27)
Cognitive dissonance	The mental conflict individual investors experience when they acquire new information that conflicts with their existing beliefs or indicates that their beliefs or assumptions are incorrect. Given that the experience of dissonance is unpleasant, individual investors will reduce it by adjusting their beliefs.	Prast (2004:11); Marchand (2012:20); Pompian (2012:31)
Rationalisation	The tendency of individual investors to develop a reasonable justification for past decisions to make them feel better about their decision-making capabilities.	Mazzoli and Marinelli (2011:40)
Confirmation bias	The tendency of individual investors to search for information that supports their past beliefs and decisions, and to disregard or undervalue information that conflicts with their beliefs and decisions.	Pompian (2012:28); Joo and Durri (2015:15)

Source: Author compilation

Mutswenje (2014:95) asserted that overconfident individual investors tend to believe that they can consistently time the market and in such a way so as to outperform the market. However, in reality this is not feasible and overconfidence results in excessive trading, underestimation of risk and overestimation of returns and consequently, receiving lower returns than the market (Marchand, 2012:16; Pompian, 2012:39).

3.6.1.1.4 Anchoring

Fathomless information is available to individual investors in the financial markets to assist with their investment decision-making. However, anchoring transpires when individual investors tend to rely too heavily on a single piece of information when making investment decisions (Kannadhasan, 2006:4). According to Tversky and Kahneman (1974:1129), individual investors make estimates based on the initial information they receive that will be slowly adjusted to make

the final investment decision as new information is being received. The likelihood of individual investors to rely, or anchor, too heavily on their initial beliefs or past histories causes them to give unnecessary importance to statistically random events and consequently, make irrational investment decisions. When individual investors are presented with new information their adjustment to additional information tends to be slow (Shahid *et al.,* 2018:23).

Anchoring can lead to the occurrence of the biased effect known as conservatism (Mazzoli & Marinelli, 2011:39; Pompian, 2012:33). The conservatism bias transpires when individual investors are considered to be too slow and too conservative to adjust their beliefs to new information (Prast, 2004:11). These individual investors tend to abide by their prior beliefs and are not willing to incorporate new information that might be valuable in their decision-making. These individual investors believe that it is expensive to process new information or adjust their beliefs (Byrne & Brooks, 2008:1; Zahera & Bansal, 2018:214). Subsequently, conservatism causes individual investors to under-react or fail to act on new information and as a result, continue to maintain beliefs close to those derived from prior estimates and information (Zindel *et al.,* 2014:15).

3.6.1.1.5 Ambiguity aversion

Ambiguity aversion becomes apparent when individual investors have to deal with unlikeable situations where they are uncertain about the probability distribution of a gamble (risk). Ambiguity aversion relates to how competent individual investors feel when evaluating the probability distribution of a gamble (Heath & Tversky, 1991:13). Individual investors are likely to feel incompetent when they are informed of individuals who are more competent to evaluate gambles or informed of other gambles in which they could have performed better (Fox & Tversky, 1995:586). Conversely, when individual investors feel particularly competent in evaluating a gamble, the opposite of ambiguity aversion, namely the familiarity bias may occur (Mazzoli & Marinelli, 2011:41). The familiarity bias relates to the tendency of individual investors to have confidence in and have a preference for situations that they are familiar with. Individual investors are likely to be more risk-tolerant when they are familiar with a particular situation (Lai, 2011:5).

3.6.1.1.6 Perceived control

As stated by Mazzoli and Marinelli (2011:41), perceived control comprises two forms of control, namely external versus internal control (locus of control) and perceived control (illusion of control). Locus of control describes the extent to which individual investors perceive the control

they have over their personal behaviour and outcomes of a particular situation proportionate to external factors. On the other hand, individual investors that are subject to the illusion of control bias believe that they have control over the outcomes of a situation even if it is random or unmanageable (Chira *et al.,* 2008:12; Pompian, 2012:30).

3.6.1.1.7 Mental accounting

Mutswenje (2014:94) stated that individual investors tend to place particular events into mental compartments and the variation between these compartments may affect the investment behaviour of individual investors more than the events themselves. Mental accounting is defined by Thaler (1985:200) as a set of cognitive operations utilised by individual investors to categorise, evaluate and keep track of financial and investment activities. It entails keeping track of gains and losses pertaining to financial and investment decisions in separate mental accounts, whereas each account is reviewed only occasionally when an event becomes relevant (Byrne & Brooks, 2008:1).

There are three main categories of mental accounts, which include the consumption account (general expenses); the income account (revenues) and the wealth account (different sources of wealth). These categories may endure some misevaluation effects when taken into consideration separately from each other (Thaler, 1985:210; Marchand, 2012:21). Mental accounting can bring about substandard outcomes as it entails a sequential decision process that overlooks the interaction between the different accounts and the relative effects these accounts have on the financial and investment decisions of individual investors (Mazzoli & Marinelli, 2011:42; Subash, 2012:22).

3.6.1.2 Preferences

It is assumed by traditional models that individual investors assess risky choices in line with the expected utility if the objective probabilities are known (Prast, 2004:6). Conversely, research indicated that the theory of expected utility maximisation does not hold in practice, given that individual investors systematically contravened this theory when they had to make a decision among risk choices. The prospect theory, which is considered to be the most successful theory for financial applications out of all the non-expected utility theories, is discussed in the following subsection (Section 3.6.1.2.1) (Mazzoli & Marinelli, 2011:51).

3.6.1.2.1 Prospect theory

The prospect theory is regarded as an alternative theory of choice in which value is assigned to gains and losses instead of final goods and in which probabilities are replaced by decision weights (Kahneman & Tversky, 1979:265). This theory holds that the decision-making process entails two phases. The first phase is the early phase of editing, or framing, in which individual investors frame prospects in terms of losses and gains proportionate to a benchmark. Rules of thumb are applied to assist with the analysis of a variety of possibilities among which individual investors have to choose from. The second phase is referred to as the evaluation phase. Following the editing and framing of the numerous prospects, they are evaluated and the prospect with the highest value is selected (Prast, 2004:8).

According to Subash (2012:12), the prospect theory explains the variations in the behaviour of individual investors when assessing risks under uncertainty. The prospect theory is based on the notion that individual investors tend to behave differently when dealing with prospective gains and losses. Individual investors also react differently to identical situations and the differences in the behaviour of individual investors depend on whether the situations are presented in terms of losses or gains (Jordan & Miller, 2009:273). Guillemette and Nanigian (2014:209) argue that individual investors are likely to become more concerned with prospective losses than they are pleased with prospective gains. This theory asserts that individual investors are not constantly risk-averse. Individual investors are considered to be risk-averse when dealing with assured gains and risk-takers when dealing with assured losses (Jagongo & Mutswenje, 2014:95).

The prospect theory brings about the occurrence of the biased effect, namely loss aversion (Kannadhasan, 2006:5). Loss aversion signifies that individual investors have a greater sensitivity to losses than to gains. As a result, individual investors are likely to take more risks to avoid losses instead of achieving gains. Even though individual investors carry an optimism bias towards their forecasts, they are less willing to lose funds than they are to gain (Muhammad, 2009:3). Furthermore, individual investors tend to overweigh small probabilities, as they are more sensitive to variations in probabilities at higher probability levels. Particularly, individual investors place much more weight on outcomes that are definite relative to outcomes that are merely possible; this is known as the certainty effect (Mazzoli & Marinelli, 2011:44).

While gains and losses are valued differently by individual investors, most individual investors seek to make investment decisions in a manner that enables them to avoid feelings of regret

that transpire when outcomes are unfavourable (Quiggin, 1994:154; Zindel *et al.,* 2014:15). The regret aversion bias relates to the emotional reactions that individual investors experience when they realise that judgement errors were made in investment decisions. Hence, individual investors aspire to administer situations to avoid feelings of regret or embarrassment of reporting a loss, as a result of poor investment decisions (Byrne & Brooks, 2008:1; Zahera & Bansal, 2018:214).

The prospect theory can also lead to the biased effect known as self-control. Baumeister *et al.* (2006:1773) define self-control as the process by which individual investors exercise control over their thoughts, feelings and desires. Individual investors are exposed to temptations of taking bigger financial risks and try to exercise self-control to lessen these temptations. Self-control is a measure utilised by individual investors to avoid large financial losses and to protect their investments. However, when temptations transpire in the financial markets, individual investors find it difficult to exercise self-control (Kannadhasan, 2006:5). Consequently, individual investors fail to act in pursuit of their long-term goals if they have a lack of self-control. Therefore, individual investors that are subject to the self-control bias will be extremely cautious when making financial or investment decisions (Pompian, 2012:40).

3.6.1.3 Emotional factors

Numerous researchers only concentrated on cognitive issues and did not take note of the emotional factors of risk perceptions and investment decisions (Lowenstein *et al.*, 2001:267; Mazzoli & Marinelli, 2011:45). Nonetheless, this brought about a new understanding in the behavioural finance field known as “risk as feeling” and the examination of the influence of emotions in risk perception and investment decision-making (Slovic *et al.,* 2004:313). Pompian (2012:38) asserted that emotional factors (emotional biases) are more difficult to rectify than cognitive errors, because emotional factors originate from impulse or intuition rather than conscious estimates. Furthermore, concerning emotional factors or biases, it may only be feasible to recognise the biases and adapt to it instead of rectifying it (Lucarelli *et al.,* 2015:60).

Emotional factors can cause individual investors to make suboptimal investment decisions. The effect of emotional factors upon the decision-making process is distinguishable in current feelings and mood, as well as the anticipation of future feelings (Mazzoli & Marinelli, 2011:45). Firstly, with regard to current feelings and mood, the emotions and moods individual investors experience presently influence their perceptions of risk, judgements and choices in investment decisions. When making investment decisions, individual investors are more optimistic in their

judgements and choices when they are in a happy mood and experience joyful emotions (Lerner *et al.,* 2015:803; Dickason, 2017:54). On the other hand, when individual investors are in a bad mood, they are more decisive in their strategies to evaluate information and consequently, it may bring about incorrect judgements or misattribution biases. In view of that, preceding affective states may cause individual investors to allocate their optimism about a choice to the incorrect sources. In addition, feelings and moods tend to influence abstract judgements more than specific judgements for which individual investors have concrete information (Ross, 1977:191). Secondly, the anticipation of future feelings may also influence individual investors' perceptions of risk, judgements and choices in investment decisions. The consequences of avoiding unpleasant future feelings can lead to the occurrence of the biases depicted in Table 3-11 (Mazzoli & Marinelli, 2011:46).

Table 3-11: Biased effects of the anticipation of future feelings

Biased effect	Description	Author(s)
Regret aversion	Experiencing negative feelings about an outcome when realising that judgement errors were made relating to investment decisions.	Quiggin (1994:154); Subash (2012:21); Jagongo and Mutswenje (2014:94)
Risk aversion	The tendency of individual investors to be risk-averse over gains of moderate to high probability and losses with small probabilities.	Mazzoli and Marinelli (2011:45); Guillemette and Nanigian (2014:209)
Loss aversion	Individual investors have a greater inclination to avoid losses rather than to achieve gains.	Chira *et al.* (2008:13); Muhammad (2009:3); Zindel *et al.* (2014:14)
House money effect	The propensity of individual investors to take risks or gambles with funds that were recently won.	Thaler and Johnson (1990:644); Jordan and Miller (2009:276); Zahera and Bansal (2018:213)
Break-even effect	Transpires when individual investors experienced a loss and have an opportunity to recover from the loss.	Mazzoli and Marinelli (2011:46)
Omission bias	Transpires when regret is stronger for decisions that entail action instead of passivity.	Ritov and Baron (1990:263)
Endowment effect	The inclination of individual investors to hold on to what they have instead of exchanging it for a better option. Individual investors consider something that they own to be worth more than it would be if they did not own it.	Jordan and Miller (2009:277); Pompian (2012:41); Zahera and Bansal (2018:213)

Biased effect	Description	Author(s)
Status quo bias	The tendency of individual investors to do nothing, maintain the status quo, rather than to make a change that can bring about an unfavourable or worse outcome.	Samuelson and Zeckhauser (1988:7); Pompian (2012:40)

Source: Author compilation

3.6.1.4 Social interactions

Social interaction entails person-to-person contagion and media contagion of ideas and behaviour, which is considered essential in the individual investment decision-making process. Individual investors can obtain reasonable information from other individuals by means of observing their behaviour. Nonetheless, when individual investors give too much consideration to the ideas or facts of other individuals, it can bring about biases such as herding, rigid thinking, fundamental attribution error and false consensus effect (Mazzoli & Marinelli, 2011:46).

According to Hirshleifer and Teoh (2003:25), herding or herd behaviour in financial markets can be described as a mutual imitation that leads to a convergence of action. Individual investors have the propensity to imitate or follow the decisions or actions of a large group of individuals, even though those individuals may not consist of appropriate knowledge. Individual investors are exposed to herding for the reason that they are concerned about what other individuals may think of their investment decisions and they seek acceptance from their peers. In addition, individual investors also believe that it is improbable for a large group of individuals to be incorrect and that the group of individuals may have information that they do not have (Zahera & Bansal, 2018:213). The inclination of individual investors to follow the investment decisions made by a group of individuals brings about a lack of individuality in investment decision-making (Subash, 2012:27).

Social interactions may also bring about a biased effect known as rigid thinking. Rigid thinking transpires when individual investors exhibit habitual behaviours (Argote *et al.,* 1989:58). Conversely, the fundamental attribution error transpires when individual investors underestimate the significance of external situations and overestimate the significance of disposition in establishing the behaviour of other individuals (Ross, 1977:194). Lastly, the false consensus effect transpires when individual investors faultily think that other individuals share their beliefs more than they actually do. The overconfidence of individual investors encourages the false consensus effect by making individual investors reluctant to recognise the probability that they are making a mistake (Ross *et al.,* 1977:279; Jordan & Miller, 2009:282).

With reference to the review of the investment decision-making biases, it is frequently argued in traditional finance that the behavioural finance biases will be eradicated through learning and experience. On the contrary, research in the behavioural finance field shows that behavioural finance biases are not eradicated through learning, repetition or greater motives (Tversky & Kahneman, 1974:1125; Mazzoli & Marinelli, 2011:47). Financial planners and investment companies can enhance their understanding of individual investors' preferences and make better recommendations regarding investment strategies, when they have a better comprehension of the risk profiling of individual investors from a behavioural finance perspective (Pompian, 2016:1). Therefore, individual investor risk profiling from a behavioural finance perspective is discussed in the following section (Section 3.6.2).

3.6.2 Individual investor risk profiling from a behavioural finance perspective

As discussed earlier in this chapter, there are different types of individual investors that are classified into different risk profiling categories (Section 3.4) based on their willingness to tolerate risks (Goodall, 2005:198). When individual investors make investment decisions on how much risk to take (risk appetite) or how much loss can be tolerated without placing financial goals at risk (risk capacity), unknown risks can cause individual investors to behave irrationally (Pompian, 2016:4). In a behavioural finance context, individual investors should take into consideration their likely reaction towards known risks, and particularly unknown risks, to acquire a comprehensive depiction of their risk tolerance. If individual investors are able to comprehend and measure the risks they are taking (i.e. known risks), the results from their investment decisions can be accepted. Nonetheless, behavioural finance becomes apparent in the unknown risks. Therefore, when the risks individual investors accepted consist of outcomes that are beyond their expectation and comprehension (i.e. unknown risks) it brings about uncertainty and behavioural problems are often set in motion (Pompian, 2016:5).

As indicated in Table 3-12, Pompian (2016:7) classified individual investors into behavioural investor types based on their level of risk tolerance and a primary type of bias, either cognitive (Section 3.6.1.1) or emotional (Section 3.6.1.3). Individual investors are categorised into four risk profiling categories, namely conservative, moderate (balanced), growth (moderately aggressive) and aggressive, which display different types of behavioural biases.

Table 3-12: Risk tolerance and types of biases

	Conservative	Moderate	Growth	Aggressive
Risk tolerance	Low	Medium	High	Very high
Bias types	Primarily emotional	Primarily cognitive	Primarily cognitive	Primarily emotional
Biases	Endowment Loss Aversion Status quo Anchoring Mental accounting	Hindsight Framing Cognitive dissonance Recency Regret	Conservatism Availability Confirmation Representativeness Self-attribution	Overconfidence Self-control Affinity Illusion of control Outcome

Source: Pompian (2016:8)

According to Pompian (2016:9), conservative individual investors have low risk tolerance levels (indicating low risk appetite and risk capacity) and are primarily driven by emotional biases, such as the endowment bias, loss aversion and status quo. On the other hand, conservative individual investors are also subject to cognitive biases, such as anchoring and mental accounting. Moderate individual investors displaying moderate risk tolerance levels are primarily driven by cognitive biases, such as the hindsight bias, framing, cognitive dissonance and the recency bias. However, moderate individual investors also experience emotional reactions when they realise that judgement errors were made in investment decisions and accordingly, they are also subject to the regret aversion bias (Zindel *et al.,* 2014:15).

Growth (moderately aggressive) individual investors display medium to high levels of risk tolerance and are primarily driven by cognitive biases, such as conservatism, availability, confirmation, representativeness and self-attribution (Pompian, 2012:225). These types of individual investors believe in themselves and their investment decisions. They also attempt to outperform the financial markets and may hold more concentrated investment portfolios. However, they can be unperceptive to contrary thinking and therefore, education and information about their cognitive biases are fundamental to change their behaviour and make better investment decisions (Pompian, 2012:226). Lastly, aggressive individual investors that have high risk tolerance levels (indicating high risk appetite and risk capacity) are primarily driven by emotional biases, namely the self-control bias and affinity bias. Aggressive individual investors are also subject to cognitive biases, such as the overconfidence bias, outcome bias and illusion of control bias. These types of individual investors display overconfidence in their

own abilities to make investment decisions and are likely to believe that they can control the outcomes of their investments (Pompian, 2016:18).

Dickason and Ferreira (2018a:2) conducted a study whereby they examined which behavioural finance biases are associated with a certain level of risk tolerance and investor personality (risk profiling category). Figure 3-5 presents a graphical illustration of the findings of the study by demonstrating the investor risk tolerance levels and investor personality according to each behavioural finance bias.

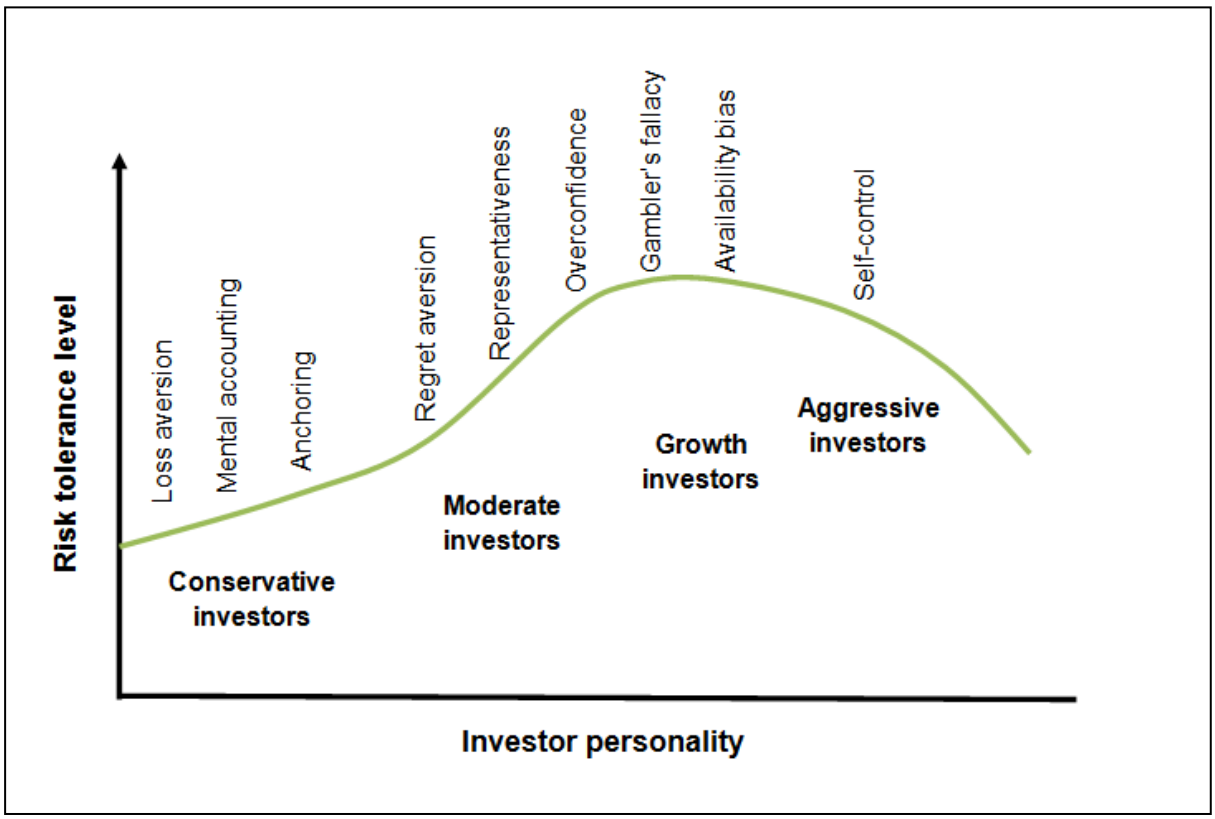

Figure 3-5: Risk tolerance, investor personality and behavioural finance biases
Source: Dickason and Ferreira (2018a:10)

As indicated in Figure 3-5, it was found in the study that conservative individual investors with low levels of risk tolerance are subject to biases, such as loss aversion and mental accounting. Alternatively, conservative individual investors with medium levels of risk tolerance are subject to the anchoring bias. Moderate individual investors with medium levels of risk tolerance were driven by the regret aversion bias. Moderate-to-growth individual investors with medium levels of risk tolerance were found to be subject to the availability, representativeness, overconfidence and gambler's fallacy biases. Lastly, individual investors that were found to be driven by the

self-control bias were aggressive individual investors with high levels of risk tolerance (Dickason & Ferreira, 2018a:11).

By taking into account all the factors relevant to individual investment decision-making and considering the risk profiling of individual investors from a behavioural finance perspective, it will also be valuable to establish if the application of life cycle investing in practice is relevant and conforms to the investor life cycle theory, which is discussed in the following section (Section 3.7).

3.7 LIFE CYCLE INVESTING: FROM THEORY TO PRACTICE

With reference to Section 3.2, the individual investor life cycle theory affirms that, as individual investors pass through the different phases of the investor life cycle, their investment needs and preferences change significantly. While being able to tolerate more risks and invest in high risk investments consisting of growth assets when they are young, they become less willing to tolerate risks and are likely to invest in low risk investments consisting of defensive assets as they age (Cocco *et al.*, 2005:494; Reilly & Brown, 2012:33). In practice, financial practitioners utilise the life cycle theory as it provides them with guidance on how individual investors make investment decisions (Bodie, 2003:24). Given the underlying principle in economic and financial theories, financial practitioners presume that individual investors behave rationally and consider all available information when making investment decisions. Conversely, the latter is not true in practice (Thaler & Johnson, 1990:645). However, relatively little attention has been devoted to determine if the application of life cycle investing in practice conforms to the individual investor life cycle theory (Bell, 2013:1). The findings of previous research conducted on the individual investor life cycle regarding its relevance in practice are discussed below.

A study conducted by Malkiel (1990:339) suggested that as individuals' age, the portion of shares held in their investment portfolios ought to decline. The suggested shares held in the investment portfolios of individual investors ought to decline from 70 per cent for a 25-year-old individual to 30 per cent for a 70-year-old individual. Delaney and Reichenstein (1996:10) analysed household portfolio composition from a broad perspective, which consisted of real estate and human wealth. It was advocated that in young and mid-aged households, human wealth is considered to be the principal asset, indicating that financial assets constitute a small portion of their wealth. It is further asserted that it is relatively realistic for young and mid-aged households to have investment portfolios that primarily consist of shares, given that losses

incurred from unfavourable returns can be recovered from over the short term by amending future consumption and savings (Delaney & Reichenstein, 1996:11).

In addition, Sung and Hanna (1996:14) investigated the effect of the number of years until retirement on the risk tolerance of individual investors. Individual investors who had 30 years or more until retirement was found to have considerably higher risk tolerance levels than individual investors who were closer to or nearing retirement age. A study conducted by Hanna and Chen (1997:23) found that individual investors with an investment horizon of 20 years or more should have an all-share investment portfolio, given that it dominates all other possible portfolios of assets for a broad spectrum of risk aversion levels. Individual investors with very low levels of subjective risk tolerance should also have high risk investment portfolios if their investment horizon is 20 years or more (Hanna & Chen, 1997:24).

Similar to the study of Malkiel (1990:339) and conforming to the individual investor life cycle theory, Coco *et al.* (2005:527) also found that individual investors have a propensity to reduce the portion of shares held in their investment portfolios as they age. This is by reason of that labour income becomes less important as individuals age and accordingly, individual investors shift their investment portfolios towards risk-free assets. Another study conducted by Schooling and Worden (2016:265) found that the change in risk tolerance as measured by the change in financial portfolio risk is related to the phase in the individual investor life cycle. The portion of financial assets held in shares decreases as individual investors' age, which conforms to the investor life cycle theory.

Gomes and Michaelides (2005:869) examined the low participation rates in the stock market and moderate equity holdings of individual investors participating in the stock market. In contrast with the individual investor life cycle theory, the findings of this study indicated that the investment portfolios of young individual investors do not primarily consist of equities. Households that are considered to be risk-averse do not accrue a sufficient amount of wealth to enter the stock market and as a result, the majority of these households never invest in equities. Only young individual investors who accumulate more wealth and who can conquer the barriers to enter the stock market are likely to invest in equities (Gomes & Michaelides, 2005:898).

Schurer (2015:491) investigated which socio-economic groups are most likely to modify their risk preferences over the life cycle by making use of data from a German survey and methods to separate age from coherent and period effects. It was found that risk tolerance declines across all socio-economic groups from late adolescence, starting at age 20 up to the age of 45.

A socio-economic gradient becomes apparent from age 45. Thereafter, the risk tolerance of individuals in the highest income brackets persists to slightly increase up until retirement age. However, the risk tolerance of individuals in the lowest income brackets persists to decrease approximately linearly up until the age of 80 years (Schurer, 2015:492).

Lastly, Van den Bergh (2018:185) examined the effect of age, risk perception and risk tolerance on the investor life cycle from a South African point of view and how it deviates from the investor life cycle theory. The findings indicated that age significantly predicts the likelihood of individual investors being classified into one of the phases of the investor life cycle. Nonetheless, the level of risk individual investors tolerate does not entirely conform to the investor life cycle theory and is reliant on their perceptions and attitudes towards risk. It can also be inferred that South African individual investors do not behave rationally when making investment decisions (Van den Bergh, 2018:186).

3.8 SYNOPSIS

Individual investors are required to make important investment decisions when constructing and managing their investment portfolios over their lifetime. For that reason, this chapter aspired to provide an overview of the investment decisions that individual investors ought to make when investing. The theoretical objective to contextualise a theoretical framework pertaining to individual investment decision-making is achieved in this chapter. The theoretical objective to examine the theoretical theories relating to the investor life cycle and behavioural finance biases, as endogenous factors influencing the risk tolerance behaviour of individual investors when making investment decisions, is also accomplished in this chapter.

In the first section of this chapter, the theoretical aspects of the individual investor life cycle are explained (Section 3.2). The investment decisions of individual investors are different throughout the phases of the investor life cycle. Therefore, individual investors must be acquainted with their phase in the investor life cycle when making investment decisions, since it affects their investment goals and objectives, and consequently, the effective management of their investment portfolios. Secondly, a discussion concerning the investment objectives and constraints (Section 3.3) followed by the risk profiling categories (Section 3.4) of individual investors are provided. Throughout the different phases of the investor life cycle, the asset allocation in the investment portfolios of individual investors should be amended to fulfil their needs and goals at each phase of the investor life cycle. Even though individual investors behave similarly towards risk in particular situations, their investment portfolios will still vary as

they find themselves in diverse circumstances. Given that risk tolerance has a significant effect on the investment decisions of individual investors, it is essential to establish their risk tolerance through risk profiling. For that reason, the investment objectives and constraints, as well as risk profiling categories of individual investors need to be established to facilitate the accurate composition and appropriate asset allocation of their investment portfolios. A summary of the traditional and non-traditional asset classes was also provided (Section 3.5). Every asset class comprises unique characteristics that make them appropriate for various investment objectives. The selection of the most suitable combination of assets to be included in investment portfolios is mainly reliant on the propensities of individual investors to tolerate risks. However, no asset class is risk-free and therefore, it is generally advised that a combination of cash, bonds, property and equities should be included in the investment portfolios of individual investors to lessen the overall risk.

In the second section of this chapter, the role of behavioural finance in individual investment decision-making is discussed (Section 3.6). The theoretical theories relating to the behavioural finance biases (investment decision-making biases) were discussed (Section 3.6.1). Additionally, individual investor risk profiling from a behavioural finance perspective was also attended to (Section 3.6.2). Behavioural finance attempts to explain the actual behaviour of individual investors and how they make investment decisions. The manner in which individual investors make investment decisions is influenced by how they think and feel. By comprehending how financial markets and individual investors behave, it may be feasible to modify or change the behaviours of individual investors to improve financial outcomes. When risk tolerance is viewed from a behavioural finance perspective, financial planners should determine how individual investors react to known risks, as well as unknown risks. Unknown risks are likely to bring about uncertainty and consequently, behavioural problems that can derail successful investment planning. It is also imperative for financial planners and individual investors to be acquainted with the various types of behavioural finance biases. When individual investors are subject to cognitive biases (Section 3.6.1.1) it may be feasible to modify or change the way individual investors think. However, when individual investors are subject to emotional biases (Section 3.6.1.3), financial planners often need to adapt to the behaviour of individual investors. Lastly, a discussion is provided to establish if the application of life cycle investing in practice is relevant and corresponds with the individual investor life cycle theory by considering the findings of previous research conducted on the individual investor life cycle (Section 3.7). In conclusion, the final section of the theoretical framework of the study is enclosed in this chapter.

Subsequently, the research design and methodology relating to this study is attended to in Chapter 4.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

Research is the process of understanding a phenomenon through the planned and methodical collection, analysis and interpretation of data (Singh, 2006:1). The research process is methodical since the identification of the objective, management of the data and reporting of the results and findings take place within established frameworks and guidelines (De Vos & Strydom, 2011:42). The frameworks and guidelines give researchers an indication of what to incorporate in the research, how the research should be executed and the required assumptions that should be implemented. Research commences with at least one question about one phenomenon or interest (Williams, 2007:65).

Considering the above-mentioned, the primary objective of this research study is to profile investor risk tolerance behaviour based on pre-identified endogenous and exogenous factors. In line with the primary objective, the following empirical objectives were formulated as specified in Chapter 1:

- Report on the risk tolerance behaviour of individual investors in the sample.
- Determine individual investors' phase in the investor life cycle.
- Identify the behavioural finance biases that drive individual investment decisions.
- Identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour.
- Identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour.
- Construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

To facilitate the attainment of the primary objective along with the empirical objectives, a comprehensive research design and methodological approach had to be constructed, which are discussed in this chapter. The following sections of research design and methodology are attended to in this chapter:

- Section 4.2 explains the research design with a summary of the four research paradigms.
- The different research approaches that describe the data collection methods are compared in Section 4.3.

- Section 4.4 elaborates on the chosen research design and approach applied to this research study.
- Section 4.5 elucidates the sampling procedure, which comprises the target population, sampling frame, sampling method and sample size. The probability and non-probability sampling methods are also examined in this section to establish the most appropriate method for this research study.
- The measuring instrument and data collection method are then described in Section 4.6. The format, design and administration of the questionnaire are discussed in this section.
- The data collection procedure, which comprises the ethical considerations, pilot study and management of information, is explained in Section 4.7.
- Lastly, the statistical procedures employed to analyse the quantitative data are outlined in Section 4.8.

4.2 RESEARCH DESIGN

A well-established and comprehensive plan, namely a research design, is required to ensure the achievement of the primary objective together with the empirical objectives of the research study (Wiid & Diggines, 2013:54). The research design refers to the overall framework of the research study, which entails the classification of the research problem, the literature review, research methodology and conclusion, to ensure that the research problem is successfully addressed (Conrad & Serlin, 2011:147). It constitutes the blueprint for the collection, analyses and interpretation of data to accomplish the empirical objectives (Creswell, 2009:3). Research designs assist researchers to classify ideas in a manner in which errors and inadequacies can be recognised (Kothari, 2004:32). However, the research design to be applied should be in line with the underlying objectives of the study and subject to the availability of resources (Creswell, 1998:2).

There are three main types of research designs, namely exploratory research, descriptive research and casual research (Zikmund & Babin, 2010:44). An exploratory research design, which follows a flexible and evolving approach, seeks to explore a rather unknown research area. It is used to obtain insights, uncover generalisations and develop new hypotheses about the underlying phenomenon being investigated. This research design is more qualitative in nature and the data collection methods consist of observations, surveys, case studies and unstructured or semi-structured interviews (Fouché & De Vos, 2005:106).

A descriptive research design, which follows a planned and structured approach, seeks to describe the characteristics of objects, individuals and groups or details of a situation, social

environment or relationship. This research design is used to answer the “who”, “what”, “when”, “where”, “why” and “how” questions (Fouché & De Vos, 2005:106). Given that the research design follows a predetermined and structured approach, the researcher initiates the research process with the establishment of a well-defined research topic and thereafter, conducts research to describe it accurately. The descriptive research design is considered to be quantitative and qualitative in nature and comprises large sample sizes (Malhotra *et al*., 2017:73).

A casual research design, which follows a planned and highly structured approach, seeks to obtain evidence to make casual inferences regarding the cause-and-effect relationships between variables. The researcher generally has a good understanding of the underlying phenomenon being investigated and therefore, the researcher can make an informed prediction regarding cause-and-effect relationships that will be studied. The data collection method used for casual research design is experimentation (Zikmund & Babin, 2010:80).

The research design process initiates with the adoption of a philosophical worldview or paradigm. Researchers need to take into consideration the philosophical worldview assumptions, which also include their worldviews, paradigms or set of beliefs that they are able to incorporate in their research studies. The four main research paradigms are reviewed in the following section (Section 4.2.1) to assist with the selection of the most appropriate paradigm for this research study.

4.2.1 Research paradigms

A research paradigm is defined as a model or pattern that consists of a range of valid and rational assumptions and design for the collection and interpretation of data (Barker, 2003:312). In addition, a research paradigm can also be referred to as a framework, viewpoint or worldview that is based on the individual beliefs, assumptions and general orientations that researchers hold about the social world and the nature of research (Welman *et al*., 2005:13; Creswell, 2014:6). Research paradigms are also utilised by researchers to organise and understand their observations and reasoning about reality and to guide the consequent action to be performed (Babbie, 2010:33).

According to Creswell (2003:4), the different philosophical worldview assumptions that researchers need to consider regarding the concept of reality relate to the nature of reality (ontology), the theory of knowledge (epistemology), the role of values in research (axiology), the language of research (rhetoric) and the methods employed in the process (methodology). A researcher decides on a stance on each of these assumptions and

consequently, the decisions have practical implications for designing and conducting research (Guba & Lincoln, 1994:108; Creswell, 1998:15). For that reason, research should be conducted within a specific paradigm and the researcher should have a comprehension of the different research paradigms to choose the most appropriate paradigm for the research study (De Vos & Strydom, 2011:40). There are four main types of research paradigms, namely the positivist paradigm, the constructivist paradigm, the participatory paradigm and the pragmatic paradigm (Frels & Onwuegbuzie, 2013:185; Creswell, 2014:6). Table 4-1 illuminates upon the primary features of the four research paradigms.

Table 4-1: Primary features of the four research paradigms

Positivism	Constructivism	Participatory	Pragmatism
Associated in quantitative studies.	Associated in qualitative studies.	Associated in mixed-methods studies, but mainly qualitative studies.	Associated in mixed-methods studies.
Concentrate on the knowledge and causation, observation of variables and theory testing.	Concentrate on meaning or understanding of a certain phenomenon formed by participants.	Concentrate on political issues.	Concentrate on the consequences of actions.
Top-down approach.	Bottom-up approach.	Participant approach.	Question approach.
Empirical testing, deductive where previous theory is tested.	Inductive based on social and historical construction.	Participatory, active participant engagement to form collaborative results.	Combination of qualitative and quantitative measures and data.
Unbiased values.	Biased values.	Biases are negotiated.	Biased/unbiased values.
Concentrate on confirmation of theory by means of formal writing.	Concentrate on theory generation by means of informal writing.	Concentrate on changing the social world for the better.	Concentrate on real world practice by means of formal and informal writing.

Source: Creswell and Plano Clark (2011:73); Frels and Onwuegbuzie (2013:183); Creswell (2014:6)

A discussion on the four main research paradigms is provided in the following subsections (Section 4.2.1.1–Section 4.2.1.4).

4.2.1.1 The positivist paradigm

The positivist paradigm is mainly associated with quantitative studies, given that scientific measures and empirical testing methods are employed to attain insights and knowledge (Frels & Onwuegbuzie, 2013:183). The positivist paradigm seeks to apply methods, techniques and procedures of natural sciences for the investigation of a social phenomenon and depictions of the social world (De Vos *et al.,* 2005:5; Babbie, 2010:35). This paradigm holds that scientific methods are the only manner in which true knowledge and objective reality can be established. It further holds that an objective reality exists outside of individual experiences and that reality is singular and not related to consciousness or perception (Neuman, 2003:75; Quinlan, 2011:14).

In the positivist paradigm, research studies are based on assumptions of knowledge, causation, reductionism, the observation of variables and testing of existing theories (Creswell & Plano Clark, 2011:72; Creswell, 2014:6). The researcher is required to start the process with a theory; collection of data that supports or rejects the theory and thereafter, make the necessary amendments before further tests are conducted. Researchers are faced with the challenge to test a theory and endeavour to improve the prognostic understanding of the underlying phenomenon (Creswell, 2003:7; McGregor & Murnane, 2010:424). Several researchers recommend the utilisation of the positivist paradigm in quantitative research studies (Babbie & Mouton, 2001:23; McGregor & Murnane, 2010:424; Frels & Onwuegbuzie, 2013:183; Creswell, 2014:6).

4.2.1.2 The constructivist paradigm

The constructivist paradigm, which underlies qualitative studies, is based on the notion of no single objective reality. This paradigm holds reality to be socially constructed and that the social world entails multiple realities. It is further believed that reality is unique to each individual and therefore, focuses on how an individual constructs, experiences and understands the social world, given their circumstances and life experiences (De Vos, 2005:358; Quinlan, 2011:14). Compared to the other research paradigms, the constructivist paradigm necessitates enhanced rationalisations to assist with the establishment of various perspectives from the multiplicity of realism (Guba & Lincoln, 1994:115).

Provided that individuals develop subjective meanings of their experiences, researchers aspire to find the complexity of perceptions in preference to the narrow meanings of a few categories or ideas (Creswell, 2009:8). The individual perspectives of participants are utilised to construct new theories and follow a bottom-up approach (Creswell & Plano Clark,

2011:72; Frels & Onwuegbuzie, 2013:186). Guba and Lincoln (1994:112) identified that as opposed to the positivist paradigm, the constructivist paradigm and its realities are adaptable. Participants also have complete control over the entire process to facilitate the establishment of an open relationship between the participants and the researchers (Glicken, 2003:31). It is presumed that the involvement of participants throughout the entire process brings about exceptional and more accurate results (De Vos *et al.,* 2011:8).

4.2.1.3 The participatory paradigm

According to Fouché and De Vos (2005:109), the participatory paradigm holds that research needs to be associated with politics and political agendas to deal with social oppressions. Research conducted within this paradigm focuses on the lives and experiences of diverse groups that are underprivileged, associate political and social actions with inequalities and seeks to increase awareness in social, economic and political issues (Heron & Reason, 1997:292; Quinlan, 2011:99). This paradigm encompasses the viewpoints and perceptions of participants in a research study to empower disadvantaged individuals and to transform the society and lives of the participants and researchers (Guba & Lincoln, 1994:113; Strydom, 2005c:410).

From this point of view, the researcher starts the research process with one underlying social, economic or political issue as the focal point of the study (Babbie, 2010:313; Creswell, 2014:10). Given that the participatory paradigm is primarily interactive, participants that are being studied actively participate in the research process and different biases are negotiated with participants to encourage improvement in the social world (Frels & Onwuegbuzie, 2013:187). The participatory paradigm is mainly utilised in qualitative studies. However, depending on the objectives of the study, this paradigm can also be utilised in mixed-methods studies (Creswell & Plano Clark, 2011:73; Frels & Onwuegbuzie, 2013:183).

4.2.1.4 The pragmatic paradigm

The pragmatic paradigm, which is utilised in mixed-methods studies, originates from actions, circumstances and consequences as opposed to previous circumstances (Tashakkori & Teddlie, 1998:19; De Vos, 2005:361). Pragmatism holds that there can be single or multiple realities that are open to empirical investigation and disbelief that reality can be permanently established (Johnson & Onwuegbuzie, 2004:14; Pansiri, 2005:191). It is believed that knowledge and reality are based on beliefs and habits that are socially constructed (Kaushik & Walsh, 2019:258). According to Frels and Onwuegbuzie (2013:183), the reality is regularly

re-established, contemplated and construed, bearing in mind its efficiency in new variable circumstances.

With the pragmatic paradigm, research questions are considered to be more important than the research process itself and concentrate on the application and solving of problems (Patton, 1990:28; Creswell & Plano Clark, 2011:74). The researcher emphasises the research problem and employs all available approaches to comprehend the problem, instead of concentrating on methods (Rossman & Wilson, 1985:630; Creswell, 2014:10). A value-oriented approach is mainly followed, seeing that biased and unbiased values are incorporated in the approach (Johnson & Onwuegbuzie, 2004:18).

Following the review of the research paradigms, the researcher ought to have a comprehension of the different paradigms to select the most appropriate paradigm for the research study. However, before the research design, along with the chosen research paradigm, applied to this research study are elaborated on, the different research approaches that describe the data collection methods are reviewed in the following section (Section 4.3).

4.3 RESEARCH APPROACH

The following step involves the selection of a research approach. A research approach refers to the procedures used to identify the methods for the collection, analyses and interpretation of data (Fouché & De Vos, 2005:101). There are three different research approaches that can be followed in a research study, namely quantitative, qualitative and mixed-methods approaches (Kothari, 2004:5; Williams, 2007:65; Conrad & Serlin, 2011:147; Frels & Onwuegbuzie, 2013:187; Creswell, 2014:3). Table 4-2 illuminates upon the three different research approaches.

Table 4-2: Research approaches

	Quantitative approach	Qualitative approach	Mixed-methods approach
Methods used	Predetermined methods.	Emerging methods.	Predetermined and emerging methods.
Questions	Questions are based on instruments.	Open-ended questions where participants can elaborate on answers.	Open-and closed-ended questions.
Data measure	Measurable (numeric) data.	Data are in die form of interviews, observations or audio.	Both quantitative and qualitative data.
Analysis	Statistical analysis.	Text and image analysis.	Statistical and text analysis.
Interpretation	Comprises statistical interpretation.	Data are interpreted using patterns or themes.	Data are interpreted across databases.
Strengths	Results can be generalised. Sufficient for a large sample. Quantitative predictions can be made. Eliminate the influence of irrelevant variables. Data collection and analysis are more time efficient. Provides accurate results. Results are independent of the researcher.	Provides individual information. Sufficient for an in-depth analysis of a smaller sample. Valuable in the description of complex phenomena. Provides an understanding of individuals' personal experiences. Data are collected in naturalistic settings. Cross-case comparisons and analyses can be conducted.	Combines strengths and avoid limitations of quantitative and qualitative approaches. Individual information adds meaning to quantitative results. New theories can be constructed and tested. Complete understanding of phenomena. More accurate results by using both quantitative and qualitative approaches.
Weaknesses	Studied aspects may be irrelevant to participants. Excludes variables not being studied.	Results may not be generalised. Difficult to make quantitative predictions and to test hypotheses and theories.	The execution of both quantitative and qualitative approaches may be challenging for the researcher.

	Quantitative approach	Qualitative approach	Mixed-methods approach
	Results may be too abstract and general.	Data collection and analysis are time-consuming. Results may be influenced by the researcher's personal biases.	More time-consuming and expensive. Data analysis and interpretation may be more complex.

Source: Johnson and Onwuegbuzie (2004:19); Flick (2011:13); Creswell (2014:17)

4.3.1 The quantitative research approach

The quantitative research approach aspires to test theories by means of examining the relationship among variables. It is reliant on deductive reasoning, and the collection and analysis of numerical data to demonstrate, elucidate, predict or control variables and phenomena of interest (Plano Clark & Ivankova, 2016:5). The quantitative research approach focuses on the objective measurement and the statistical analysis of data. Variables or underlying phenomena can be measured through instruments, such as questionnaires, polls or surveys, to analyse the numerical data by using statistical methods (Quinlan, 2011:286). It further entails measuring the validity of existing theories by employing predetermined methods based on larger samples where results are measurable and subsequently generalised (Muijs, 2010:3; Khalid *et al.,* 2012:16). The quantitative research approach is accurate in its analysis and testing as a result of its dependence on existing theories (Flick, 2011:13). Given that the research results are relatively independent of the researcher, data are used to objectively measure reality (Hopkins, 2000:1; Johnson & Onwuegbuzie, 2004:19).

As stated by Williams (2007:66), the quantitative research approach can be employed by answering relational questions regarding measured variables or underlying phenomena in research. Quantitative research questions are likely to be particular and can be classified into descriptive, comparative and relationship questions. Descriptive questions simply seek to establish the relationship between variables and measure responses on one or more variables. On the other hand, comparative questions seek to make comparisons between two or more groups concerning the same variable, specifically, the dependent variable. Lastly, relationship questions seek to establish the trend between two or more variables (Onwuegnbuzie & Leech, 2006:480; Creswell, 2009:4). Researchers employing a quantitative research approach aspire to establish, confirm or validate relationships and create generalisations that contribute to theory. The findings obtained from quantitative research can be prognostic, explanatory and corroborated (Leedy & Ormrod, 2001:14; Williams, 2007:66).

4.3.2 The qualitative research approach

According to Williams (2007:67) and Delport *et al.* (2011:298), qualitative research is viewed as a comprehensive approach that involves discovery. The qualitative research approach concentrates on discovering the experiences of individuals with a phenomenon through the collection and analysing of narrative and text data articulated in words and images (Plano

Clark & Ivankova, 2016:5). This research approach is sufficient for an in-depth analysis of a smaller sample and aspires to obtain a comprehension of the underlying phenomenon under investigation based on the perspectives of individuals (Kothari, 2004:3; Flick, 2011:12). Creswell (2009:4) asserted that the qualitative research approach encompasses emerging questions and procedures, data collection takes place in a naturalistic setting and the analysis of data is based on inductive reasoning derived from particulars to general themes. Qualitative research questions are considered to be open-ended and evolving for participants to elaborate on answers and subsequently, for researchers to understand and explain the phenomenon under investigation. Themes should be created from the data collected and should intent to answer the "what", "how" or "why" questions concerning the underlying phenomenon being investigated (Onwuegnbuzie & Leech, 2006:482; Flick, 2011:13).

As stated by Fouché and Schurink (2011:308), the qualitative research approach concentrates on comprehension rather than rationalisation and natural examination in preference to controlled measurement. Therefore, the main aim of the qualitative research approach is to elucidate the underlying phenomenon being investigated as opposed to performing statistical comparisons between variables. It also concentrates on the subjective examination of reality from the perspective of an insider, as opposed to an outsider's perspective that is predominant in the quantitative research approach. Consequently, a qualitative research study may be faced with the risk that the results may be influenced by the personal biases of the researcher (Johnson & Onwuegbuzie, 2004:19). As indicated by Leedy and Ormrod (2001:104), as well as Williams (2007:67), the final written report consists of a flexible structure, given that the qualitative research approach is less controlled in description, as it creates and establishes new theories. By following a qualitative research approach, the researcher can construct a multifaceted representation, examine words and report on the in-depth perspectives of participants (Creswell, 1998:15). Lastly, the researcher should have sufficient time, resources and a strong dedication to investigate a phenomenon (Creswell, 1998:15; Creswell, 2009:13).

4.3.3 The mixed-methods research approach

Given that both quantitative and qualitative research approaches entail certain limitations, certain research studies require a combination of both quantitative and qualitative research approaches. Accordingly, the mixed-methods research approach became known as the third research approach, which employs both quantitative and qualitative data collection methods and analytical procedures in the same research study or in a series of research studies that

investigates the same underlying phenomenon (Denscombe, 2008:270; Leech & Onwuegbuzie, 2009:265; Creswell & Plano Clark, 2011:5; Flick, 2011:188; Khalid *et al.,* 2012:16; Plano Clark & Ivankova, 2016:5). Its logic of inquiry incorporates the utilisation of induction (discovery of patterns), deduction (theory testing and hypothesis) and abduction (uncovering and depending on the greatest set of explanations to comprehend the results) (Johnson & Onwuegbuzie, 2004:19; Onwuegbuzie & Leech, 2006:474). As stated by Delport and Fouché (2011:436), the mixed-methods research approach aspires to validate the utilisation of various approaches by responding to research questions, as opposed to limiting the choices of researchers. It enables researchers to attend to a variety of confirmatory and exploratory questions and as a result, validate and construct new theories in the same study. Mixed-methods research questions combine both quantitative research questions (closed-ended) and qualitative research questions (open-ended). The quantitative data (numerical) and qualitative data (narrative and text) should be collected and analysed either concurrently or sequentially (Leech & Onwuegbuzie, 2009:267; Creswell & Plano Clark, 2011:5; Creswell, 2014:217).

Frels and Onwuegbuzie (2013:184) revealed that the mixed-methods research approach enables researchers to draw from the strengths and minimise the weaknesses of the quantitative and qualitative research approaches. It also places researchers in the best situation to combine the research approaches to provide them with a better comprehension of the underlying phenomenon being studied and consequently, comprehensive, accurate and valuable research results are obtained (Creswell & Plano Clark, 2011:5). The strengths and weaknesses of quantitative and qualitative research are not absolute, but it is rather relative to the context and how the researcher seeks to address the underlying phenomenon being studied (Williams, 2007:70). On the other hand, the mixed-methods research approach requires more time, resources, knowledge and skills for the collection and analysis of both quantitative and qualitative data (Delport & Fouché, 2011:436).

After the review and comparison of the different research approaches in this section, the researcher has the relevant knowledge to select the most appropriate approach for the research study. Accordingly, the chosen research design, along with the research paradigm, and research approach applied to this research study are elaborated on in the following section (Section 4.4).

4.4 CHOSEN RESEARCH DESIGN AND APPROACH FOR THIS STUDY

This research study entails a descriptive research design, whereby a positivist research paradigm is applied. A descriptive research design was followed as it is used to explain the

characteristics, attitudes, perceptions and behaviours of individuals and to establish the differences between numerous groups (Malhotra *et al.,* 2017:73). The application of the positivist research paradigm enabled the researcher to conduct deductive research to test existing theories, predict results and establish the relationships between variables to improve the prognostic understanding of the underlying phenomenon (Babbie & Mouton, 2001:23; De Vos *et al.,* 2005:5; Creswell & Plano Clark, 2011:72; Creswell, 2014:6). Given that scientific measures and empirical testing methods are employed in this research study to attain insights and knowledge, the positivist research paradigm is mainly associated with quantitative research studies (Frels & Onwuegbuzie, 2013:183).

A quantitative research approach was followed in this research study, which allowed for the systematic and objective gathering of information from the representative sample using questionnaires (Williams, 2007:66; Creswell & Plano Clark, 2011:31). The underlying phenomenon being investigated is usually measured once in its present state of existence with the aim to establish relationships among variables. It also involves the classification of the characteristics of an underlying phenomenon, which is determined on an observational basis or through the investigation of the relationship between two or more variables. Also, hypotheses are only developed subsequent to collection of the data (Maree & Pietersen, 2007:152). By following a quantitative research approach, the collection and analysis of data were more time efficient. The objective measurement and the statistical analysis of the data provided quantifiable, accurate and unbiased results that enabled the researcher to test existing theories, establish and verify relationships among variables and create generalisations that contribute to theory (Johnson & Onwuegbuzie, 2004:19; Flick, 2011:13; Plano Clark & Ivankova, 2016:5).

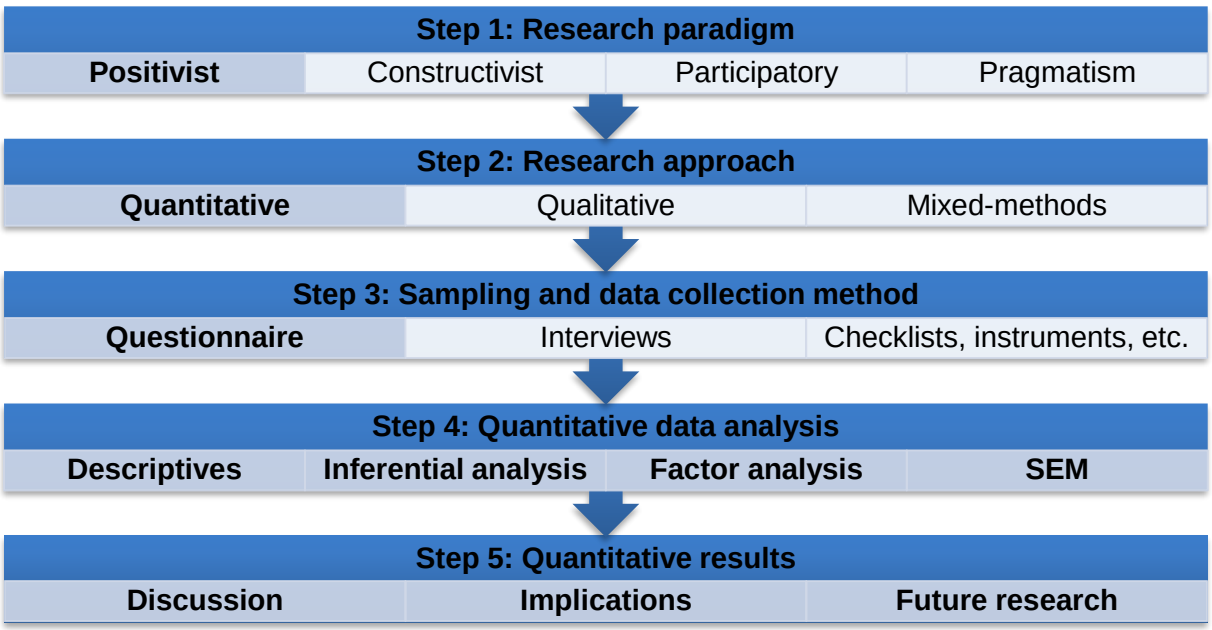

Figure 4-1: Methodological research framework
Source: Author compilation

An outline of the methodological research framework is provided in Figure 4-1. According to this figure, the next step of the methodological research framework entails the sampling procedure that was followed in this research study, which is discussed in the following section (Section 4.5).

4.5 SAMPLING PROCEDURE

According to Kerlinger (1986:5), as well as Onwuegbuzie and Collins (2007:281), sampling can be defined as the process of selecting a fragment of a population as a representative of an entire population. Kothari (2004:55) and Flick (2011:71) refer to a sampling procedure as the process of drawing conclusions from an entire population through the identification of a set of elements or items that have particular characteristics or information required for the investigation of an underlying phenomenon. The sampling procedure ensures that the sample utilised in a research study is as representative as possible of the entire population from which the sample was drawn (Quinlan, 2011:482). As discussed in the following subsections, the sampling procedure comprises the identification and selection of the target population (Section 4.5.1), sampling frame (Section 4.5.2), sampling method (Section 4.5.3) and sample size (Section 4.5.4) (Strydom, 2005b:194).

4.5.1 Target population

Powers *et al.* (1985:235) and Brooks (2014:62) define the target population as the total set of individuals, entities or units that could be included in a research study. The target population consists of particular characteristics or information of interest sought by the researcher for inclusion in the research study. Also, the target population is defined in terms of time span and/or geographical location (Strydom, 2005b:193). Careful consideration should be given to the selection of a target population. The incorrect selection of a target population will bring about skewed and inaccurate results and consequently, the true characteristics of the population required to investigate the underlying phenomena and to solve the research problem will not be displayed (Stagnor, 2015:112). As pointed out by Quinlan (2011:207), when selecting the target population, the researcher should determine the parameters of the population. The target population for this research study consists of individual investors from an investment company within the South African context.

4.5.2 Sampling frame

A sampling frame comprises a complete list of suitable elements, characteristics or units of the target population or set of guidelines for recognising the target population (Arkava & Lane, 1983:27; Iacobucci & Churchill, 2010:284; Quinlan, 2011:210). A sampling frame, instead of an entire target population, is studied by researchers given that it is more efficient and feasible to conduct research studies using smaller samples (Strydom, 2005b:194). The sampling frame of this study consists of a purposive sample of individual investors from an investment company in South Africa. By following a purposive sampling method, individuals that have other products, for example, insurance products, but no investments were eliminated from the sample frame. The purposive sampling frame comprises the most suitable and representative characteristics of the target population that are most valuable for the investigation of the underlying phenomena and solving of the research problem (Grinnell & Unrau, 2008:153). As mentioned in Chapter 1, the inclusion criteria for individual investors are as follows:

- Older than 18 years;
- a current investor (a screening question was asked); and
- lives in Gauteng.

The individual investors from the investment company should be 18 years and older, a current investor with some form of a formal investment product with the investment company and should live in Gauteng. Thus, Gauteng province was selected for this research study, as

it encompasses the greatest portion of the South African population (Stats SA, 2020:1). The individual investors from the South African investment company had to meet the inclusion criteria to ensure that every individual chosen to partake in the study makes a valuable contribution (Quinlan, 2011:213). For that reason, the individual investors chosen to participate in the study were chosen with a purpose (Babbie, 2010:193).

4.5.3 Sampling method

A sampling method is a procedure that is followed in order to identify how a particular sample will be drawn from a population (Mack *et al.*, 2005:5; Onwuegbuzie & Collins, 2007:281). When choosing a sampling method, there are a range of variables to take into consideration, such as research objectives, correctness, knowledge, resources, time, scope and statistical analysis methods (Maree & Pietersen, 2007:172; Diedericks, 2015:102). As illustrated by Figure 4-2 and discussed in the following subsections (Section 4.5.3.1–Section 4.5.3.2), sampling methods can be categorised into two main categories, namely probability sampling and non-probability sampling, which each comprises a number of subcategories (Strydom, 2005b:198; Quinlan, 2011:209).

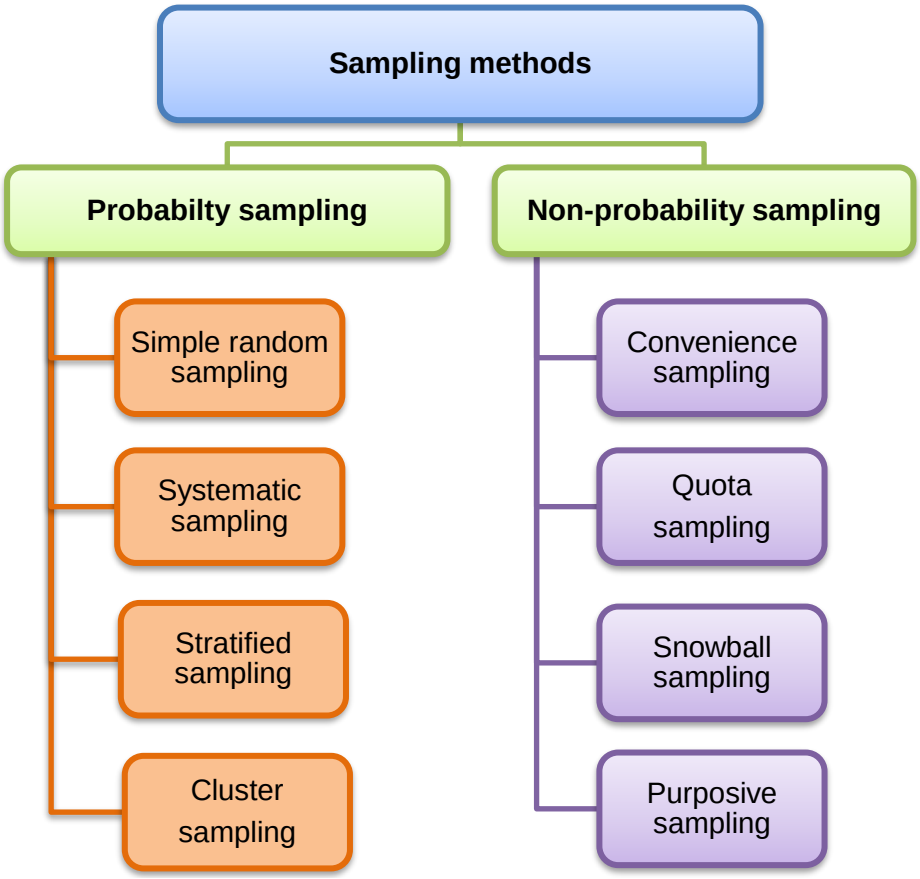

Figure 4-2: Sampling methods

Source: Strydom (2005b:198); Quinlan (2011:209)

4.5.3.1 Probability sampling

Probability sampling is a sampling method, which is founded on the concept of randomisation, where each individual, entity or unit in the population has an equal probability of being chosen for a sample (Kirk, 1999:367; DePoy & Gilson, 2008:234; Quinlan, 2011:209). Gravetter and Forzano (2003:118) contested that in probability sampling, the probability of choosing a particular individual is known and can be estimated. As depicted by Figure 4-2, there are four different probability sampling methods, namely simple random sampling, systematic sampling, stratified sampling and cluster sampling (Strydom, 2005b:198; Quinlan, 2011:209). Each of these probability sampling methods is summarised in Table 4-3.

Table 4-3: Probability sampling methods

Probability sampling method	Description
Simple random sampling	Each individual, entity or unit is selected at random and independently, and has a known and equal probability of being selected from a sampling frame.
Systematic sampling	Involves the selection of items at regular intervals from the sampling frame. Only the first case is selected randomly. All subsequent cases are selected according to a specific interval, depending on the percentage sample required. Every participant is chosen randomly from a list by choosing the kth participant every time.
Stratified sampling	Entails the selection of a sample based on some known characteristic of a population that will have an impact on the research. The sample frame is divided into subcategories where these categories are regarded to be homogeneous according to a list of characteristics. After that, a random sample is chosen from each of the subcategories.
Cluster sampling	Utilised when the population is found in clusters or groups and no fixed list of participants is obtainable, only a geographical map. The population is divided into different clusters or groups based on particular characteristics and thereafter, some clusters are selected randomly from all the clusters to include in the study.

Source: Singleton *et al*. (1988:145); Glicken (2003:108); Grinnell and Unrau (2005:160); Strydom (2005b:200); Onwuegbuzie and Collins (2007:285); Flick (2011:72); Quinlan (2011:210)

4.5.3.2 Non-probability sampling

Non-probability sampling is a sampling method, which is based on non-randomisation, where each individual, entity or unit in the population does not have an equal probability of being chosen for a sample (Unrau *et al*., 2007:280). Salkind (2000:87), as well as Gravetter and Forzano (2003:118), stated that the probability of choosing a particular individual, entity or unit is also not known beforehand for the reason that the researcher is not acquainted with the size or members of the population. Non-probability sampling can be utilised in quantitative and qualitative research (Onwuegbuzie & Collins, 2007:283; Creswell & Plano Clark, 2011:174). As depicted by Figure 4-2, there are four different non-probability sampling methods, which include convenience sampling, quota sampling, snowball sampling and purposive (judgemental) sampling (Strydom, 2005b:202; Quinlan, 2011:214). Each of these non-probability sampling methods is summarised in Table 4-4.

Table 4-4: Non-probability sampling methods

Non-probability sampling method	Description
Convenience sampling	Entails the selection of a sample based on the availability, accessibility and willingness of individuals to participate in the study to save time and expenses. The researcher is familiar with how many individuals to include in the sample and as a result, keep engaging individuals in the study until the total sample has been attained.
Quota sampling	Individuals, entities or units are chosen based on predetermined characteristics for the total sample to comprise the same distribution of characteristics presumed to be present in the population being investigated. A sample is established through the utilisation of different quota criteria.
Snowball sampling	The researcher finds a suitable participant that meets the inclusion criteria to partake in the study and after being interviewed, asks the participant to suggest more individuals to partake in the study. This sampling method is generally utilised when access to suitable participants for the study is limited.
Purposive (judgemental) sampling	Individuals, entities or units are selected based on the researcher's judgement to select the most suitable participants that meet the inclusion criteria and who will make a valuable contribution to the study. Individuals chosen to be included in the sampling frame would be key informants on the underlying phenomenon being investigated. The sample comprises the most characteristic and representative elements of the population that are most valuable for the research study. For that reason, the individuals chosen to partake in the study are selected with a purpose.

Source: Marshall (1996:523); Royse (2004:197); Mack *et al.* (2005:5); Strydom (2005b:202); Onwuegbuzie and Collins (2007:286); Grinnell and Unrau (2008:153); Babbie (2010:192); Quinlan (2011:214)

For the purpose of this research study, a non-probability purposive sampling method was used to filter the individual investors from the investment company, who meet the inclusion criteria of 18 years and older, a current investor with some form of a formal investment product with the investment company and lives in Gauteng, to obtain the representative sample. The individual investors from the South African investment company had to meet the inclusion criteria to be selected for participation in the study to ensure that every individual chosen to partake in the study makes a valuable contribution. By following a purposive sampling method, the researcher was able to purposefully select participants for participation in the study. These participants consisted of the most suitable and representative characteristics of the target population. They were also considered most valuable to obtain insights and maximise the understanding of the underlying phenomenon being investigated and solving of the research problem.

4.5.4 Sample size

Malhotra (2010:374) refers to the sample size as the number of elements chosen from the target population to be included in the research study. Singleton *et al.* (1988:158) and Neuman (2003:232) affirmed that determining a sample size is multifaceted and as a result, the type of sample, the statistic under consideration, the desired degree of accuracy, the relative homogeneity or heterogeneity of the target population and accessible resources, for example, time and funds, should be taken into consideration when selecting a sample size. Iacobucci and Churchill (2010:312) asserted that large sample sizes are not necessarily required to ensure accuracy in a research study; essentially, sometimes smaller sample sizes bring about more accuracy in a research study. Strydom (2005b:195); Malhotra and Birks (2006:361), as well as Onwuegbuzie and Collins (2007:287), further elaborated that the sample size of a study is influenced by the average size of samples utilised in comparable studies and that the determination of a sample size must be led by the consideration of resource constraints.

In this research study, the questionnaire was electronically distributed to 2 000 individual investors in the database of the South African investment company. Taken into consideration the response rates, costs and time constraints, 1 059 responses were received back from the database of the investment company. For this study, given that the sample was selected using purposive sampling, a sample size of 463 individual investors

was selected whereby all the inclusion criteria of 18 years and older, a current investor with some form of a formal investment product with the investment company and lives in Gauteng were met to obtain the representative sample. As represented in Table 4-5, this sample size is in the range of the sample sizes of other comparable studies previously conducted.

Table 4-5: Sample size

Author(s)	Research objective	Sample size
Eckel and Grossman (2002)	To examine the impact of gender differences on risk tolerance.	204
Grable and Joo (2004)	To examine the environmental and biopsychosocial factors related to risk tolerance.	406
Strydom *et al.* (2009)	To examine the relationship between demographical factors and risk tolerance in South Africa.	84
Sages and Grable (2010)	To examine client characteristics, such as financial numeracy, net worth and financial management skills that differ based on risk tolerance.	247
Larkin *et al*. (2013)	To examine the relationship between demographical factors and the risk tolerance of Irish individuals.	656
Olweny *et al.* (2013)	To examine the extent to which financial attributes affect individual investor risk tolerance at the Nairobi Securities Exchange, Kenya.	500
Shusha (2017)	To examine the effect of demographic characteristics on financial risk tolerance among Egyptians.	386
Dickason and Ferreira (2018c)	To examine if gender and ethnicity have an effect on risk tolerance within the South African context.	500
Abdillah *et al.* (2019)	To examine the effect of emotional intelligence, locus of control and risk aversion on the intention to invest in a digital risky investment, with financial literacy as a moderating effect.	98
Dickason and Ferreira (2019)	To examine the risk tolerance levels of South African individual investors based on their marital status and gender.	600

Source: Author compilation

In a research study that employs statistical methods, such as factor analysis, Pallant (2013:185) advocates that a sample size should be at least 150 and that a sample with a ratio of at least five items per variable is required. In this research study, the sample (463) yielded a ratio of five items for each variable. For that reason, the sample size of 463 individual investors was efficient for the analysis of this research study, given that it

sufficiently meets all the requirements for the statistical analysis employed to facilitate the investigation of the underlying phenomena and attainment of the empirical objectives.

This section illuminated the sampling procedure employed in this research study. The measuring instrument and method used to collect the data in this research study are discussed in the following section (Section 4.6).

4.6 MEASURING INSTRUMENT AND DATA COLLECTION METHOD

Delport (2005:159) stated that measuring instruments, such as questionnaires, checklists, indexes and scales, are generally utilised by researchers in quantitative data collection methods to facilitate the successful collection of sufficient primary quantitative data to investigate the underlying phenomenon and achieve the empirical objectives of a study. The decision regarding which data collection method to employ in a study is based on the research objectives, the target population, the data required for the study and where the data are to be found (Quinlan, 2011:217). When gathering information from a large population in a study, a survey method is considered to be appropriate to analyse the behaviour of participants as it is within a framework of positivism, deductive reasoning and mainly utilised to generate quantitative data. A survey method entails the collection of data from participants using questionnaires, which is either in a written format by using self-administered questionnaires or verbal format, whereby participants are interviewed using structured questionnaires (Quinlan *et al*., 2015:268). The primary quantitative data for this research study were collected through a self-administered questionnaire and entailed the electronic distribution of the questionnaire to individual investors in the database of the South African investment company.

4.6.1 Format and design of the questionnaire

Questionnaires are among the most widely used data collection methods in survey research, given that they are considered to be highly structured, effective and accurate measuring instruments (Quinlan, 2011:223). A questionnaire is a document that consists of a set of questions or statements which is completed by respondents to obtain information relating to underlying phenomena in a research study (Kothari, 2004:100; Babbie, 2007:246). Considering the above, Delport (2005:166) stated that the main objective of a questionnaire is to obtain facts and opinions relating to an underlying phenomenon from individuals who are acquainted with the particular matter. By using the survey method to collect quantitative data, the researcher can design a customised questionnaire that meets the specific requirements for the collection of the required information relevant to the underlying

phenomenon and research objectives of the study (Flick, 2011:106). In designing the questionnaire, the researcher has given careful consideration and determined very specifically, with the necessary knowledge regarding the underlying phenomenon, what data were required. The questionnaire has been designed very accurately to ensure validity and reliability of the questionnaire to obtain the required quantitative data for the research study (Quinlan *et al*., 2015:275). As stated by Delport (2005:170) and Flick (2011:110), a questionnaire should consist of a covering letter to introduce and describe the underlying phenomenon of the study, the importance of the questionnaire, as well as the beneficence of the participation of the respondents, to motivate participants to complete the questionnaire. The covering letter should also incorporate a request for permission of the participants to be included in the study, whereby confidentiality and anonymity are ensured. An adequate, straightforward and informative covering letter was carefully compiled, which included all the required information and motivated the participants to complete the questionnaire to achieve sufficient response rates (Mack *et al.*, 2005:104). The respective responses and willingness of participants to complete questionnaires are likely to be influenced by the design of the questionnaire. A questionnaire that is incompetently designed and presented can result in a poor image and devaluate the importance of the research. For that reason, the format and design of the questionnaire should be constructed in line with certain fundamental principles to ensure the criteria of reliability and validity (Kothari, 2004:100; Delport & Roestenburg, 2011a:186).

4.6.1.1 Principles of the format and design of the questionnaire

The following set of fundamental principles were considered and conformed to with the compilation of the questionnaire:

4.6.1.1.1 Intent and reason for the utilisation of the questionnaire

The researcher aspired to obtain facts and opinions from the representative sample of the population, which is individual investors from the South African investment company, to facilitate the collection of the primary quantitative data regarding the underlying phenomenon and research objectives of this study. This was accomplished through the electronic distribution of a self-administered questionnaire to individual investors of the South African investment company for completion in an online format.

4.6.1.1.2 Length of the questionnaire

Mack *et al.* (2005:103), as well as Delport and Roestenburg (2011a:193), affirmed that the questionnaire should be concise by incorporating only the relevant questions that are imperative for the collection of the required information. Questions and statements must be kept as short as possible with a maximum of 16 to 20 words per sentence, whereby questions can comprise more than one sentence (Brislin, 1986:137; Flick, 2011:107). However, the questionnaire should also be comprehensive enough to incorporate all relevant questions to avoid the pitfall of missing information or the inadequate representation of a concept (Delport, 2005:170). Oppenheim (1966:35) asserted that when participants are interested in the research topic, they are also more likely to complete rather lengthy questionnaires. The questionnaire utilised in this study consisted of five sections and commenced with a covering letter to introduce and describe the importance and underlying phenomenon of the study, as well as the beneficence of the participation of the respondents. The questionnaire was kept as concise as possible and the questions and statements were well-structured to collect the greatest amount of information with the least number of questions. This ensured that participants communicated as much information as possible in the shortest period of time when the questionnaire was completed (Delport & Roestenburg, 2011a:193; Quinlan *et al*., 2015:277). McDaniel and Gates (2013:359) affirmed that the recommended time frame for completion of a questionnaire is normally between 15 to 20 minutes. The questionnaire utilised in this study was designed to be completed by participants within the time frame of 15 to 20 minutes. The questionnaire is attached in Annexure C.

4.6.1.1.3 Instructions and language of the questionnaire

Leedy and Ormrod (2005:190) suggested that instructions to be followed on the questionnaire should be stated clearly and precisely by the researcher. Neuman (2003:284), as well as Delport and Roestenburg (2011a:195), stated that when participants are required to answer questions in different manners on a questionnaire, they should be provided with additional instructions at the place in the questionnaire where the format changes. It is also recommended that the instructions should be in a different style (i.e. different font, colour or in capital letters) from the questions to make a distinction between them. In this research study, the researcher provided participants with clear and precise instructions on the questionnaire regarding how questions and statements should be answered to facilitate the accurate completion of the questionnaire.

A questionnaire should also be constructed in the language of the participants as failure to do so can bring about a lack of validity (Delport & Roestenburg, 2011a:192). The questionnaire for this study was presented in English, because the individual investors from the South African investment company come from different cultural backgrounds. English is considered to be a prominent and international language of communication that is understood by a diversity of cultures (Alfarhan, 2016:2). The researcher also gave careful consideration to ensure that no jargon, slang, abbreviations or emotional language are used in the questionnaire (Leedy & Ormrod, 2005:191). The questionnaire was also designed so that individuals 18 years and older who are current investors with some form of a formal investment product with the investment company can understand the underlying phenomenon, the importance of the study and the purpose of the questionnaire.

4.6.1.1.4 Formulation of questions

The formulation of questions in a questionnaire requires creative thinking and a high level of accuracy to ensure that the questionnaire has enhanced face validity prior to the initiation of the study (Delport, 2005:171). Quinlan (2011:338) asserted that when designing the questionnaire, the researcher must engage with the words, concepts and language applied in the questions. The questions should gather the reasons for the particular behaviours or attitudes of participants and signify their state of information about the underlying phenomena being investigated in the study (Flick, 2011:107).

In this study, the researcher formulated the questions in accordance with certain basic principles to ensure that the questions were suitable for this study (Mack *et al.*, 2005:104; Delport & Roestenburg, 2011a:192; Flick, 2011:110; Quinlan *et al*., 2015:277):

- Questions proceeded in a logical order moving from easy to more difficult questions.
- The questions and sentences were kept brief, precise and clear.
- The vocabulary, style and concepts of the questions were understood by all participants.
- Abstract, biased, suggestive and negative questions were omitted.
- Double-barrelled questions were omitted; each question enclosed only one thought or item.
- Each question was related to the purpose of the study.
- Questions were presented in general, non-threatening terms.

4.6.1.1.5 Types of questions

Questionnaires can comprise both open-ended and close-ended questions. Open-ended questions enable participants to provide an unlimited number of possible answers, adequate answers to multifaceted matters and to articulate their viewpoints or feelings (Neuman, 2006:287; Quinlan, 2011:223). Conversely, close-ended questions consist of a set of predefined responses from which the participants have to choose one or in certain cases more than one response from a set of responses (Maree & Pietersen, 2007:161; Flick, 2011:108).

In this study, close-ended questions were incorporated into the questionnaire in which the participants were required to choose one response from a set of responses. Close-ended questions are considered to be valuable when a relatively large sample is being investigated, when considerable information regarding the underlying phenomenon exists and the response options are rather familiar (Monette *et al.,* 2002:163). By incorporating close-ended questions, the participants understood and answered the questions more accurately, responses were compared well with one another and the researcher was able to code the responses easily and effectively to statistically analyse the quantitative data (Delport & Roestenburg, 2011a:198).

4.6.1.2 Design and administration of the questionnaire

The questionnaire (Annexure C) was electronically distributed to individual investors in the database of the designated South African investment company. All participants received the same questionnaire, comprising the same format and number of questions, for completion. The layout of the questionnaire, consisting of five sections, is exemplified in Table 4-6 and discussed in the following subsections (Section 4.6.1.2.1–Section 4.6.1.2.5).

Table 4-6: Layout of the questionnaire

Section	Source	Objective	Question format
Section A: Demographical and socio-cultural information (A1-A15)	Derived from theory and Hammit *et al.* (2009:117); Yao *et al*. (2011:885)	To obtain general background information of the individual investors and more importantly, to identify and analyse the effect of demographical and socio-cultural factors, as endogenous factors, on individual investor risk tolerance behaviour.	Close-ended questions where participants were required to choose the most appropriate answers.
Section B:	Derived from theory and	To determine where	Close-ended

Section	Source	Objective	Question format
Self-report on investor life cycle (B1-B12)	Marx *et al.* (2010:266); Reilly and Brown (2012:33); Harty (2014:1)	individual investors would describe themselves to be in the investor life cycle. To identify and analyse the effect of the investor life cycle, as an endogenous factor, on individual investor risk tolerance behaviour.	questions. A six-point Likert scale was used: (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) somewhat agree, (5) agree and (6) strongly agree.
Section C: Self-report on risk tolerance behaviour (C1–C20)	Derived from theory and Grable and Lytton (2001:43); Yao *et al.* (2004:250); Blais and Weber (2009:34); Gilliam *et al.* (2010:40); Discovery (2019b:1); Liberty (2019:1); AMP (2020:1); Sanlam (2020:2)	To measure and report on the risk tolerance behaviour of individual investors, that is, the level of risk tolerance individual investors will take and how they will behave towards risk in different financial risk events.	Close-ended questions. A six-point Likert scale was used: (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) somewhat agree, (5) agree and (6) strongly agree.
Section D: Behavioural finance (D1–D9)	Derived from theory and Dickason (2017); Ferreira (2018)	To identify the behavioural finance biases that drive individual investment decisions. To identify and analyse the effect of the behavioural finance biases, as endogenous factors, on individual investor risk tolerance behaviour.	Close-ended questions. A six-point Likert scale was used: (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) somewhat agree, (5) agree and (6) strongly agree.
Section E: The external environment (E1–E45)	Derived from theory and Grable (2000:628); Yao *et al*. (2004:251); Rossini and Maree (2005:45); Hanna and Lindamood (2007:1); Newcomb (2012:2); Guillemette and Finke	To identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour.	Close-ended questions. A six-point Likert scale was used: (1) very unlikely, (2) unlikely, (3) somewhat unlikely, (4) somewhat

Section	Source	Objective	Question format
	(2014:44); Chester (2016:6); Schooley and Worden (2016:267); Kuzniak and Grable (2017:317); Mavee and Schimmel-pfenning (2017:1); Antelme (2018b:7); Woodyard and Grable (2018:56); Money Matters (2019:2); Patel (2019:1); Pettinger (2019:2)		likely, (5) likely and (6) very likely.

Source: Author compilation

Before elaborating on the various sections of the questionnaire, the measurement and scales included in the design of a questionnaire should be considered. Measurement is the assignment of numerical values or other symbols to objects following a certain set of predefined rules (Stevens, 1946:677; Kothari, 2004:69; Malhotra & Birks, 2006:292). Grinnell and Unrau (2008:106) further refer to measurement as how an object is described and the description aspires to inform the researcher to make judgements concerning the object. The level of scale measurement is considered essential as it determines the mathematical comparisons that are acceptable and categorise the degree of measurement precision (Delport, 2005:164; Quinlan *et al*., 2015:105). There are four primary scales of measurement, namely nominal scales, ordinal scales, interval scales and ratio scales (Singh, 2006:216; Myatt, 2007:21; Delport & Roestenburg, 2011b:208; Flick, 2011:127; Quinlan *et al*., 2015:105).

- *Nominal scales* – Nominal scales represent the primary level of measurement in which a value is assigned to an object, in no particular order, intended for identification or classification purposes (Singh, 2006:216; Quinlan *et al*., 2015:106). Nominal scales are employed to create mutually exclusive and comprehensive groups that are comparable, for instance, age, gender, etc (Flick, 2011:126). Also, the presence or absence of a characteristic is verified through the utilisation of nominal scales (Babbie, 2010:143; Delport & Roestenburg, 2011b:208).

- *Ordinal scales* – Ordinal scales, also known as ranking scales, enable the ranking of objects according to certain criteria and the significance they hold (Babbie, 2010:144; Quinlan *et al*., 2015:107). Ordinal scales are based on the same basic principle as nominal scales, but is considered to be more accurate than nominal scales (Delport &

Roestenburg, 2011b:208). With ordinal scales, values are assigned to objects and arranged in a particular and logical order to signify the relative degree to which the objects possess some characteristics (Malhotra & Birks, 2006:295). Importance is given to the position that an object lies in, for example strongly agree to strongly disagree, very likely to very unlikely or most preferred to least preferred (Delport, 2005:164). However, the differences between the values do not describe the degree of actual differences between them (Myatt, 2007:21).

- *Interval scales* – Interval scales do not only comprise both nominal and ordinal scale properties, but it also capture information regarding the differences in the values of objects (Delport, 2005:165; Quinlan *et al*., 2015:108). Interval scales are more accurate than nominal and ordinal scales as it explain values where the interval between the values has significance. With interval scales, numerically equal distances on the scale represent equal values in the object being measured (Malhotra & Birks, 2006:296; Babbie, 2010:144). Interval scales are based on a zero point and unit of measurement that is assumed to be arbitrary (Singh, 2006:217).

- *Ratio scales* – The greatest level of measurement is represented by ratio scales (Malhotra & Birks, 2006:297). Ratio scales describe objects with characteristics that comprise all the features of nominal, ordinal and interval scales and in addition, are based on a fixed, absolute and non-arbitrary zero point (or "true zero" point) that signifies the absence of a concept (Babbie, 2010:145; Delport & Roestenburg, 2011a:180; Quinlan *et al*., 2015:109). Ratio scales specify the true quantities of the object which are measured and the ratio of scale values can also be computed (Kothari, 2004:72; Malhotra & Birks, 2006:297).

In the following section, the five sections of the questionnaire, as signified in Table 4-6, are discussed (Section 4.6.1.2.1–Section 4.6.1.2.5).

4.6.1.2.1 Section A: Demographical and socio-cultural information

Section A of the questionnaire consisted of demographical and socio-cultural questions to obtain general background information of the participants and more importantly, to identify and analyse the effect of demographical and socio-cultural factors, as endogenous factors, on individual investor risk tolerance behaviour. Demographical information refers to the statistical data of the socio-economic characteristics of a population (Merriam-Webster Dictionary, 2020:1), while socio-cultural information refers to the differences between groups of individuals in relation to the social class and society in which they live (Cambridge

Dictionary, 2020:1). Demographical questions, namely age, gender, ethnicity, marital status, education, employment status, annual income, income variability, net worth, homeownership, household size and number of dependants were included in the questionnaire. Socio-cultural questions concerning religious beliefs, financial and investment knowledge and health awareness were included in the questionnaire.

As established in previous studies and discussed in Chapter 2 (Section 2.5.1), demographical and socio-cultural factors are found to be significant factors in research that influence the propensities of individual investors to take risks (Wallach & Kogan, 1961:26; McInish, 1982:125; Morin & Suarez, 1983:1211; Hawley & Fujji, 1993:197; Irwin, 1993:7; Roszkowski *et al.,* 1993:225; Sung & Hanna, 1996:12; Grable & Joo, 2004:81; Grable *et al*., 2009:4; Hammitt *et al.*, 2009:130; Yao *et al*., 2011:883; Dickason, 2017:216; Van den Bergh, 2018:178; Shah *et al.,* 2020:220). The inclusion of demographical and socio-cultural factors in the study is also essential to facilitate the achievement of the primary objective to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

4.6.1.2.2 Section B: Self-report on investor life cycle

Section B of the questionnaire, which focused on the self-report on investor life cycle, consisted of a 12-item scale in which participants were asked to indicate, based on a set of statements, where they would describe themselves to be in the investor life cycle. This section of the questionnaire included self-structured questions that were derived from theory (Marx *et al.,* 2010:266; Reilly & Brown, 2012:33; Harty, 2014:1), based on the theoretical analysis of the investor life cycle theory as discussed in Chapter 3 (Section 3.2). The self-report on investor life cycle was measured on a six-point Likert scale (1 = strongly disagree, 6 = strongly agree). The inclusion of the self-report on investor life cycle in this study enabled the researcher to firstly, determine where individual investors would describe themselves to be in the investor life cycle. Secondly, it allowed the researcher to identify and analyse the effect of the investor life cycle, as an endogenous factor, on individual investor risk tolerance behaviour. Lastly, it also assisted with the achievement of the primary objective to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

4.6.1.2.3 Section C: Self-report on risk tolerance behaviour

Section C of the questionnaire, which focused on the self-report on risk tolerance behaviour, consisted of a 20-item scale. This section of the questionnaire included self-structured

questions concerning financial risk events that were derived from theory and existing risk scales, namely the GL-RTS, the SCF and DOSPERT scale (Yao *et al.,* 2004:250; Blais & Weber, 2009:34; Gilliam *et al.,* 2010:40; Discovery, 2019b:1; Liberty, 2019:1; AMP, 2020:1; Sanlam, 2020:2).

The GL-RTS, initially developed by Grable and Lytton in 1999 and which is broadly utilised by researchers and financial practitioners in the financial industry, considers various facets of financial risk tolerance. The GL-RTS is used to measure financial risk tolerance based on three primary factors, namely investment risk, risk comfort and experience, and speculative risk (Grable & Lytton, 2001:47; Gilliam *et al.,* 2010:42; Kuzniak *et al.,* 2015:179).

The SCF, which is also a broadly utilised measurement instrument of financial risk tolerance, is a single-question measure and is utilised to establish the perceptions of individual investors towards financial risk tolerance (Gilliam *et al.,* 2010:40). However, the SCF is only a direct measure for investment choice attitudes and experiences, since it does not incorporate all the variables of financial risk tolerance (Grable & Lytton, 2001:43). The following statements regarding the amount of financial risk individual investors are willing to take, namely (1) take substantial financial risk expecting to earn substantial returns, (2) take above-average financial risk expecting to earn above-average returns, (3) take average financial risk expecting to earn average returns and (4) not willing to take any financial risk, are utilised by numerous researchers and were also incorporated in the self-structured risk tolerance behaviour scale (Grable & Lytton, 2001:43; Yao *et al.,* 2004:250; Gilliam *et al.,* 2010:41).

Lastly, the DOSPERT scale is a psychometric scale developed to measure individual differences in risk attitudes, namely the self-reported degree of risk-taking and perceived attitudes, which is the trade-off between perceived risk and benefits (Blais & Weber, 2009:34). The evaluation of behavioural intentions or likelihood of respondents to engage in risky activities or behaviours originated from the five domains of life, namely ethical, financial, health/safety, social and recreational risks (Blais & Weber, 2006:33). However, only statements from the financial domain of the DOSPERT scale were included in the self-report on risk tolerance behaviour scale.

The self-report on risk tolerance behaviour was measured on a six-point Likert scale (1 = strongly disagree, 6 = strongly agree), where individual investors were asked to indicate the degree to which they agree or disagree with a set of statements regarding the amount of financial risk they are willing to take when making an investment decision or applicable to the participant in a specified situation. The inclusion of the self-report on risk tolerance behaviour

scale in this study allowed the researcher to examine the level of risk tolerance individual investors are willing to take and how they behave towards risk in different financial risk events, by asking a combination of self-structured questions from existing theory and risk scales.

4.6.1.2.4 Section D: Behavioural finance

Section D of the questionnaire, which focused on the behavioural finance biases, consisted of a nine-item scale with statements to illuminate upon the behavioural finance biases that drive individual investors' investment decisions. The extent to which the behavioural finance biases drive individual investors' investment decisions was measured using a six-point Likert scale (1 = strongly disagree, 6 = strongly agree). This section of the questionnaire, which was adapted from Dickason (2017) and Ferreira (2018), consisted of statements that were derived from theory relating to the behavioural finance biases as discussed in Chapter 3 (Section 3.6). The inclusion of the behavioural finance scale in this study enabled the researcher to firstly, identify the behavioural finance biases that drive individual investment decisions. Secondly, it allowed the researcher to identify and analyse the effect of behavioural finance biases, as endogenous factors, on individual investor risk tolerance behaviour. Finally, it also assisted with the achievement of the primary objective to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

Table 4-7 demonstrates the behavioural finance biases and relevant statements, as derived from theory, included in Section D of the questionnaire.

Table 4-7: Behavioural finance biases and statements

Behavioural finance bias	Description	Statement in the questionnaire
Representativeness	Individual investors classify new information and make investment decisions based on their perceptions of past experiences or known events.	My investment decisions are based on the past performance of investments.
Overconfidence	Individual investors have a tendency to overestimate their investment capabilities.	My superior investment knowledge drives my decisions.
Anchoring	Individual investors have a tendency to rely on a single piece of information when making investment decisions, regardless of the fathomless	I rely on a single piece of information (past or current information) to make investment decisions.

Behavioural finance bias	Description	Statement in the questionnaire
	information available.	
Gambler's fallacy	Individual investors inaccurately predict financial market movements as they base their investment decisions on future market trends.	My investment decisions are based on future market predictions.
Availability bias	Individual investors base their investment decisions on the most recently available information.	My investment decisions are based on the most recent information.
Loss aversion	Individual investors have a greater inclination to avoid losses rather than to achieve gains and therefore, have a tendency to hold onto non-performing investments with the anticipation that investments will produce positive returns in the future.	I would rather hold onto current investments with negative returns instead of selling and taking a loss.
Regret aversion	Individual investors tend to manage situations to avoid feelings of regret or embarrassment of reporting a loss as a result of poor investment decisions.	My previously incorrect investment decisions which led to a financial loss drive my investment decisions.
Mental accounting	Individual investors group information regarding particular events and keep track of gains and losses concerning investment decisions in separate mental compartments.	I receive a good return on my investment and will rather keep money in my current investment as to earn higher future returns elsewhere.
Self-control	Individual investors exercise self-control to lessen the temptations of taking bigger financial risks to avoid large financial losses and to protect their investments.	I exercise self-control when making investment decisions.

Source: Kannadhasan (2006:5); Byrne and Brooks (2008:1); Mazzoli and Marinelli (2011:36); Singh (2012:118); Pompian (2016:8); Dickason (2017:44); Ferreira (2018:46)

4.6.1.2.5 Section E: The external environment

Section E of the questionnaire encompassed a 45-item scale that consisted of six sections regarding events occurring in the external environment, namely political-legal, technological, tax implications, macroeconomic factors (interest rates, exchange rates, inflation and GDP), international stock market and economic events and reactions to market fluctuations and volatility (Rossini & Maree, 2005:45). Participants were asked to indicate the likelihood that these events are to influence their investment decisions by using a six-point Likert scale (1 = very unlikely, 6 = very likely). This section of the questionnaire included self-structured questions that were derived from theory based on the theoretical analysis of the exogenous factors associated with investor risk tolerance behaviour as discussed in Chapter 2 (Section 2.5.2). The inclusion of the events pertaining to the external environment enabled the researcher to firstly, identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour. It also assisted with the achievement of the primary objective to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

Overall, all the questions included in the questionnaire were close-ended questions, where participants were only required to choose the most appropriate answers. Likert scales, which are defined as a psychometric response scale that measures attitudes, beliefs and perspectives, were utilised in various sections of the questionnaire to acquire participants' preferences or level of agreement with a set of statements (LaMarca, 2011:1). The utilisation of the self-administered questionnaire, as a quantitative data collection method, was sufficient to enable participants to interpret the questions and accordingly, answer them as accurately as possible (Delport & Roestenburg, 2011a:195). Therefore, it can be inferred that questionnaires are valuable and comprehensive quantitative data collection instruments that can be utilised for the effective and objective gathering of information from a representative sample of the population, specifically in this study, individual investors from a South African investment company. The data collection procedure is discussed in the following section (Section 4.7).

4.7 DATA COLLECTION PROCEDURE

The data collection procedure encompassed a consent form, whereby the designated South African investment company informed the participants of the study to be conducted by the researcher. The consent form specified and ensured that the identity and any given information of all the participants remained anonymous and confidential consistently throughout the research study. The questionnaire was completed by the participants after

permission was granted. The researcher considered the ethical guidelines and principles and accordingly, the research study adhered to the ethical standards of academic research that are discussed in the following subsection (Section 4.7.1). Discussions on the pilot study of the questionnaire (Section 4.7.2.) and management of information (Section 4.7.3) are also provided in this section.

4.7.1 Ethical considerations

This research study, regarding data collection and data management, complied with the ethical standards of academic research as stipulated by the North-West University (NWU, 2020:19). Ethical considerations are referred to as moral values and principles that govern the conduct of individuals, groups or organisations (Strydom, 2005a:57; Quinlan, 2011:70). Hence, researchers should make ethical responsible decisions by conforming to ethical guidelines and principles. The consent form, whereby the participants were informed about the purpose and procedures of the research study, was signed by the designated investment company (Annexure A). The research study has also obtained ethical clearance from the Economic and Management Sciences Research Ethics Committee of the North-West University, with the ethics clearance number: NWU-00770-19-A4 (Annexure B).

The following ethical guidelines and principles were taken into considerations in this research study:

- *Informed consent* – When participants are invited by a researcher to partake in a research study, the researcher is ethically compelled to inform the participants of the nature of the research study, the nature and degree of their participation in the research study and any possible consequences that may occur as a result of their participation (Quinlan, 2011:79). Informed consent ensures that participants comprehend the purpose of the research study, the procedures to be followed and their involvement in the research study, for them to decide in a conscious, mindful manner if they want to participate in the research study (Mack *et al.*, 2005:9). It is essential that the researcher has written informed consent (Hakim, 2000:143; Flick, 2011:217), therefore the consent form (Annexure A) provided adequate information regarding the purpose and procedures of the research study, as well as the consent of participants to partake in the research study. The necessary permission was acquired from the designated investment company to perform the research study.

- *Voluntary participation* – Participants were informed that their participation in the research study was entirely voluntary, no participant was obligated to participate, and

that they have the right to withdraw from the research study at any time without any negative consequences (Mack *et al.*, 2005:10; Flick, 2011:217).

- *Guaranteed confidentiality and anonymity of participants* – Confidentiality (the guarantee that the contribution of participants to the research study will remain confidential) and anonymity (the guarantee that participants will always remain unidentified and that they will be unidentifiable in any form of writing in the research study) were guaranteed in the research study (Babbie, 2010:67; Quinlan, 2011:79). Thus, only the designated investment company screening the participants and gathering the data had access to their client database. The researcher did not know the client database, thereby ensuring that the identity and contribution of all the participants remained anonymous and confidential consistently throughout the research study. The participants were instructed not to leave any identifying marks on the questionnaire. Only raw data were received from the designated investment company and were only utilised for the research study. As a result, the information provided by the participants was treated as highly confidential, as only the researcher had access to the information.

- *True reflection of information* – The researcher provided participants with a true reflection of information with no deceptions and no intentional misrepresentation of facts. All relevant information regarding the research study, together with the research questions in the questionnaire were presented in a clear, truthful and unambiguous manner (Struwig & Stead, 2001:69; Strydom, 2005a:70).

- *True representation of findings* – The findings of a research study should be presented to the public domain in written format to serve a purpose and to be deemed as research (Strydom, 2011a:126). The designated investment company granted permission and advised that the data may be published without any concerns, provided that they always remain anonymous and should not be mentioned in any manner. The findings of the research study will be published in the public domain in a written format by means of a thesis and academic articles. Furthermore, the published data and findings of the research study is a true representation of the data collected and analysed.

- *Data management* – The data of the research study will be kept for a minimum of five years (Quinlan, 2011:357).

4.7.2 Pilot study

A pilot study, which is the pretesting and validation of a measuring instrument designed for a research study, should be conducted before the execution of a research study to ensure reliability and the successful completion of a research study (Strydom, 2011b:236; Quinlan *et al*., 2015:279). Questionnaires ought to be pilot tested before being utilised in a research study to ensure that any errors can be rectified immediately at no large costs, to improve the face and content validity of questionnaires and to establish how long it will take participants to complete a questionnaire (Delport & Roestenburg, 2011a:195). However, a pilot study was not executed by the researcher in this study, because the designated investment company did not grant consent to conduct a pilot study. Furthermore, the designated investment company did not grant additional access to their database, as it was agreed that access to their database and the distribution of the questionnaire will only occur once. Therefore, this research study was approved without performing a pilot study.

4.7.3 Management of information

The management of information in this research study relates to how efficiently the researcher managed the accessibility of records of the designated investment company. Information was managed, and anonymity and confidentiality were also ensured, by firstly, making backup copies of the information and data on a computer and memory stick, which was password-protected and stored in a secure place (Flick, 2011:220). The anonymity and confidentiality of participants were also ensured by only placing unidentified numbers on the questionnaires. The statistical package, SPSS, was used as a tool to manage the data, whereby the data were secured within the software package and password-protected. To upload the data into SPSS, the researcher needed to code the data, which provided anonymity to the data and ensured that the identities of participants remained anonymous. Furthermore, uploading the data into SPSS also ensured that the data are correct and accordingly, accurately coded and uploaded by the researcher (Quinlan *et al*., 2015:356). Lastly, the data will be deleted five years after completion of the research study (Quinlan, 2011:357). This level of information and data management ensured adherence to high ethical standards.

After the collection of the data, the data needed to be processed and analysed by the researcher to achieve the research objectives of the study. The statistical analysis of the quantitative data is discussed in the following section (Section 4.8).

4.8 STATISTICAL ANALYSIS OF QUANTITATIVE DATA

The analysis of quantitative data relates to the process of collecting, categorising, tabulating and interpreting numerical data, using statistical methods to obtain the necessary information from the data collected to describe and analyse the underlying phenomena being investigated (Singh, 2006:224; Monette *et al.,* 2008:364). The collected data are considered meaningless if it is not transformed and analysed in a manner to answer the research questions (Singh, 2006:222). Therefore, the analysis of data seeks to lessen the collected data to a logical and interpretable format, so that the relations of research problems can be examined and inferences can be made (Rubin & Babbie, 2005:552). The process of data analysis initiates with the preparation of the data for analysis, followed by the analysis of the data and thereafter, the validation and interpretation of the data (Marczyk *et al.,* 2005:198). Preliminary data analysis is required to clean the data by editing, coding and tabulating the data to statistically analyse the quantitative data. Minimal errors were identified in the research study, as the data were captured and coded electronically. The quantitative data were analysed using the statistical package, SPSS, Version 26 for Microsoft Windows® (IBM SPSS, 2020). This study also has received statistical clearance from a statistician (Annexure D). The following statistical methods were used to analyse the quantitative data, to ensure the efficient measurement of the numerous questions and scales employed:

- Reliability and validity analysis
- Factor analysis
- Descriptive analysis
    - Frequencies and percentages
    - Measures of central tendency and dispersion
- Inferential analysis
    - T-tests
    - ANOVA
    - Correlation analysis
- SEM

The statistical methods employed in this study to achieve the empirical objectives are discussed in the following subsections (Section 4.8.1–Section 4.8.6).

4.8.1 Reliability analysis

Reliability analysis is performed to ensure that the results acquired are consistent and do not entail random errors, for example, misinterpretation of questions or coding errors (Pallant, 2001:6). Reliability, which is an indicator of a measure's internal consistency, signifies the degree of accuracy in the measurement of an instrument and the degree to which variables are free from random error (Flick, 2011:200; Quinlan *et al*., 2015:112). A measuring instrument is considered reliable when it measures the same item more than once and it generates the same results (Delport & Roestenburg, 2011a:177). Therefore, Maree and Pietersen (2007:152) asserted that reliability in quantitative research is related to the consistency and stability of results produced over a given period and the level of accuracy it exhibits from the population being investigated. As indicated and discussed in Table 4-8, reliability analysis comprises three methods, namely test-retest reliability, equivalent forms reliability and internal consistency reliability.

Table 4-8: Methods of reliability analysis

Method	Definition
Test-retest reliability	Involves administering the same scale or measure to the same participants at two different occasions to test for consistency by calculating the correlation between the two sets of responses. When two sets of responses produce the same results, no random errors are present and a high correlation coefficient results in a more reliable scale. Conversely, when two sets of responses do not produce the same results, random errors are present and a low correlation coefficient results in a less reliable scale.
Equivalent forms reliability	Derived from the principles of test-retest reliability, but it involves administering two different scales or measurements to the same participants at two different occasions.
Internal consistency reliability	Signifies a measure of homogeneity and measures the degree to which the results on a specific item or scale correlate with one another. The internal consistency of a multi-item measurement scale is mainly measured by Cronbach's alpha coefficient, which measures the average correlation between all the items that constitute the complete scale. The coefficient α ranges between 0 and 1, with higher values closer to 1 (0.8 - 0.9) indicating a highly reliable scale. Scales with a coefficient α between 0.7 and 0.8 indicates good reliability, between 0.6 and 0.7 indicates fair reliability and below 0.6 indicates poor reliability.

Source: Pallant (2007:6); Babbie (2010:152); Delport and Roestenburg (2011a:177); Flick (2011:201); Quinlan *et al*. (2015:275); Stagnor (2015:95)

Even though it is uncommon to have perfect reliability, Neuman and Kreuger (2003:179), as well as Salkind (2006:108), advocated that reliability of scales and measures can be increased by considering the following principles:

- Increase the number of items on a scale or use multiple indicators of a variable. Two or more indicators, for instance, two or more questions in a questionnaire, should be employed to measure every feature of a variable.
- Clear, concise and standardised instructions should be provided by the researcher.
- Eliminate unclear or vague items. Items should be clear, precise and easily defined.
- The length of the questionnaire should be within acceptable limits.
- Increase the level of measurement and temperate the level of difficulty of the instrument.

These principles were considered and complied with in the research study. The researcher also ensured that the participants could comprehend and respond to the research questions as easy as possible (Leedy & Ormrod, 2005:19; Quinlan, 2011:336). Furthermore, the reliability of the scale and the reliability of the items incorporated into the scale were measured by the internal consistency reliability method, by employing Cronbach's alpha coefficient. Given the utilisation of the self-administered questionnaire and six-point Likert scales in the research study, the internal consistency reliability method was sufficient to measure the reliability of the instrument and scales by using Cronbach's alpha coefficient (Khalid *et al.,* 2012:22; Pallant, 2013:6).

To conclude, it is evident that the high reliability of measurement instruments will bring about more consistent results. On the other hand, high reliability does not always guarantee valid results, but there can be no valid results without reliability. For that reason, an instrument cannot be valid before being reliable. However, reliability is important, but not a prerequisite for validity (Salkind, 2006:178; Delport & Roestenburg, 2011a:178). The validity of quantitative data is discussed in the following section (Section 4.8.2).

4.8.2 Validity analysis

Validity refers to the accuracy of a measurement instrument or scale and the degree to which it exhibits the actual and correct score or meaning of the underlying phenomena being studied (Babbie, 2010:153; Quinlan *et al*., 2015:115). Validity ensures that the measurement instrument or scale being employed measures what it is intended to measure (Leedy & Ormrod, 2005:28; Salkind, 2006:113; Pallant, 2013:6). There are four main methods for establishing validity, namely content validity, face validity, criterion validity and construct validity (Babbie, 2010:153; Flick, 2011:203; Quinlan *et al*., 2015:115). Content and face

validity can be established prior to the collection of the data, while criterion and construct validity can only be established after the measurement instrument has been employed to collect the data (Delport & Roestenburg, 2011a:173). The four methods of validity are discussed in the following subsections (Section 4.8.2.1–Section 4.8.2.4).

4.8.2.1 Content validity

With the utilisation of content validity, the validity of a measurement instrument is established by ensuring that the underlying phenomenon being investigated is fully represented in the measurement instrument (Babbie, 2010:154). Content validity relates to the extent to which a measured variable accurately indicates the full domain of the theoretical variable (Quinlan *et al*., 2015:274). In this research study, a self-administered questionnaire was used as a valid instrument to profile investor risk tolerance behaviour based on endogenous and exogenous factors. All the important aspects relating to the underlying phenomenon being investigated was fully represented and measured by the self-administered questionnaire (Delport & Roestenburg, 2011a:173; Creswell, 2014:160). Content validity was also ensured by providing a clear indication of what is being measured and analysing the literature regarding the underlying phenomenon being investigated to ensure that all possible items on scale were included to measure the theoretical variables (Delport, 2005:161). This was exercised in all the sections of the questionnaire as measures were developed based on theoretical variables.

4.8.2.2 Face validity

Face validity relates to the degree to which a measurement instrument appears to represent the content of the underlying phenomenon being investigated (Gravetter & Forzano, 2003:87; Babbie, 2010:153). If face validity is not considered, the researcher may encounter resistance from participants, which may negatively affect the results of a research study (Delport, 2005:161). In this research study, the measuring instrument was structured not only to accurately measure the underlying phenomenon under investigation, but also to ensure that it appears to be an appropriate measure of the underlying phenomenon being investigated (Delport & Roestenburg, 2011a:174). Subjective judgements were also obtained from individuals with knowledge and expertise on the underlying phenomenon to advice if the instrument appears to be valid (Quinlan, 2011:336; Khalid *et al.,* 2012:23). The researcher also endeavoured to ensure the co-operation of the participants by submitting the self-administered questionnaire to the designated investment company, which was distributed to the individual investors in their database. Thus, the distribution and completion of the questionnaire by the participants contributed to face validity, as it indicates the

association between the ability of the researcher to describe the theoretical foundation that the measurement instrument was built on and the results obtained from the measured variables (Babbie, 2010:154; Quinlan *et al*., 2015:115).

4.8.2.3 Criterion validity

Criterion validity relates to the degree of correlation of a measure or scale with other standard measures of similar constructs or external criterion (Pallant, 2007:6; Flick, 2011:204). With the utilisation of criterion validity, the validity of a measurement instrument is established against an external criterion, known or believed to measure the phenomenon, trait or behaviour being examined (Delport & Roestenburg, 2011a:174; Quinlan *et al*., 2015:275). Criterion validity was not performed in this research study, because of time constraints.

4.8.2.4 Construct validity

Construct validity, which is the most complex validation method, determines the degree to which a measurement instrument accurately and effectively measures the theoretical variables or constructs being investigated (Delport, 2005:162; Pallant, 2007:6). Construct validity applies to measurement instruments with multiple indicators, i.e. questions or variables, and establishes how consistent all of the indicators are with each other and with the underlying phenomenon being investigated (Quinlan, 2011:336; Creswell, 2014:160). In this research study, the researcher ensured that the questions and statements employed were relevant to the underlying phenomenon being investigated and that the questionnaire provides a comprehensive representation and examination of the underlying phenomenon being investigated. The construct validity of the scales employed in the research study was established by the Cronbach's alpha coefficient and inter-item correlations (Hinkin, 1998:116; Quinlan *et al*., 2015:275).

The four methods of validity involve a sequence in which each validity method evolves on the previous method. Each method necessitates additional information, but it also provides a more adequate measurement of validity (Monette *et al*., 2008:117). To conclude, the questionnaire and scales designed and utilised by the researcher are valid measures of the underlying phenomenon being investigated. Furthermore, with the development and evaluation of measurement instruments and scales, researchers also employ factor analysis (Pallant, 2020:188). Accordingly, the factor analysis of quantitative data is discussed in the following section (Section 4.8.3).

4.8.3 Factor analysis

Factor analysis is a data reduction technique that is primarily employed to reduce or summarise a large number of variables into a smaller and more manageable number of variables (Khalid *et al.,* 2012:24; Pallant, 2013:178). It produces a more efficient representation of the original set of observations, which provides evidence of construct validity for an instrument (Hinkin, 1998:112; Plucker, 2003:20). As stated by Delport and Roestenburg (2011a:175), factor analysis is mainly utilised when there is some hesitation regarding the exact nature of the factors being measured or when the researcher seeks to confirm whether the theoretical variables are being measured. Therefore, factor analysis seeks to determine which variables group together based on the correlation between variables to measure a particular construct and also to identify the variables that do not correlate with the dimension of measurement (Babbie, 2010:491).

There are two main approaches to factor analysis, namely EFA and CFA (Plucker, 2003:22; Pallant, 2013:178; Statistic Solutions, 2020b:2). EFA seeks to examine the relationship between interrelated variables by grouping the variables into a few principal factors (Malhotra *et al.*, 2012:774). CFA, which is a multifaceted set of techniques, seeks to verify a particular hypothesis or theories regarding the structure underlying a set of variables (Urdan, 2011:177). CFA is utilised to determine the factor and factor loading (correlation between a variable and underlying factor) of the measured variables and to verify what is expected based on previous theory. CFA presumes that each factor is allied with a particular subset of measured variables (Statistic Solutions, 2020b:2).

As recommended by Malhotra (2010:639), the following steps were employed to perform factor analysis:

1. Formulate the problem and identify the variables to be factor analysed.
2. Construct the correlation matrix.
3. Determine the method of factor analysis.
4. Determine the number of factors to be extracted.
5. Determine the method of rotation and rotate the factors.
6. Interpret the rotated factors.
7. Depending on the objectives, calculate the factor scores or select surrogate variables to represent the factors in subsequent multivariate analysis.
8. Determine the model fit.

As asserted by Plucker (2003:22) and Pallant (2013:181), the most common factor extraction methods are principal component analysis, principal factors, image factoring, maximum likelihood factoring, alpha factoring, unweighted least squares and generalised least squares. Concerning the rotation of factors, there are two broad categories of approaches to rotation, namely orthogonal (uncorrelated) or oblique (correlated) factor solutions. The orthogonal approach entails rotational methods, such as Varimax, Quartimax and Equamax, while the oblique approach entails rotational methods, such as Direct Oblimin and Promax (Leech *et al.,* 2005:78; Pallant, 2013:183; Statistic Solutions, 2020b:2). In this research study, principal component analysis was utilised to extract the factors and the rotation method employed was Oblimin with Kaiser Normalisation, which is considered to be the most commonly utilised methods to extract and rotate factors (Pallant, 2020:192).

The descriptive statistical procedures of quantitative data are discussed in the following section (Section 4.8.4).

4.8.4 Descriptive statistics

Descriptive statistical analysis relates to the elemental transformation of raw data to report on the distribution of a sample or population across a wide range of variables (Kothari, 2004:131; Fouché & Bartley, 2011:251). Descriptive statistics are utilised to describe the variables from the data collected, for example, age, gender, education and income, by using frequencies, ranges, means, modes, medians and standard deviations (Singh, 2006:224; Quinlan, 2011:399; Khalid *et al.,* 2012:25). As indicated and described in Table 4-9, descriptive statistics can be divided into three main categories, namely measures of central tendency, measures of dispersion and measures of shape (Myatt, 2007:55; Babbie, 2010:429; Quinlan *et al*., 2015:359).

Table 4-9: Categories of descriptive statistics

Descriptive statistics		
Measures of central tendency	Mean	The sum of all values divided by the total number of values.
	Mode	The value which occurs most regularly in a data set.
	Median	The middle value in a data set.
Measures of dispersion	Range	The difference between the maximum and minimum values in a data set.
	Variance	Measures the extent to which values differ from the arithmetic mean value.
	Standard	It is the square root of variance and measures the spread

	deviation	of data around the arithmetic mean. It is utilised to compare data sets that have the same mean, but a different data range.
Measures of shape	Kurtosis	Measures the degree to which a frequency distribution is peaked or flat.
	Skewness	Measure of asymmetry in a frequency distribution, which measures the extent to which deviations from the mean is larger in one direction than in the other.

Source: Kruger *et al.* (2005:231); Myatt (2007:56); Babbie (2010:429); Quinlan *et al*. (2015:360)

Descriptive statistical analysis was employed to describe and summarise the data acquired from the questionnaire, to determine the collection of scores attained. Descriptive statistical analysis was suitable to organise, analyse and interpret the quantitative data (Leedy & Ormrod, 2005:252). In the following section, the inferential statistical procedures of quantitative data are discussed (Section 4.8.5).

4.8.5 Inferential statistics

Inferential statistics are employed to collect data from a sample of a population to make predictions and inferences about the population (Urdan, 2011:3; Quinlan *et al.,* 2015:361). Inferential statistics have two main objectives, namely the estimation of population parameters and to test hypotheses about a population parameter (Kothari, 2004:131; Khalid *et al.,* 2012:25). As indicated and described in Table 4-10, inferential statistics can be categorised into main measures, namely t-tests, ANOVA, correlation, linear regression and logistic regression (Marczyk *et al.,* 2005:198; Babbie, 2010:429; Quinlan, 2011:401).

Table 4-10: Measures of inferential statistics

Inferential statistics	
T-tests	Test if the arithmetic means of two groups are statistically different from one another.
ANOVA	Tests if the arithmetic means of numerous groups are statistically different from one another.
Correlation	A single number that describes the strength and direction of a relationship between two variables. It measures the extent to which changes in one variable are associated with changes in another variable.
Simple linear regression	Measures the extent to which an independent variable predicts a dependent variable. It also exhibits how well the line suits the data.

	The smaller the distance of the data from the regression line, the stronger the relationship between two variables.
Multiple linear regression	Measures the extent to which multiple independent variables predict a dependent variable.
Binary logistic regression	It predicts the relationship between independent variables and a dependent variable that is categorical or binary.
Multinomial logistic regression	An extension of binary logistic regression where the dependent variable comprises more than two categories.

Source: Marczyk *et al.* (2005:198); Babbie (2010:429); Quinlan *et al*. (2015:362)

Researchers should give careful consideration when choosing between the different statistical techniques to be employed in a researcher study (Khalid *et al.,* 2012:26). The statistical techniques employed in this research study are discussed in the following section (Section 4.8.6).

4.8.6 Outline of the statistical techniques utilised in the research study

The statistical techniques employed in the research study, to facilitate the attainment of the empirical objectives, are summarised in Table 4-11.

Table 4-11: Outline of the statistical techniques utilised in the research study

Empirical objectives	Methods
1. Report on the risk tolerance behaviour of individual investors in the sample.	Descriptive Factor analysis Reliability analysis
2. Determine individual investors' phase in the investor life cycle.	Descriptive Factor analysis Reliability analysis Correlation
3. Identify the behavioural finance biases that drive individual investment decisions.	Descriptive Correlation
4. Identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour.	Descriptive T-tests ANOVA Correlation
5. Identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour.	Descriptive Factor analysis Reliability analysis Correlation
6. Construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.	SEM

Source: Author compilation

The descriptive and inferential statistics, as well as SEM, employed in the research study are elaborated on in the following subsections (Section 4.8.6.1–Section 4.8.6.3).

4.8.6.1 Descriptive statistics

Regarding the first empirical objective, *report on the risk tolerance behaviour of individual investors in the sample*, descriptive statistics, namely measures of central tendency and dispersion, were employed to determine individual investors' level of risk tolerance behaviour.

Regarding the second empirical objective, *determine individual investors' phase in the investor life cycle,* descriptive statistics, namely measures of central tendency and dispersion, were employed to establish if individual investors would describe themselves to be in the growth phase or defensive (cautious) phase of the investor life cycle.

Regarding the third empirical objective, *identify the behavioural finance biases that drive individual investment decisions,* descriptive statistics, namely frequencies and percentages, as well as measures of central tendency and dispersion, were employed to identify the behavioural finance biases that drive individual investment decisions.

Regarding the fourth empirical objective, *identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour,* descriptive statistics, namely frequencies and percentages, were applied to describe the demographical and socio-cultural information of the participants in the research study. As specified above, the descriptive statistics of the self-report on investor life cycle and behavioural finance biases, as endogenous factors that influence individual investor risk tolerance behaviour, are attended to in the second and third empirical objectives.

Regarding the fifth empirical objective, *identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour,* descriptive statistics, namely measures of central tendency and dispersion, were employed to identify the effect of exogenous factors on individual investor risk tolerance behaviour.

The inferential statistics employed in the research study are attended to in the following subsection (Section 4.8.6.2).

4.8.6.2 Inferential statistics

Regarding the first empirical objective, *report on the risk tolerance behaviour of individual investors in the sample,* factor analysis, namely EFA, was conducted to identify the financial risk events that influence the risk tolerance behaviour of individual investors. This factored the most significant financial risk events according to three newly established risk tolerance behaviour categories, namely high risk, average risk and low risk, to report on the risk tolerance behaviour of individual investors in the sample.

Regarding the second empirical objective, *determine individual investors' phase in the investor life cycle,* factor analysis, namely EFA, was conducted to identify the most significant statements that contribute to individual investors being classified into one of the phases of the investor life cycle. This factored the most significant statements that contributed to individual investors being classified into one of the newly established phases of the investor life cycle, namely the growth investor phase or defensive (cautious) investor phase. Correlation analysis, using Spearman's rho, was also employed to determine the strength and direction of the relationship between individual investors' phase in the investor life cycle, their age, as well as their net worth.

Regarding the third empirical objective, *identify the behavioural finance biases that drive individual investment decisions,* correlation analysis, by utilising Spearman's rho, was employed to determine the strength and direction of the relationship between the behavioural finance biases and the investor life cycle.

Regarding the fourth empirical objective, *identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour,* the influence of endogenous factors, namely demographical factors, socio-cultural factors, the investor life cycle and behavioural finance biases, on individual investor risk tolerance behaviour were identified and analysed by means of t-tests, ANOVA and correlation analysis. T-tests and ANOVA were employed to test the hypothesis regarding the endogenous factors that influence the risk tolerance behaviour of individual investors. Correlation analysis, using Spearman's rho, was employed to determine the strength and direction of the relationship between the endogenous factors and the risk tolerance behaviour of individual investors.

Regarding the fifth empirical objective, *identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour,* factor analysis, namely EFA and CFA, was conducted. EFA was conducted to identify the most significant financial risk events pertaining to the external environment that are likely to influence the investment decisions of

individual investors and CFA was conducted to establish if the specified model is a good fit for the data. Correlation analysis, using Spearman's rho, was employed to determine the strength and direction of the relationship between the exogenous factors, namely political-legal, technological, tax implications, macroeconomic factors, international events and reactions to market fluctuations and volatility, and the risk tolerance behaviour of individual investors.

Regarding the sixth empirical objective, *construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors*, SEM was employed to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors. This also facilitated the attainment of the primary objective of the research study.

In view of the sixth and final empirical objective, the SEM employed in the research study is attended to in the following subsection (Section 4.8.6.3).

4.8.6.3 Structural equation modelling

SEM, which is a well-known multivariate statistical analysis technique, was employed to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors. SEM was employed to facilitate the attainment of the primary objective in the research study, based on its ability to test an existing theory of a phenomenon and to test the theoretical relationship between multiple variables (Hardy & Bryman, 2004:436). SEM can be viewed as a combination of different statistical techniques, such as factor analysis and multiple regression analysis, and is employed to examine structural relationships between variables that can be observed or measured (known as indicator or measured variables) and variables that cannot be observed or measured (known as latent variables, factors or constructs), while incorporating potential measurement errors (Hox & Bechger, 1998:354; Kaplan, 2009:3; Statistic Solutions, 2020c:1). SEM enables researchers to analyse a series of dependent relationships concurrently, while also analysing multiple dependent variables (Shook *et al.*, 2004:397). It also enables researchers to identify how a set of variables should be structured and subsequently, tests and investigates how well the particular model fits with the observed data (Urdan, 2011:182). Lastly, it enables researchers to test hypotheses and describe the complete and simultaneous relationships among multiple variables (Sarstedt & Mooi, 2019:280).

As demonstrated by Figure 4-3 and discussed in the following subsections (Section 4.8.6.3.1–Section 4.8.6.3.6), a six-step process should be followed when conducting SEM (Weston & Gore, 2006:719; Malhotra *et al.,* 2012:870; Statistic Solutions, 2020c:2).

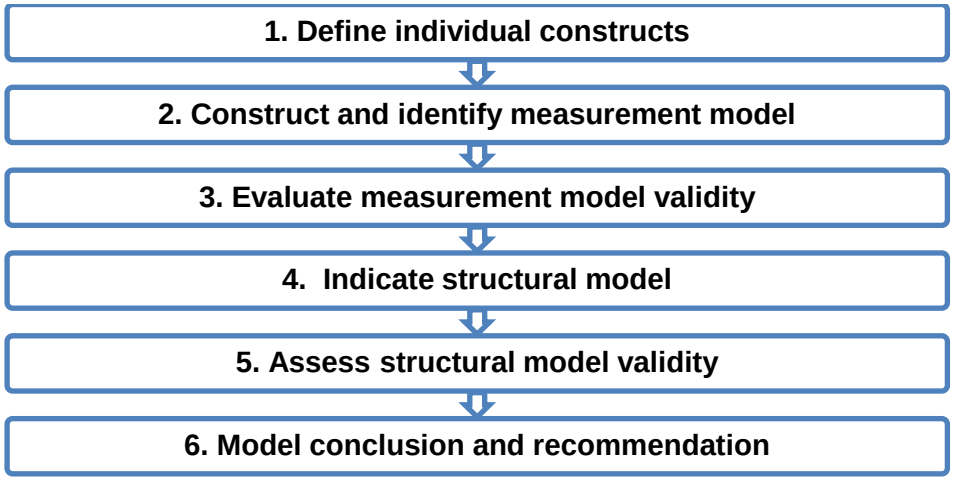

Figure 4-3: The six-step process of SEM
Source: Weston and Gore (2006:719); Malhotra *et al.* (2012:870); Statistic Solutions (2020c:2)

4.8.6.3.1 Define multiple individual variables

Given that SEM is based on the theoretical relationship between numerous variables or constructs (Hardy & Bryman, 2004:436), the first step in SEM is to define the constructs theoretically, state how they will be measured and discuss the interrelationships among the multiple variables (Kline, 2016:119; Statistic Solutions, 2020c:2). Hair *et al.* (2010:655) asserted that a sound theory is required to employ SEM in a research study and to obtain efficient results. Therefore, SEM is utilised to test two theories, which is the measurement theory and the structural theory. The measurement theory indicates how variables come together to represent the theory, whereas the structural theory describes the interrelationships among variables (Weston & Gore, 2006:724; Statistic Solutions, 2020c:2). This step also entails converting the structural relationships into hypotheses to be tested by the model (Malhotra *et al.,* 2012:871). As indicated by Figure 4-4, the theoretical framework model presents a theoretical relationship between the constructs of the study, namely the endogenous factors (demographical factors, socio-cultural factors, investor life cycle and behavioural finance biases) and exogenous factors (political-legal factors, technological factors, tax implications, macroeconomic factors, international events and market fluctuations and volatility) that influence the risk tolerance behaviour of individual investors.

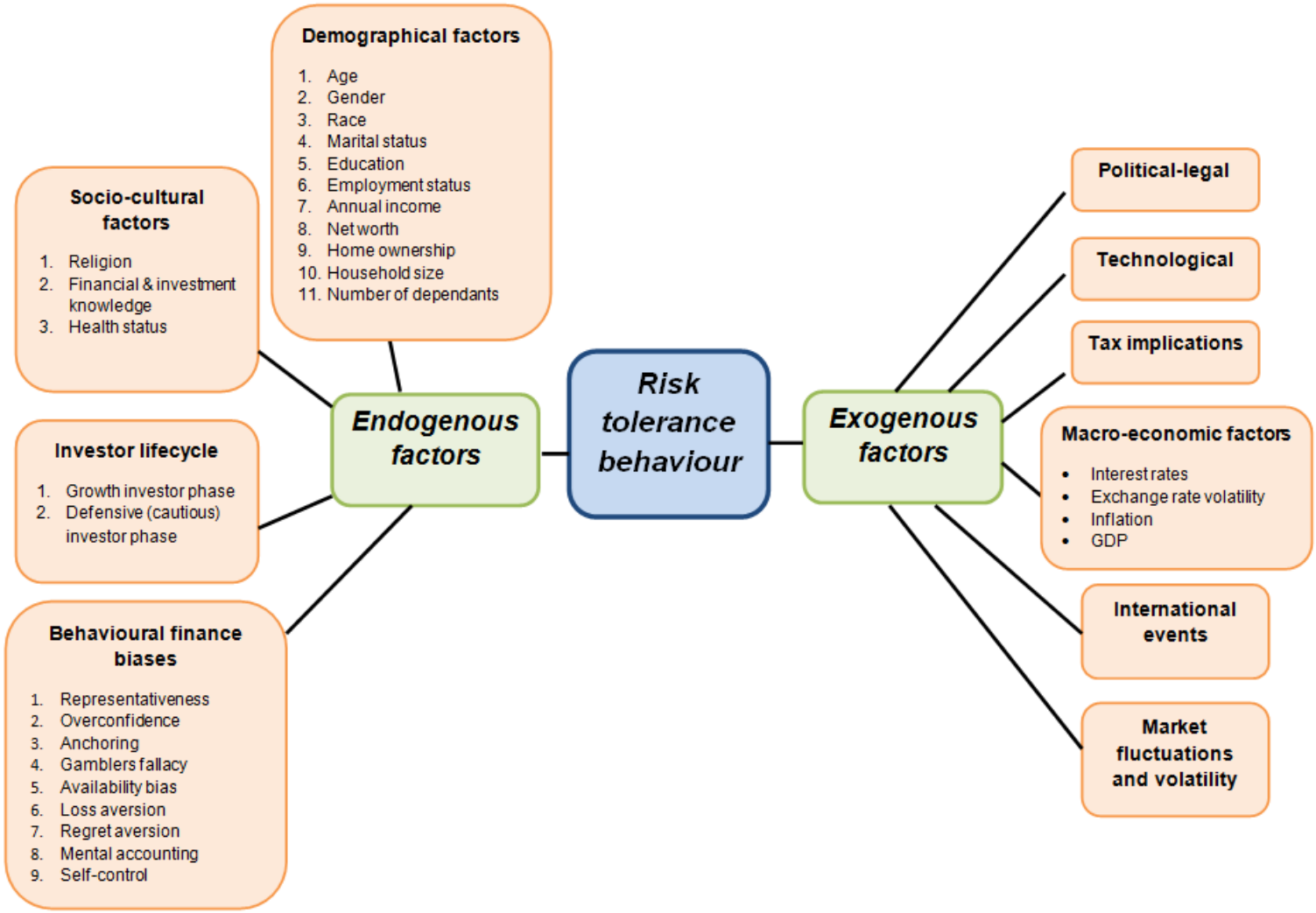

Figure 4-4: Theoretical relationship among variables
Source: Author compilation

4.8.6.3.2 Construct and identify measurement model

The second step in conducting SEM is to construct and identify the measurement model. During this step, every latent variable to be incorporated into the model is identified and assigned to the indicator variables (Weston & Gore, 2006:729; Hair *et al.*, 2010:656). As mentioned earlier in Section 4.8.6.3, variables can either be observed and measured (indicator variables) or unobserved and unmeasured (latent variables). Latent variables can either be independent (the variable is not dependent on or predicted by other variables) or dependent (the variable is dependent on and predicted by other variables) (Mooi *et al.,* 2018:290). Latent variables are directly allied with indicator variables, thereby making the measurement of latent variables attainable by measuring them indirectly (Lee, 2007:1). Furthermore, measurement theory is based on the notion that latent variables bring about the indicator variables. However, latent variables do not always fully describe the indicator variables and therefore, error terms should be added for every latent variable (Statistic Solutions, 2020c:2).

Malhotra *et al.* (2012:804) asserted that the required sample size for conducting SEM depends on the complexity of the model, estimation technique, number of variables, amount of missing data and the communality (the variance of a latent variable that is explained by its specific construct). Researchers should ensure that SEM is being estimated on a sufficient sample size. Larger sample sizes generate more stable and efficient results. The minimum sample sizes for SEM, as suggested by Malhotra *et al.* (2012:805), are indicated in Table 4-12.

Table 4-12: Sample sizes for SEM

Minimum sample size	Model specifications
200	Five or fewer constructs with more than three indicator variables and communalities greater than 0.5.
300	Five or fewer constructs with less than three indicator variables and communalities lower than 0.5.
400	Large number of constructs with less than three indicator variables and communalities lower than 0.5.

Source: Malhotra *et al.* (2012:805)

4.8.6.3.3 Evaluate measurement model validity

The third and most important step in conducting SEM is to evaluate the validity of the measurement model by attending to the following principal question: “Is the measurement

model fit?" (Malhotra *et al.,* 2012:805; Kline, 2016:118). According to Hardy and Bryman (2004:445), as well as Malhotra *et al.* (2012:805), the validity of the measurement model is reliant on establishing acceptable levels of goodness-of-fit and finding specific evidence of construct validity. Therefore, several fit indices ought to be considered to determine whether the associations among indicator and latent variables in the estimated model adequately reflect the observed associations in the data (Weston & Gore, 2006:741). The three main types of indices, namely absolute fit, incremental fit and parsimony fit, together with their acceptable levels of fit are indicated by Figure 4-5.

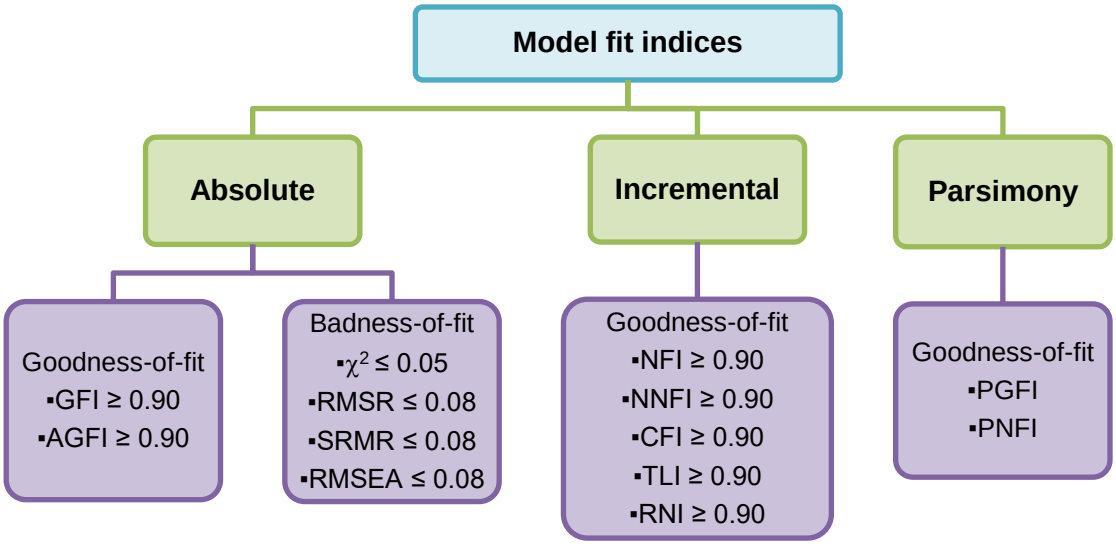

Figure 4-5: Classification of model fit indices
Source: Malhotra *et al.* (2012:805)

As stated by Weston and Gore (2006:741), absolute fit indices directly evaluate how well a model fits the observed data. As illustrated by Figure 4-5, absolute fit indices consist of goodness-of-fit indices, namely the goodness-of-fit-index (GFI) and the adjusted goodness-of-fit index (AGFI), and badness-of-fit indices, namely the chi-square test (χ^2), the root mean square residual (RMSR), the standardised root mean square residual (SRMR) and the root mean square error of approximation (RMSEA). Goodness-of-fit indices specify how well the specified model fits the observed data and entail values ranging from 0─1, with values greater than 0.90 indicating good model fit. On the other hand, badness-of-fit indices measure error or deviation and entail values ranging from 0─1, with lower values closer to 0 indicating good model fit (Malhotra *et al.,* 2012:806).

Incremental fit indices evaluate how well the specified model fits the data compared to a baseline model which assumes that measured variables are not correlated (Malhotra *et al.,* 2012:806). As illustrated by Figure 4-5, incremental fit indices comprise goodness-of-fit

indices, such as the normed fit index (NFI), the non-normed fit index (NNFI), the comparative fit index (CFI), the Tucker-Lewis index (TLI) and the relative non-centrality index (RNI). Incremental fit indices entail values ranging from 0─1 and require values greater than 0.90 to signify good model fit (Hox & Bechger, 1998:361; Gefen *et al.,* 2000:36).

Lastly, parsimony fit indices evaluate fit relative to model complexity and are valuable in comparing models of different complexities, instead of single models (Malhotra *et al.,* 2012:806). As illustrated by Figure 4-5, parsimony fit indices consist of goodness-of-fit indices, namely the parsimony goodness-of-fit index (PGFI) and the parsimony normed fit index (PNFI). Parsimony fit indices entail values ranging from 0─1, with higher values closer to 1 indicating good model fit. These indices can be improved by a better model fit or by a less complex model that estimates fewer parameters (Hair *et al.*, 2010:662; Malhotra *et al.,* 2012:807).

4.8.6.3.4 Indicate structural model

Subsequent to the evaluation and establishment of the validity of the measurement model, the structural model can be indicated and laid out for specification (Statistic Solutions, 2020c:2). When moving from the measurement model to the structural model, the focus shifts from the relationships between indicator and latent variables to the nature and degree of the relationships between latent variables. The structural model specifies how the latent variables are related to one another and seeks to establish dependence relationships (one independent variable is dependent on other independent variables) (Hair *et al.*, 2010:663; Malhotra *et al.,* 2012:810). Figure 4-6 indicates the dependency relationships among variables in the research study according to theory.

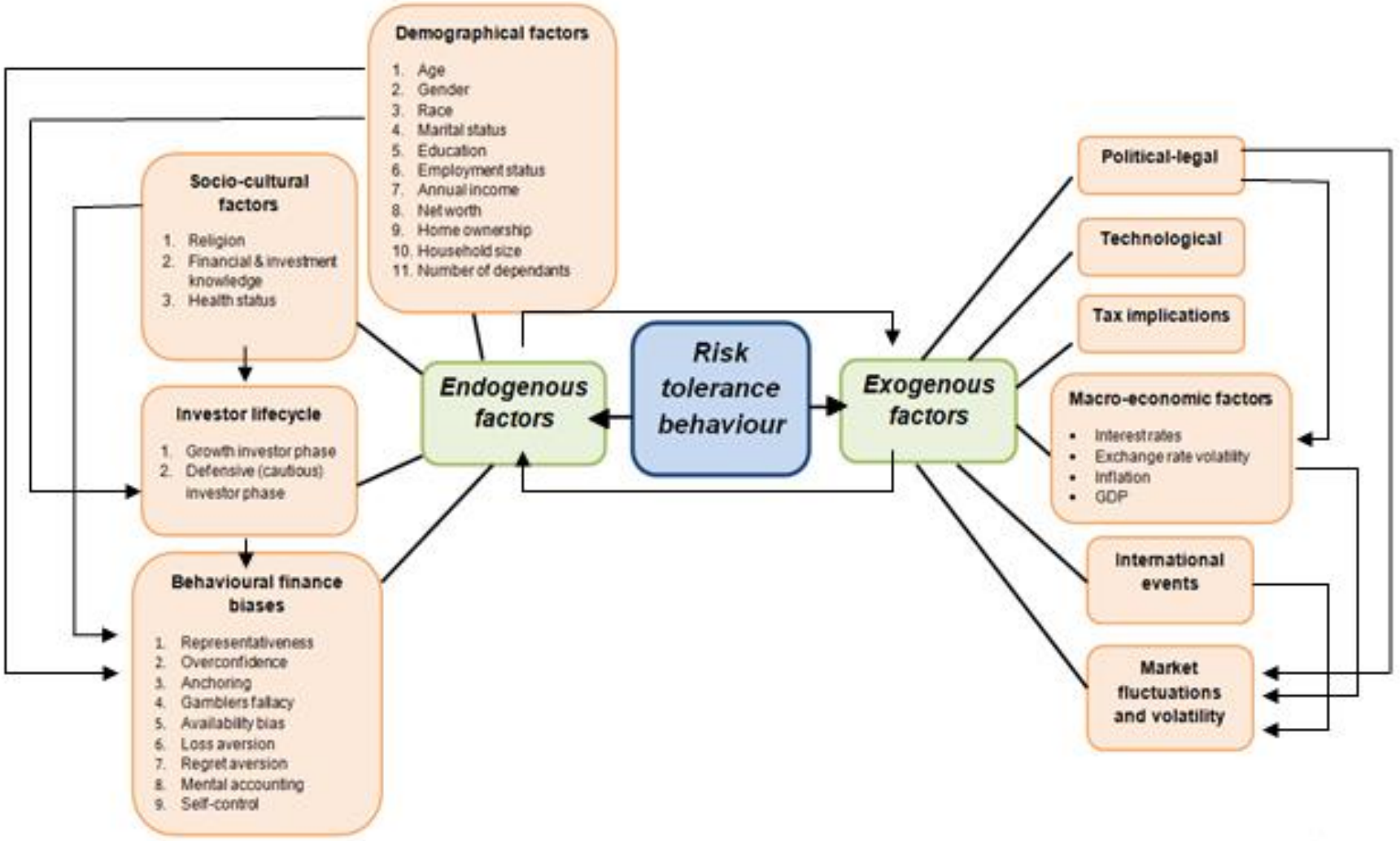

Figure 4-6: Dependency relationships among variables
Source: Author compilation

4.8.6.3.5 Assess structural model validity

This step entails the assessment of the validity of the structural model and accordingly, seeks to establish the validity of the structural model and the corresponding hypothesised theoretical relationships between the multiple variables (Kline, 2011:94). Assessing the validity of the structural model comprises three stages, which is to examine the model fit, compare the proposed structural model with competing models and to test structural relationships and hypotheses (Malhotra *et al.,* 2012:811).

4.8.6.3.6 Model conclusions and recommendations

Once the validity of the structural model has been assessed and found to be satisfactory, model conclusions can be drawn and recommendations can be provided regarding the measurement of the constructs to provide insights and possibilities for future research (Malhotra *et al.,* 2012:812; Kline, 2016:120). The SEM model conducted in this research study made a notable contribution to the field of study, seeing that no other researcher has developed a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

4.9 SYNOPSIS

The research design and methodology employed for the empirical portion of the study were discussed in this chapter. A comprehensive research design and methodological approach were constructed to facilitate the achievement of the empirical objectives and accordingly, the primary objective of the research study. This chapter mainly concentrated on explaining and discussing the research design with an overview of the four research paradigms (Section 4.2), research approach (Section 4.3), sampling procedure (Section 4.5), measuring instrument and data collection method (Section 4.6), data collection procedure (Section 4.7) and the statistical analysis of quantitative data employed in the research study (Section 4.8). As discussed in Section 4.4, this research study entailed a descriptive research design, whereby a positivist research paradigm was employed, and a quantitative research approach was followed. A non-probability purposive sampling method was used to filter the individual investors from the investment company, who meet the inclusion criteria of 18 years and older, a current investor with some form of a formal investment product with the investment company and lives in Gauteng, to obtain the representative sample (Section 4.5.2). The individual investors from the South African investment company had to meet the inclusion criteria to be selected for participation in the study to ensure that every individual chosen to partake in the study makes a valuable contribution.

The primary quantitative data were collected through a self-administered questionnaire and validated scales were utilised. As discussed in Section 4.5.4, the study included a sample size of 463 individual investors, which was adequate for the analysis of the quantitative data, as it sufficiently meets all the requirements for the statistical analysis employed to facilitate the investigation of the underlying phenomena and attainment of the empirical objectives. Lastly, with reference to Section 4.8, statistical procedures, such as reliability analysis, validity analysis, factor analysis, descriptive analysis, inferential analysis and SEM were employed to analyse the quantitative data. SEM was employed to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors. The utilisation of SEM facilitated the attainment of the primary objective of the research study, based on its ability to test an existing theory of a phenomenon and to test the theoretical relationship between multiple variables.

This chapter formed the basis from which Chapter 5 initiates and contributed towards the analysis and interpretation of the empirical study. Therefore, the analysis and interpretation of the empirical findings of the research study are attended to in Chapter 5.

CHAPTER 5: ANALYSIS AND INTERPRETATION OF EMPIRICAL RESULTS

5.1 INTRODUCTION

The empirical results of the research study are analysed and interpreted in this chapter. The primary objective of this study was to construct a model that will assist to profile investor risk tolerance behaviour based on pre-identified endogenous and exogenous factors. The analysis and interpretation of the empirical results are conferred according to the empirical objectives specified in Chapter 1:

- Report on the risk tolerance behaviour of individual investors in the sample.
- Determine individual investors' phase in the investor life cycle.
- Identify the behavioural finance biases that drive individual investment decisions.
- Identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour.
- Identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour.
- Construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

In order to facilitate the achievement of the empirical objectives, and ultimately, the primary objective, a comprehensive discussion relating to the analysis and interpretation of the empirical findings of the study were presented. The following sections relating to the analysis and interpretation of the empirical results are discussed in this chapter:

- Section 5.2 attends to the preliminary data analysis, which provides a summary of the data gathering process followed by the coding of data.
- Section 5.3 describes the demographical and socio-cultural characteristics of the sample in the research study.
- Section 5.4 attends to the factor analysis, namely EFA and CFA, applied to ensure reliability and validity of scales.
- Section 5.5 reports on the descriptive statistics, namely frequencies and percentages, as well as measures of central tendency and dispersion, applied in the research study to achieve all relevant empirical objectives.
- Section 5.6 reports on the inferential statistics, namely t-tests, ANOVA and correlation analysis, applied in the research study to achieve all relevant empirical objectives.

- Lastly, Section 5.7 focuses on the employment of SEM to achieve the final and primary empirical objective of the research study.

As mentioned in Chapter 4 (Section 4.9), the quantitative data of the research study were analysed using the statistical package, SPSS, Version 26 for Microsoft Windows® (IBM SPSS, 2020). The preliminary data analysis is discussed in the subsequent section (Section 5.2).

5.2 PRELIMINARY DATA ANALYSIS

As proposed by Malhotra *et al.* (2017:530), a preliminary data analysis was conducted to ensure the integrity of data. This is required to clean the data by editing, coding and tabulating the data for statistical analysis purposes. The data gathering process and the coding of data are discussed in the following subsections (Section 5.2.1–Section 5.2.2).

5.2.1 Data gathering process

In accordance with the sampling procedure (Section 4.5) and the data collection procedure (Section 4.7) outlined in Chapter 4, the self-administered questionnaire was distributed to individual investors in the database of the South African investment company to be completed in an online format. The research study conformed to ethical guidelines and principles. The purpose of the research study was described in the covering letter, which also stipulated that confidentiality and anonymity of participants are ensured at all times and that their participation in the research study is strictly voluntarily. Out of the 2 000 self-administered questionnaires distributed, 1 059 completed questionnaires were received back given response rates, costs and time constraints. For this study, given that the sample was selected using purposive sampling, a sample size of 463 individual investors was reached, whereby all the inclusion criteria of 18 years and older, a current investor with some form of a formal investment product with the investment company and lives in Gauteng were met to obtain the representative sample.

The following section attends to the coding of data relating to the various sections of the questionnaire.

5.2.2 Coding

Coding is described by Malhotra *et al.* (2017:534) as ascribing a code, generally in a numerical format, to each possible response to every question in the questionnaire. Wiid and Diggines (2013:222) accentuated that coding is used to transform raw data through ascribing

a number to each response, which is followed by entering the data into a computer and accordingly, tabulating the results. The questionnaire utilised in this research study encompassed five sections. Section A consisted of 15 questions regarding the demographical and socio-cultural information of the participants. Section B consisted of a 12-item scale in which participants were asked to indicate based on a set of statements where they would describe themselves to be in the investor life cycle. Section C consisted of a 20-item scale which focused on obtaining information relating to the participants' self-report on risk tolerance behaviour. Section D consisted of a 9-item scale with statements to illuminate upon the behavioural finance biases that drive the investment decisions of the participants. Section E consisted of a 45-item scale to obtain information regarding events occurring in the external environment that are likely to influence the investment decisions of participants. Table 5-1 displays the variables, codes and values ascribed to each response throughout the numerous sections of the questionnaire.

Table 5-1: Codebook

Section A: Demographical and socio-cultural information			
Question	**Code**	**Construct**	**Values ascribed to responses**
Question 1	A1	Age	18–24 (1), 25–34 (2), 35–49 (3), 50+ (4)
Question 2	A2	Gender	Male (1), Female (2)
Question 3	A3	Ethnicity	African (1), Asian (2), Coloured (3), White (4), Other (5)
Question 4	A4	Marital status	Single (1), Common-law spouse (2), Married (3), Divorced (4), Widowed (5)
Question 5	A5	Education	No matric (1), Matric (2), Further training (3), 3-year diploma (4), 3+year diploma (5), Bachelor's degree (6), Honours degree (7), Master's degree (8), Doctoral degree (9), Other (10)
Question 6	A6	Employment status	Salaried employed (1), Self-employed (2), Unemployed – not looking for work (3), Unemployed – looking for work (4), Retired (5), Other (6)
Question 7	A7	Annual income	Below R100 000 (1), R100 001–R200 000 (2), R200 001–R300 000 (3), R300 001–R 400 000 (4), R400 001–R500 000 (5), R500 001–R600 000 (6), R600 001–R700 000 (7), R700 001–R800 000 (8), R800 001–R900 000 (9), R900 001–R1 000 000 (10), More than R1 000 000 (11)
Question 8	A8	Income variability	My income is very stable and predictable (1), My income is somewhat stable and predictable (2), My income is fluctuating and unpredictable (3)
Question 9	A9	Net worth	Less than R1 million (1), Between R1 million and R3.5 million (2), Between R3.5 million and R7 million (3), Between R7 million and R12 million (4),

			Between R12 million and R30 million (5), R30 million and more (6)
Question 10	A10	Homeownership	Living with relatives (1), Renting (2), Homeownership with a mortgage (3), Homeownership without a mortgage (4)
Question 11	A11	Household size	1–2 individuals (1), 3–5 individuals (2), 6+ individuals (3)
Question 12	A12	Number of financial dependants	0 dependants (1), 1–2 dependants (2), 3–5 dependants (3), 6+ dependants (4)
Question 13	A13	Religion	None (1), Christianity (2), Judaism (3), Hinduism (4), Islam (5), Other (6)
Question 14	A14	Financial and investment knowledge	Little (1), Average (2), Above-average (3), Superior (4)
Question 15	A15	Health status	Poor (1), Fair (2), Good (3), Very good (4), Excellent (5)
Section B: Self-report on investor life cycle			
Item	**Code**	**Construct**	**Values ascribed to responses**
Item 1 Item 2 Item 3 Item 4 Item 5 Item 6 Item 7 Item 8 Item 9 Item 10 Item 11 Item 12	B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12	Investor life cycle	Strongly disagree (1), Disagree (2), Somewhat disagree (3), Somewhat agree (4), Agree (5), Strongly agree (6)
Section C: Self-report on risk tolerance behaviour			
Item	**Code**	**Construct**	**Values ascribed to responses**
Item 1 Item 2 Item 3 Item 4 Item 5 Item 6 Item 7 Item 8 Item 9 Item 10 Item 11 Item 12 Item 13	C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13	Risk tolerance behaviour	Strongly disagree (1), Disagree (2), Somewhat disagree (3), Somewhat agree (4), Agree (5), Strongly agree (6)

Item 14	C14		
Item 15	C15		
Item 16	C16		
Item 17	C17		
Item 18	C18		
Item 19	C19		
Item 20	C20		
Section D: Behavioural finance			
Item	**Code**	**Construct**	**Values ascribed to responses**
Item 1	D1	Behavioural finance biases	Strongly disagree (1), Disagree (2), Somewhat disagree (3), Somewhat agree (4), Agree (5), Strongly agree (6)
Item 2	D2		
Item 3	D3		
Item 4	D4		
Item 5	D5		
Item 6	D6		
Item 7	D7		
Item 8	D8		
Item 9	D9		
Section E: The external environment			
Item	**Code**	**Construct**	**Values ascribed to responses**
Item 1	E1	Political-legal factors	Very unlikely (1), Unlikely (2), Somewhat unlikely (3), Somewhat likely (4), Likely (5), Very likely (6)
Item 2	E2		
Item 3	E3		
Item 4	E4		
Item 5	E5		
Item 6	E6		
Item 7	E7		
Item 8	E8		
Item 9	E9		
Item 10	E10		
Item 11	E11		
Item 12	E12		
Item 13	E13	Technological factors	Very unlikely (1), Unlikely (2), Somewhat unlikely (3), Somewhat likely (4), Likely (5), Very likely (6)
Item 14	E14		
Item 15	E15		
Item 16	E16		
Item 17	E17		
Item 18	E18	Tax implications	Very unlikely (1), Unlikely (2), Somewhat unlikely (3), Somewhat likely (4), Likely (5), Very likely (6)
Item 19	E19		
Item 20	E20		
Item 21	E21	Interest rates	Very unlikely (1), Unlikely (2), Somewhat unlikely (3), Somewhat likely (4), Likely (5), Very likely (6)
Item 22	E22		
Item 23	E23		
Item 24	E24	Exchange rate volatility	Very unlikely (1), Unlikely (2), Somewhat unlikely (3), Somewhat likely (4), Likely (5), Very likely (6)
Item 25	E25		
Item 26	E26		

Item 27 Item 28 Item 29 Item 30	E27 E28 E29 E30	Inflation	Very unlikely (1), Unlikely (2), Somewhat unlikely (3), Somewhat likely (4), Likely (5), Very likely (6)
Item 31 Item 32 Item 33 Item 34	E31 E32 E33 E34	GDP	Very unlikely (1), Unlikely (2), Somewhat unlikely (3), Somewhat likely (4), Likely (5), Very likely (6)
Item 35 Item 36 Item 37 Item 38	E35 E36 E37 E38	International events	Very unlikely (1), Unlikely (2), Somewhat unlikely (3), Somewhat likely (4), Likely (5), Very likely (6)
Item 39 Item 40 Item 41 Item 42 Item 43 Item 44 Item 45	E39 E40 E41 E42 E43 E44 E45	Market fluctuations and volatility	Very unlikely (1), Unlikely (2), Somewhat unlikely (3), Somewhat likely (4), Likely (5), Very likely (6)

Source: Author compilation

In the following section (Section 5.3), the demographical and socio-cultural information of the sample is discussed.

5.3 DEMOGRAPHICAL AND SOCIO-CULTURAL INFORMATION

As mentioned in Section 5.2.2., Section A of the questionnaire consisted of demographical and socio-cultural questions to obtain general background information of the participants. The frequencies and percentages relating to the demographical and socio-cultural information of the final sample, 463 individual investors, included in the research study are highlighted in Table 5-2. The demographical information consisted of age, gender, ethnicity, marital status, education, employment status, annual income, income variability, net worth, homeownership, household size and number of financial dependants. The socio-cultural information consisted of religion, financial and investment knowledge and health status.

Table 5-2: Demographical and socio-cultural information

Code	Construct	Category	Frequency (*f*)	Percentage (%)
A1	Age	18–24 years	4	0.9
		25–34 years	83	17.9
		35–49 years	176	38.0
		50+ years	200	43.2
A2	Gender	Male	205	44.3

Code	Construct	Category	Frequency (*f*)	Percentage (%)
		Female	258	55.7
A3	Ethnicity	African	88	19.0
		Asian	38	8.2
		Coloured	27	5.8
		White	306	66.1
		Other	4	0.9
A4	Marital status	Single	105	22.7
		Common-law spouse	26	5.6
		Married	267	57.7
		Divorced	48	10.4
		Widowed	17	3.7
A5	Education	No matric	12	2.6
		Matric	87	18.8
		Further training	57	12.3
		3-year diploma	60	13.0
		3+year diploma	58	12.5
		Bachelor's degree	87	18.8
		Honours degree	53	11.4
		Master's degree	30	6.5
		Doctoral degree	10	2.2
		Other	9	1.9
A6	Employment status	Salaried employed	319	68.9
		Self-employed	56	12.1
		Unemployed ─ not looking for work	11	2.4
		Unemployed ─ looking for work	15	3.2
		Retired	52	11.2
		Other	10	2.2
A7	Annual income	Below R100 000	25	5.4
		R100 001–R200 000	69	14.9
		R200 001–R300 000	52	11.2
		R300 001–R 400 000	49	10.6
		R400 001–R500 000	41	8.9
		R500 001–R600 000	28	6.0
		R600 001–R700 000	29	6.3
		R700 001–R800 000	18	3.9

Code	Construct	Category	Frequency (*f*)	Percentage (%)
		R800 001–R900 000	13	2.8
		R900 001–R1 000 000	16	3.5
		More than R1 000 000	35	7.6
		Missing	88	19.0
A8	Income variability	My income is very stable and predictable	269	58.1
		My income is somewhat stable and predictable	120	25.9
		My income is fluctuating and unpredictable	74	16.0
A9	Net worth	Less than R1 million	244	52.7
		Between R1 million and R3.5 million	132	28.5
		Between R3.5 million and R7 million	43	9.3
		Between R7 million and R12 million	19	4.1
		Between R12 million and R30 million	19	4.1
		R30 million and more	6	1.3
A10	Homeownership	Living with relatives	47	10.2
		Renting	122	26.3
		Homeownership with a mortgage	181	39.1
		Homeownership without a mortgage	113	24.4
A11	Household size	1–2 individuals	203	43.8
		3–5 individuals	226	48.8
		6+ individuals	34	7.3
A12	Number of financial dependants	0 dependants	120	25.9
		1–2 dependants	206	44.5
		3–5 dependants	118	25.5
		6+ dependants	19	4.1
A13	Religion	None	67	14.5
		Christianity	342	73.9
		Judaism	15	3.2
		Hinduism	11	2.4
		Islam	13	2.8

Code	Construct	Category	Frequency (*f*)	Percentage (%)
		Other	15	3.2
A14	Financial and investment knowledge	Little	93	20.1
		Average	233	50.3
		Above-average	124	26.8
		Superior	13	2.8
A15	Health status	Poor	15	3.2
		Fair	62	13.4
		Good	188	40.6
		Very good	138	29.8
		Excellent	60	13.0

Source: Author compilation

The frequencies and percentages relating to the demographical and socio-cultural information presented in Table 5-2 are elaborated on in the following subsections (Section 5.3.1–Section 5.3.15).

5.3.1 Age

Participants were required to specify their age according to four categories, namely 18–24 years, 25–34 years, 35–49 years or 50 years and older. As shown in Table 5-2, the first age category, 18–24 years, represented the minority of the sample (0.9%), whereby 4 out of the 463 participants were classified into this age category. The second age category, 25–34 years, represented 17.9 per cent of the sample, whereby 83 out of the 463 participants were classified into this age category. The third age category, 35–49 years, represented 38.0 per cent of the sample, whereby 176 out of the 463 participants were classified into this age category. The last age category, 50 years and older, represented the majority of the sample (43.2%), whereby 200 out of the 463 participants were classified into this age category.

5.3.2 Gender

As indicated in Table 5-2, the majority of the sample (55.7%) was female individual investors, representing 258 out of the 463 participants. Male individual investors, on the other hand, comprised 44.3 per cent of the sample, representing 205 out of the 463 participants.

5.3.3 Ethnicity

Participants were required to specify their ethnicity in relation to five categories, namely African, Asian, Coloured, White or other. As shown in Table 5-2, the majority of the sample comprised White participants (66.1%), which were followed by African participants (19.0%), Asian participants (8.2%) and Coloured participants (5.8%). Out of the 463 participants, 306 participants were White, 88 participants were African, 38 participants were Asian and 27 participants were Coloured. However, the minority of the sample (0.9%) consisted of participants that came from other ethnic backgrounds, representing 4 out of the 463 participants.

5.3.4 Marital status

Participants were required to indicate their marital status in relation to five categories, that is, single, common-law spouse, married, divorced or widowed. Table 5-2 indicates that the majority of the sample is married (57.7%), representing 267 out of the 463 participants. Subsequently, 22.7 per cent of the sample (105 participants) is single, 10.4 per cent of the sample (48 participants) is divorced and 5.6 per cent of the sample (26 participants) has common-law spouses. However, only 3.7 per cent of the sample, 17 out of the 463 participants, is widowed.

5.3.5 Education

Participants were asked to indicate their highest level of formal education according to eight categories, namely no matric, matric, further training, 3-year diploma, 3+year diploma, bachelor's degree, honours degree, master's degree, doctoral degree or other. As seen in Table 5-2, the level of formal education among the sample of 463 individual investors was rather widespread. The majority of the sample indicated that they either have matric (18.8%) or a bachelor's degree (18.8%) as their highest level of formal education, each category representing 87 participants. Subsequently, 13.0 per cent of the sample (60 participants) has a 3-year diploma, followed by 12.5 per cent of the sample (58 participants) consisting of a 3+year diploma and 12.3 per cent of the sample (57 participants) indicating that they had further formal training. Furthermore, 11.4 per cent of the sample (53 participants) has an honours degree, while only 6.5 per cent of the sample (30 participants) has a master's degree. The minority of the sample has no matric (2.6%), a doctoral degree (2.2%) or other forms of formal education (1.9%).

5.3.6 Employment status

Participants were asked to specify their status of employment in relation to six categories, which included salaried employed, self-employed, unemployed ─ not looking for work, unemployed ─ looking for work, retired or other. Table 5-2 signifies that 319 out of the 463 participants were salaried employed, representing the majority of the sample (68.9%). This was followed by 56 self-employed participants (12.1%) and 52 retired participants (11.2%). Unemployed participants who are looking for work represented 3.2 per cent of the sample, while unemployed participants who are not looking for work represented 2.4 per cent of the sample. The smallest portion of the sample (2.2%) was engaged in other forms of employment.

5.3.7 Annual income

Participants were asked to indicate their annual income according to categories subdivided into values of R100 000, starting with income categories below R100 000 up to more than R1 million. Participants were not requested to explicitly specify how much they earn on an annual basis. As shown in Table 5-2, only 25 out of the 463 participants, representing 5.4 per cent of the sample, earns an annual income below R100 000. On the other hand, only 35 out of the 463 participants, representing 7.6 per cent of the sample, earns more than R1 million on an annual basis. The majority of the sample (14.9%) earns an annual income between R100 001 and R200 000, representing 69 out of the 463 participants. Subsequently, 11.2 per cent of the sample earns an annual income between R200 001 and R300 000. This is followed by 10.6 per cent of the sample earning an annual income between R300 001 and R400 000 and 8.9 per cent of the sample earning an annual income between R400 001 and R500 000. The higher income brackets, namely R500 001–R600 000 (6.0%), R600 001–R700 000 (6.3%), R700 001–R800 000 (3.9%), R800 001–R900 000 (2.8%) and R900 001–R1 million (3.5%) signified smaller portions of the sample. However, 88 participants failed to respond to this question, signifying a missing value of 19.0 per cent. This may be attributed to the fact that they did not want to disclose their earnings on an annual basis due to confidentiality purposes.

5.3.8 Income variability

Participants were asked to indicate the variability of their income according to three categories, namely my income is very stable and predictable, my income is somewhat stable and predictable or my income is fluctuating and unpredictable. Concerning Table 5-2, 269 out of the 463 participants specified that their income is very stable and predictable,

representing the majority of the sample (58.1%). Moreover, 120 participants specified that their income is somewhat stable and predictable, representing 25.9 per cent of the sample. However, only 74 participants specified that their income is fluctuating and unpredictable, representing the minority of the sample (16.0%).

5.3.9 Net worth

Participants were asked to specify their net worth according to six categories, namely less than R1 million, between R1 million and R3.5 million, between R3.5 million and R7 million, between R7 million and R12 million, between R12 million and R30 million or more than R30 million. As shown in Table 5-2, the majority of the sample (52.7%), representing 244 out of the 463 participants, indicated that they have a net worth of less than R1 million. Subsequently, 28.5 per cent of the sample indicated that they have a net worth between R1 million and R 3.5 million, which is followed by 9.3 per cent of the sample indicating that they have a net worth between R3.5 million and R7 million. Smaller portions of the sample were represented by participants consisting of a net worth between R7 million and R12 million (4.1%), between R12 million and R30 million (4.1%) or more than R30 million (1.3%).

5.3.10 Homeownership

Participants were required to indicate their homeownership status in relation to four categories, which include living with relatives, renting, homeownership with a mortgage or homeownership without a mortgage. As seen in Table 5-2, the majority of the sample (39.1%) has homeownership with a mortgage, representing 181 out of the 463 participants. Subsequently, 26.3 per cent of the sample (122 participants) is renting, while 24.4 per cent (113 participants) has homeownership without a mortgage. However, only 47 participants are living with relatives, which represent the minority of the sample (10.2%).

5.3.11 Household size

Participants were asked to indicate the size of their household based on three categories, that is, 1–2 individuals, 3–5 individuals or more than 6 individuals. With reference to Table 5-2, 226 out of the 463 participants indicated that their household comprises 3–5 individuals, representing the majority of the sample (48.8%). Subsequently, 203 out of the 463 participants indicated that their household comprises 1–2 individuals, representing 43.8 per cent of the sample. Only 34 out of the 463 participants indicated that their household comprises more than 6 individuals, representing the minority of the sample (7.3%).

5.3.12 Number of financial dependants

Participants were asked to indicate how many individuals are financially dependent on themselves according to four categories, that is, 0 dependants, 1–2 dependants, 3–5 dependants or more than 6 dependants. As shown in Table 5-2, the majority of the sample (44.5%), comprising 206 out of the 463 participants, indicated that they have 1–2 individuals who are financially dependent on themselves. Subsequently, 25.9 per cent of the sample indicated that they have no financial dependents, followed by 25.5 per cent of the sample indicating that they have 3–5 financial dependants. The minority of the sample (4.1%), only 19 out of the 463 participants, have more than 6 individuals who are financially dependent on themselves.

5.3.13 Religion

Participants were asked to indicate their beliefs regarding religion according to six categories, namely none, Christianity, Judaism, Hinduism, Islam or other. As shown in Table 5-2, the majority of the sample (73.9%), representing 342 out of the 463 participants, indicated that their religious affiliation is Christianity. Subsequently, 67 out of the 463 participants indicated that they do not have a religious affiliation, representing 14.5 per cent of the sample. The smaller portions of the sample specified their religious affiliation as Judaism (3.2%), other (3.2%), Islam (2.8%) and Hinduism (2.4%).

5.3.14 Financial and investment knowledge

Participants were required to specify their levels of financial and investment knowledge in terms of four categories, namely little, average, above-average or superior. Table 5-2 shows that 233 out of the 463 participants stated they have average financial and investment knowledge, representing the majority of the sample (50.3%). This is followed by 26.8 per cent of the sample stating that they have above-average financial and investment knowledge, while 20.1 per cent of the sample stated that they have little financial and investment knowledge. Only 13 out of the 463 participants stated that they have superior financial and investment knowledge, representing the minority of the sample (2.8%).

5.3.15 Health status

Participants were required to indicate their health status in relation to five categories, which includes poor, fair, good, very good or excellent. As represented in Table 5-2, the majority of the sample (40.6%), comprising 188 out of the 463 participants, stated that they have good

health. Subsequently, 29.8 per cent of the sample, comprising 138 out of the 463 participants, stated that their health is very good. Moreover, 13.4 per cent of the sample indicated their health status as fair, followed by 13.0 per cent indicating that they have excellent health. Only 3.2 per cent of the sample, comprising 15 out of the 463 participants, stated that they have poor health.

The following section attends to the factor analysis conducted on the scale sections of the questionnaire (Section 5.4).

5.4 FACTOR ANALYSIS

According to Pallant (2020:188), factor analysis is a data reduction technique that is generally utilised to reduce or summarise a large number of variables into a smaller and more manageable number of variables. Factor analysis techniques are used to a great extent by researchers engaged in the development and evaluation of tests and scales. It produces a more efficient representation of the original set of observations, which provides evidence of construct validity for an instrument (Hinkin, 1998:112; Plucker, 2003:20). As mentioned in Chapter 4 (Section 4.8.3), there are two main approaches to factor analysis, namely EFA and CFA. EFA is applied to examine the interrelationships among a set of variables, whereas CFA is used to verify particular hypotheses relating to the structure underlying a set of variables (Pallant, 2020:188).

Factor analysis was applied on the following sections of the questionnaire:

- Section B: Self-report on investor life cycle
- Section C: Self-report on risk tolerance behaviour
- Section E: The external environment

Before EFA can be performed, the suitability of the data for factor analysis should be assessed by means of sample size determination, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity. Concerning the sample size, a sample size of at least 150 is recommended and a ratio of at least five items per variable is required (Pallant, 2020:190). In this research study, the sample (463) yielded a ratio of five items for each variable. Regarding the KMO measure of sampling adequacy, the index ranges from 0 to 1, with values greater than 0.5 indicating sampling adequacy, while values below 0.5 indicate that the sample size is not adequate for factor analysis (Malhotra *et al.*, 2017:714; Sarstedt & Mooi, 2019:265). However, Pallant (2020:190) suggested a minimum KMO value of 0.6 for a good factor analysis. Bartlett's test of sphericity should be statistically

significant at $p < 0.05$ for factor analysis to be considered suitable (Sarstedt & Mooi, 2019:265; Pallant, 2020:194). As reported on in the following subsections (Section 5.4.1–Section 5.4.3), it was ensured that the dataset is suitable for factor analysis in this research study. Principal component analysis was utilised to extract the factors and the rotation method applied was Oblimin with Kaiser Normalisation. Factor loadings of 0.3 or greater were deemed suitable for the extraction of factors (Pallant, 2020:194).

Factor analysis applied on Section B, C and E of the questionnaire is discussed in the following subsections (Section 5.4.1–Section 5.4.3).

5.4.1 EFA on Section B: Self-report on investor life cycle

EFA was utilised in Section B of the questionnaire to identify the most significant statements that individual investors consider when determining where they would describe themselves to be in the investor life cycle. As shown in Table 5-3, the KMO and Bartlett's test of sphericity generated appropriate results for factor analysis in Section B of the questionnaire. The KMO index attained a value of 0.717, which is greater than the minimum value of 0.5 and can be regarded as good sampling adequacy (Malhotra *et al.*, 2017:714). Bartlett's test of sphericity had an approximate chi-square statistic of 1004.109 with 28 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). This signified that the variables are related and that the data are suitable for factor analysis relating to Section B of the questionnaire.

Table 5-3: KMO and Bartlett's test of sphericity for Section B

KMO and Bartlett's test of sphericity		**Self-report on investor life cycle**
KMO measure of sampling adequacy		0.717
Bartlett's test of sphericity	Approx. chi-square	1004.109
	Degree of freedom (df)	28
	Significance (Sig.)	0.000

Source: Author compilation

Table 5-4 presents the pattern matrix of factors for Section B: Self-report on investor life cycle. The percentage of variance and eigenvalue for each of the factors are also illustrated. As previously mentioned, principal component analysis was used to extract the factors and the rotation method applied was Oblimin with Kaiser Normalisation. Table 5-4 indicates the item loadings on the two factors and accordingly, four items per factor were grouped. Pallant (2020:201) asserted that three or more items loaded on each factor are required. Also, factor loadings of 0.3 or greater are deemed suitable for the extraction of factors (Pallant,

2020:194). Thus, all the items that loaded into factors were deemed suitable, with all items loading above 0.3 in factor one and three items loading above 0.3 in factor two.

Table 5-4: Pattern matrix of Section B (Self-report on investor life cycle)

Item	Factors	
	1	2
B1	0.846	
B8	0.826	
B4	0.825	
B2	0.592	
B12		0.833
B7		0.784
B11		0.761
B10		0.290
Eigenvalue	2.474	2.118
% of Variance	30.920	26.479
Cumulative %	30.920	57.399

Source: Author compilation

5.4.1.1 Naming and interpretation of dimensions in Section B: Self-report on investor life cycle

As seen in Table 5-4, two factors, with eigenvalues greater than 1.0, were extracted and explained 57.399 per cent of the variance. Factors with eigenvalues less than 1.0 were not considered (Mooi *et al.,* 2018:278; Pallant, 2020:199). The two factors were appropriate and best fit to explain the newly developed self-report on investor life cycle scale and to classify individual investors into one of the two phases of the investor life cycle.

Factor one, named the growth investor phase, consisted of four variables that explained 30.920 per cent of the variance with an eigenvalue of 2.474. The items that are loaded into this factor classify individual investors in the growth investor phase of the life cycle based on the investor life cycle theory discussed in Chapter 3 (Section 3.2).

Factor two, named the defensive (cautious) investor phase, consisted of four variables that explained 26.479 per cent of the variance with an eigenvalue of 2.118. The items that are loaded into this factor classify individual investors in the defensive (cautious) investor phase of the life cycle based on the investor life cycle theory discussed in Chapter 3 (Section 3.2).

5.4.1.2 Internal reliability of Section B: Self-report on investor life cycle

Reliability, which relates to the internal consistency of the scale, was measured by the Cronbach's alpha coefficient. The coefficient α ranges between 0 and 1, with higher values closer to 1 (0.8–0.9) indicating a highly reliable scale. Scales with a coefficient α between 0.7 and 0.8 indicate good reliability, between 0.6 and 0.7 indicate fair reliability and below 0.6 indicate poor reliability (Quinlan *et al*., 2015:114; Malhotra *et al.*, 2017:360). However, Pallant (2020:102) asserted that the reliability of a scale is rather sensitive to the number of items in the scale. Preferably, the Cronbach's alpha coefficient of a scale should be greater than 0.7. However, short scales, consisting of less than 10 items, generally result in low Cronbach's alpha values of 0.5. Therefore, it may also be appropriate to report on the average inter-item correlation for the items. Clark and Watson (1995:315) recommend an optimal range for the inter-item correlation of 0.15 to 0.5, while Pallant (2020:102) recommended an optimal range of 0.2 to 0.4. To validate the internal consistency of the self-report on investor life cycle scale in Section B of the questionnaire, the Cronbach's alpha values were calculated for the two factors, namely the growth investor phase and the defensive (cautious) investor phase.

Table 5-5 illustrates the values of the Cronbach's alpha coefficient and average inter-item correlation per factor relating to the self-report on investor life cycle scale in Section B of the questionnaire.

Table 5-5: Reliability of scale for Section B (Self-report on investor life cycle)

Section B: Self-report on investor life cycle	Number of items	Cronbach's alpha	Average inter-item correlation
Factor 1: Growth investor phase	4	0.781	0.468
Factor 2: Defensive (cautious) investor phase	4	0.663	0.311

Source: Author compilation

The decision was initially made to remove items (B3, B5, B6 and B9) from the scale, which consisted of negative or low correlations below 0.3 to enhance the internal consistency reliability of the scale and ultimately, to attain the sufficient Cronbach's alpha values shown in Table 5-5. As seen in Table 5-5, the two factors extracted generated acceptable Cronbach's alpha values of greater than 0.6, indicating that both factors consist of sufficient reliability (Malhotra *et al.*, 2017:360). The growth investor phase has a Cronbach's alpha value of 0.781, indicating good reliability, while the average inter-item correlation was 0.468, indicating a strong relationship among the items (Pallant, 2020:106). The defensive (cautious) investor phase has a Cronbach's alpha value of 0.663, indicating fair reliability,

while the average inter-item correlation was 0.311, indicating a strong relationship among the items (Quinlan *et al*., 2015:114; Pallant, 2020:106). Hence, it can be concluded that the newly developed self-report on investor life cycle scale in Section B of the questionnaire consists of satisfactory internal consistency reliability and is deemed reliable.

5.4.2 EFA on Section C: Self-report on risk tolerance behaviour

EFA was utilised in Section C of the questionnaire to identify the financial risk events that influence the risk tolerance behaviour of individual investors. With reference to Table 5-6, the KMO and Bartlett's test of sphericity generated satisfactory results for factor analysis in Section C of the questionnaire. The KMO index attained a value of 0.851, which is greater than the minimum value of 0.5 and displays great sampling adequacy (Malhotra *et al.*, 2017:714). Bartlett's test of sphericity had an approximate chi-square statistic of 2757.082 with 136 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). This denoted that the variables are related and that the data are suitable for factor analysis relating to Section C of the questionnaire.

Table 5-6: KMO and Bartlett's test of sphericity for Section C

KMO and Bartlett's test of sphericity		**Self-report on risk tolerance behaviour**
KMO measure of sampling adequacy		0.851
Bartlett's test of sphericity	Approx. chi-square	2757.082
	Degree of freedom (df)	136
	Significance (Sig.)	0.000

Source: Author compilation

The pattern matrix of factors for Section C: Self-report on risk tolerance behaviour are presented in Table 5-7. The percentage of variance and eigenvalue for each of the factors are also illustrated. As mentioned earlier, principal component analysis was used to extract the factors and the rotation method applied was Oblimin with Kaiser Normalisation. The item loadings on the three factors are shown in Table 5-7. A minimum of five items per factor were grouped, with all items loading above 0.3 on the three factors. This was deemed satisfactory, as the criteria of three or more items loadings on each factor with factor loadings of 0.3 or greater were met (Pallant, 2020:201).

Table 5-7: Pattern matrix of Section C (Self-report on risk tolerance behaviour)

Item	Factors		
	1	2	3
C10	0.830		
C6	0.830		
C2	0.810		
C4	0.712		
C8	0.592		
C9	0.455		
C15	0.444		
C1		0.793	
C18		0.743	
C11		0.690	
C20		0.673	
C5		0.644	
C16			0.761
C19			0.729
C12			0.628
C14			0.604
C13			0.551
Eigenvalue	4.814	2.359	2.146
% of Variance	28.316	13.875	12.626
Cumulative %	28.316	42.192	54.817

Source: Author compilation

5.4.2.1 Naming and interpretation of dimensions in Section C: Self-report on risk tolerance behaviour

As presented in Table 5-7, three factors with eigenvalues greater than 1.0 were extracted and explained 54.817 per cent of the variance. Thus, factors with eigenvalues less than 1.0 were not considered (Mooi *et al.,* 2018:278). The three factors were deemed appropriate and best fit to explain the newly developed self-report on risk tolerance behaviour scale and to report on the risk tolerance behaviour of individual investors in the sample (Pallant, 2020:199).

Factor one, labelled as average risk, comprised seven variables that explained 28.316 per cent of the variance with an eigenvalue of 4.814. The items that are loaded into this factor relate to the financial risk events that indicate the propensities of individual investors to take average risks when making investment decisions.

Factor two, labelled as high risk, comprised five variables that explained 13.875 per cent of the variance with an eigenvalue of 2.359. The items that are loaded into this factor relate to

the financial risk events that indicate the propensities of individual investors to take high risks when making investment decisions.

Factor three, labelled as low risk, comprised five variables that explained 12.626 per cent of the variance with an eigenvalue of 2.146. The items that are loaded into this factor relate to the financial risk events that indicate the propensities of individual investors to take low risks when making investment decisions.

5.4.2.2 Internal reliability of Section C: Self-report on risk tolerance behaviour

In order to validate the internal consistency of the self-report on risk tolerance behaviour scale in Section C of the questionnaire, the Cronbach's alpha values were calculated for the three factors, namely low risk, average risk and high risk. Table 5-8 demonstrates the values of the Cronbach's alpha coefficient and average inter-item correlation per factor relating to the self-report on risk tolerance behaviour scale in Section C of the questionnaire.

Table 5-8: Reliability of scale for Section C (Self-report on risk tolerance behaviour)

Section C: Self-report on risk tolerance behaviour	Number of items	Cronbach's alpha	Average inter-item correlation
Factor 1: Average risk	7	0.837	0.419
Factor 2: High risk	5	0.797	0.441
Factor 3: Low risk	5	0.679	0.299

Source: Author compilation

The decision was initially made to remove items (C3, C7 and C17) from the scale, which consisted of negative or low correlations below 0.3 to enhance the internal consistency reliability of the scale and ultimately, to arrive at the sufficient Cronbach's alpha values shown in Table 5-8. It is evident from Table 5-8 that the three factors extracted generated acceptable Cronbach's alpha values of greater than 0.6, which indicates that all three factors consist of sufficient reliability (Malhotra *et al.*, 2017:360). The first factor, average risk, has a Cronbach's alpha value of 0.837, signifying very good reliability, while the average inter-item correlation was 0.419, indicating a strong relationship among the items. The second factor, high risk, has a Cronbach's alpha value of 0.797, which indicates good reliability, while the average inter-item correlation was 0.441, indicating a strong relationship among the items. The third factor, low risk, has a Cronbach's alpha value of 0.679, which denotes fair reliability, while the average inter-item correlation was 0.299, indicating a rather strong relationship among the items (Quinlan *et al.*, 2015:114; Pallant, 2020:106). Therefore, it can be concluded that the newly developed self-report on risk tolerance behaviour scale in

Section C of the questionnaire consists of satisfactory internal consistency reliability and is deemed reliable.

5.4.3 EFA and CFA on Section E: The external environment

EFA was utilised in Section E of the questionnaire to identify the financial risk events pertaining to the external environment that are likely to influence the investment decisions of individual investors. Section E of the questionnaire comprised six sections regarding events occurring in the external environment, namely political-legal, technological, tax implications, macroeconomic factors (interest rates, exchange rates, inflation and GDP), international stock market and economic events, as well as reactions to market fluctuations and volatility. The EFA and internal reliability conducted on all six sections are discussed in the following subsections (Section 5.4.3.1–Section 5.4.3.6). Thereafter, the CFA performed on Section E of the questionnaire is discussed in Section 5.4.3.7.

5.4.3.1 Section E: Political-legal

As indicated in Table 5-9, the KMO and Bartlett's test of sphericity generated sufficient results for the factor analysis relating to the political-legal construct in Section E of the questionnaire. The KMO index demonstrated great sampling adequacy with a value of 0.869, which exceeds the minimum required value of 0.5 (Sarstedt & Mooi, 2019:265). Bartlett's test of sphericity had an approximate chi-square statistic of 2040.194 with 66 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). This signified that the variables are related and that the data are suitable to conduct factor analysis.

Table 5-9: KMO and Bartlett's test of sphericity for Section E: Political-legal

KMO and Bartlett's test of sphericity		Political-legal
KMO measure of sampling adequacy		0.869
Bartlett's test of sphericity	Approx. chi-square	2040.194
	Degree of freedom (df)	66
	Significance (Sig.)	0.000

Source: Author compilation

The component matrix for the political-legal construct is presented in Table 5-10. Principal component analysis was used to extract the factors. Given that only one factor was extracted, the solution could not be rotated. As seen in Table 5-10, the required results were achieved as all the items transpired into a single factor (political-legal) and explained 39.258 per cent of the variance with an eigenvalue of 4.711. All the items that loaded into the

political-legal construct were deemed suitable, since all items loadings were greater than 0.3 (Pallant, 2020:201).

Table 5-10: Component matrix for Section E: Political-legal

Items	Item loading	Eigenvalue	% of variance	Cumulative %	Cronbach's alpha	Average inter-item correlation
E1	0.736	4.711	39.258	39.258	0.855	0.350
E2	0.798					
E3	0.598					
E4	0.368					
E6	0.534					
E7	0.745					
E8	0.780					
E9	0.797					
E10	0.720					
E11	0.358					
E12	0.551					

Source: Author compilation

The decision was initially made to remove an item (E5) from the scale as it consisted of low correlation of less than 0.3. This item was removed to enhance the internal consistency reliability of the scale and ultimately, to accomplish the sufficient Cronbach's alpha value depicted in Table 5-10. The Cronbach's alpha value of 0.855 signified very good reliability, while the average inter-item correlation of 0.350 indicated a strong relationship among the items (Quinlan *et al*., 2015:114). Therefore, it can be concluded that the political-legal construct in Section E of the questionnaire consists of satisfactory internal consistency reliability and is deemed reliable.

5.4.3.2 Section E: Technological

With reference to Table 5-11, the KMO and Bartlett's test of sphericity produced satisfactory results for the factor analysis relating to the technological construct in Section E of the questionnaire. The KMO index demonstrated good sampling adequacy with a value of 0.738, which exceeds the minimum required value of 0.5 (Sarstedt & Mooi, 2019:265). Bartlett's test of sphericity had an approximate chi-square statistic of 547.311 with 10 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). As a result, this signified that the variables are related and that the data are suitable for conducting factor analysis.

Table 5-11: KMO and Bartlett's test of sphericity for Section E: Technological

KMO and Bartlett's test of sphericity		Technological
KMO measure of sampling adequacy		0.738
Bartlett's test of sphericity	Approx. chi-square	547.311
	Degree of freedom (df)	10
	Significance (Sig.)	0.000

Source: Author compilation

The component matrix for the technological construct is presented in Table 5-12. Principal component analysis was used to extract the factors. Given that only one factor was extracted, the solution could not be rotated. It is evident in Table 5-12, that the desired results were attained as all the items transpired into a single factor (technological) and explained 48.417 per cent of the variance with an eigenvalue of 2.421. Given that the item loadings exceeded the minimum threshold of 0.3, all the items that loaded into the technological construct were deemed appropriate (Pallant, 2020:201).

Table 5-12: Component matrix for Section E: Technological

Items	Item loading	Eigenvalue	% of variance	Cumulative %	Cronbach's alpha	Average inter-item correlation
E13	0.781	2.421	48.417	48.417	0.773	0.470
E14	0.807					
E15	0.823					
E16	0.690					

Source: Author compilation

It was initially decided to remove an item (E17) from the scale due to its negative and low correlation of less than 0.3 to enhance the internal consistency reliability of the scale and ultimately, to attain the high Cronbach's alpha value shown in Table 5-12. The Cronbach's alpha value of 0.773 exhibited good reliability, while the average inter-item correlation of 0.470 showed a strong relationship among the items (Quinlan *et al*., 2015:114). For that reason, the technological construct in Section E of the questionnaire consists of satisfactory internal consistency reliability and is deemed reliable.

5.4.3.3 Section E: Tax implications

As illustrated in Table 5-13, the KMO and Bartlett's test of sphericity generated adequate results for the factor analysis relating to the tax implications construct in Section E of the questionnaire. Good sampling adequacy was established by the KMO index with a value of 0.711, which exceeds the minimum required value of 0.5 (Sarstedt & Mooi, 2019:265).

Bartlett's test of sphericity had an approximate chi-square statistic of 707.751 with 3 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). This signified that the variables are related and that the data are suitable for conducting factor analysis.

Table 5-13: KMO and Bartlett's test of sphericity for Section E: Tax implications

KMO and Bartlett's test of sphericity		Tax implications
KMO measure of sampling adequacy		0.711
Bartlett's test of sphericity	Approx. chi-square	707.751
	Degree of freedom (df)	3
	Significance (Sig.)	0.000

Source: Author compilation

The component matrix for the tax implications construct is exemplified in Table 5-14. Principal component analysis was used to extract the factors. Given that only one factor was extracted, the solution could not be rotated. As shown in Table 5-14, the required results were attained as all the items transpired into a single factor (tax implications) and explained 78.934 per cent of the variance with an eigenvalue of 2.368. All the items that loaded into the tax implications construct were deemed appropriate, since all item loadings were greater than 0.3 (Pallant, 2020:201). The Cronbach's alpha value of 0.865 displayed very good reliability, while the average inter-item correlation of 0.683 indicated a strong relationship among the items (Quinlan *et al*., 2015:114). After the evaluation of the item-total correlation, the decision was made that no item will be removed because the Cronbach's alpha value obtained for this scale displayed very good reliability. Hence, it can be concluded that the tax implications construct in Section E of the questionnaire has satisfactory internal consistency reliability and is deemed reliable.

Table 5-14: Component matrix for Section E: Tax implications

Items	Item loading	Eigenvalue	% of variance	Cumulative %	Cronbach's alpha	Average inter-item correlation
E18	0.919	2.368	78.934	78.934	0.865	0.683
E19	0.846					
E20	0.899					

Source: Author compilation

5.4.3.4 Section E: Macroeconomic factors

The section relating to the macroeconomic factors in Section E of the questionnaire included four subsections, namely interest rates, exchange rates, inflation and GDP. The EFA and

internal reliability conducted on these four macroeconomic factors are discussed in the following subsections (Section 5.4.3.4.1–Section 5.4.3.4.4).

5.4.3.4.1 Interest rates

As shown in Table 5-15, the KMO and Bartlett's test of sphericity relating to the interest rate construct, as a macroeconomic factor, in Section E of the questionnaire generated adequate results for factor analysis. The KMO index demonstrated good sampling adequacy with a value of 0.733, which exceeds the minimum required value of 0.5 (Sarstedt & Mooi, 2019:265). Bartlett's test of sphericity had an approximate chi-square statistic of 952.333 with 3 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). This implied that the variables are related and that the data are suitable to conduct factor analysis.

Table 5-15: KMO and Bartlett's test of sphericity for Section E: Interest rates

KMO and Bartlett's test of sphericity		**Interest rates**
KMO measure of sampling adequacy		0.733
Bartlett's test of sphericity	Approx. chi-square	952.333
	Degree of freedom (df)	3
	Significance (Sig.)	0.000

Source: Author compilation

The component matrix for the interest rate construct is typified in Table 5-16. Principal component analysis was used to extract the factors. Given that only one factor was extracted, the solution could not be rotated. As illustrated in Table 5-16, the desired results were achieved as all the items transpired into a single factor (interest rates) and explained 84.538 per cent of the variance with an eigenvalue of 2.536. Since all item loadings were greater than 0.3, all the items that loaded into the interest rate construct were deemed suitable (Pallant, 2020:201). Very good reliability was portrayed by the Cronbach's alpha value of 0.908 (Quinlan *et al*., 2015:114). The average inter-item correlation of 0.768 indicated a very strong relationship among the items (Clark & Watson, 1995:315). After the evaluation of the item-total correlation, the decision was made that no item will be removed because the Cronbach's alpha value obtained for this scale displayed very good reliability. For this reason, it can be concluded that the interest rate construct in Section E of the questionnaire has satisfactory internal consistency reliability and is deemed reliable.

Table 5-16: Component matrix for Section E: Interest rates

Items	Item loading	Eigenvalue	% of variance	Cumulative %	Cronbach's alpha	Average inter-item correlation
E21	0.908	2.536	84.538	84.538	0.908	0.768
E22	0.944					
E23	0.906					

Source: Author compilation

5.4.3.4.2 Exchange rate volatility

The KMO and Bartlett's test of sphericity relating to the exchange rate volatility construct, as a macroeconomic factor, in Section E of the questionnaire are illustrated in Table 5-17. Accordingly, the KMO and Bartlett's test of sphericity generated satisfactory results for factor analysis. The KMO index demonstrated good sampling adequacy with a value of 0.764, which exceeds the minimum required value of 0.5 (Sarstedt & Mooi, 2019:265). Bartlett's test of sphericity had an approximate chi-square statistic of 1049.583 with 3 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). Hence, it can be implied that the variables are related and that the data are suitable for conducting factor analysis.

Table 5-17: KMO and Bartlett's test of sphericity for Section E: Exchange rate volatility

KMO and Bartlett's test of sphericity		Exchange rate volatility
KMO measure of sampling adequacy		0.764
Bartlett's test of sphericity	Approx. chi-square	1049.583
	Degree of freedom (df)	3
	Significance (Sig.)	0.000

Source: Author compilation

The component matrix for the exchange rate volatility construct is exemplified in Table 5-18. Principal component analysis was used to extract the factors. Given that only one factor was extracted, the solution could not be rotated. As shown in Table 5-18, the required results were attained as all the items transpired into a single factor (exchange rate volatility) and explained 86.784 per cent of the variance with an eigenvalue of 2.604. All the items that loaded into the exchange rate volatility construct were deemed appropriate, since all item loadings were greater than 0.3 (Pallant, 2020:201). Very good reliability was portrayed by the Cronbach's alpha value of 0.924 (Quinlan *et al*., 2015:114). The average inter-item correlation of 0.802 indicated a very strong relationship among the items (Clark & Watson, 1995:315). After the evaluation of the item-total correlation, the decision was made that no item will be removed for the reason that the Cronbach's alpha value obtained for this scale displayed very good reliability. Consequently, it can be concluded that the exchange rate

volatility construct in Section E of the questionnaire has satisfactory internal consistency reliability and is deemed reliable.

Table 5-18: Component matrix for Section E: Exchange rate volatility

Items	Item loading	Eigenvalue	% of variance	Cumulative %	Cronbach's alpha	Average inter-item correlation
E24	0.932	2.604	86.784	86.784	0.924	0.802
E25	0.929					
E26	0.933					

Source: Author compilation

5.4.3.4.3 Inflation

The KMO and Bartlett's test of sphericity relating to the inflation construct, as a macroeconomic factor, in Section E of the questionnaire are illustrated in Table 5-19. The KMO index attained a value of 0.493, which is slightly below the minimum required value of 0.5 (Malhotra *et al.*, 2017:712). Although, Bartlett's test of sphericity had an approximate chi-square statistic of 525.999 with 6 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). This indicated that the variables are related and that the data are still appropriate to conduct factor analysis (Pallant, 2020:194).

Table 5-19: KMO and Bartlett's test of sphericity for Section E: Inflation

KMO and Bartlett's test of sphericity		Inflation
KMO measure of sampling adequacy		0.493
Bartlett's test of sphericity	Approx. chi-square	525.999
	Degree of freedom (df)	6
	Significance (Sig.)	0.000

Source: Author compilation

The component matrix for the inflation construct shown in Table 5-20 displayed item loadings greater than 0.3 and as a result, all the items that loaded into the inflation construct were deemed appropriate (Pallant, 2020:201). Principal component analysis was used to extract the factors. Given that only one factor was extracted, the solution could not be rotated. As displayed in Table 5-20, the required results were attained as all the items transpired into a single factor (inflation) and explained 46.786 per cent of the variance with an eigenvalue of 1.871.

Table 5-20: Component matrix for Section E: Inflation

Items	Item loading	Eigenvalue	% of variance	Cumulative %	Cronbach's alpha	Average inter-item correlation
E27	0.811	1.871	46.786	46.786	0.691	0.421
E28	0.897					
E29	0.637					

Source: Author compilation

It was initially decided to remove an item (E30) from the scale due to its low correlation of less than 0.3. This item was removed to enhance the internal consistency reliability of the scale and ultimately, to attain the adequate Cronbach's alpha value shown in Table 5-20. Consequently, the Cronbach's alpha value of 0.691 indicated fair reliability, while the average inter-item correlation of 0.421 showed a strong relationship among the items (Quinlan *et al*., 2015:114). Therefore, the inflation construct in Section E of the questionnaire consists of satisfactory internal consistency reliability and is deemed reliable.

5.4.3.4.4 Gross domestic product

As shown in Table 5-21, the KMO and Bartlett's test of sphericity relating to the GDP construct, as a macroeconomic factor, in Section E of the questionnaire produced adequate results for factor analysis. The KMO index exhibited average sampling adequacy with a value of 0.665, which exceeds the minimum required value of 0.5 (Sarstedt & Mooi, 2019:265). Bartlett's test of sphericity had an approximate chi-square statistic of 377.771 with 6 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). Therefore, it can be denoted that the variables are related and that the data are suitable for conducting factor analysis.

Table 5-21: KMO and Bartlett's test of sphericity for Section E: GDP

KMO and Bartlett's test of sphericity		GDP
KMO measure of sampling adequacy		0.665
Bartlett's test of sphericity	Approx. chi-square	377.771
	Degree of freedom (df)	6
	Significance (Sig.)	0.000

Source: Author compilation

The component matrix for the GDP construct is typified in Table 5-22. Principal component analysis was used to extract the factors. Given that only one factor was extracted, the solution could not be rotated. With reference to Table 5-22, the desired results were achieved as all the items transpired into a single factor (GDP) and explained 51.142 per cent

of the variance with an eigenvalue of 2.046. All the items that loaded into the GDP construct were deemed appropriate, since all item loadings were greater than 0.3 (Pallant, 2020:201).

Table 5-22: Component matrix for Section E: GDP

Items	Item loading	Eigenvalue	% of variance	Cumulative %	Cronbach's alpha	Average inter-item correlation
E31	0.742	2.046	51.142	51.142	0.758	0.513
E32	0.853					
E33	0.860					

Source: Author compilation

It was initially decided to remove an item (E34) from the scale because of its low correlation of less than 0.3. This item was removed to improve the internal consistency reliability of the scale and ultimately, to attain the satisfactory Cronbach's alpha value shown in Table 5-22. As a result, the Cronbach's alpha value of 0.758 displayed good reliability and the average inter-item correlation of 0.513 showed a strong relationship among the items (Quinlan *et al*., 2015:114). Thus, the GDP construct in Section E of the questionnaire has satisfactory internal consistency reliability and is deemed reliable.

5.4.3.5 Section E: International stock market and economic events

Relating to the international events construct in Section E of the questionnaire, the KMO and Bartlett's test of sphericity generated satisfactory results for factor analysis. As illustrated in Table 5-23, the KMO index demonstrated good sampling adequacy with a value of 0.770, which exceeds the minimum required value of 0.5 (Malhotra *et al.*, 2017:712). Bartlett's test of sphericity had an approximate chi-square statistic of 713.239 with 6 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). This signified that the variables are related and that the data are suitable for conducting factor analysis.

Table 5-23: KMO and Bartlett's test of sphericity for Section E: International events

KMO and Bartlett's test of sphericity		International events
KMO measure of sampling adequacy		0.770
Bartlett's test of sphericity	Approx. chi-square	713.239
	Degree of freedom (df)	6
	Significance (Sig.)	0.000

Source: Author compilation

The component matrix for the international events construct is exemplified in Table 5-24. Principal component analysis was used to extract the factors. Given that only one factor was

extracted, the solution could not be rotated. As presented in Table 5-24, the required results were attained as all the items transpired into a single factor (international events) and explained 66.171 per cent of the variance with an eigenvalue of 2.647. All the items that loaded into the international events construct were deemed appropriate, since all item loadings were greater than 0.3 (Pallant, 2020:201). The Cronbach's alpha value of 0.825 displayed very good reliability, while the average inter-item correlation of 0.546 indicated a strong relationship among the items (Quinlan *et al*., 2015:114). After consideration was given to the evaluation of the item-total correlation, the decision was made that no item will be removed as the Cronbach's alpha value obtained for this scale presented very good reliability. Consequently, it can be concluded that the international events construct in Section E of the questionnaire has satisfactory internal consistency reliability and is deemed reliable.

Table 5-24: Component matrix for Section E: International events

Items	Item loading	Eigenvalue	% of variance	Cumulative %	Cronbach's alpha	Average inter-item correlation
E35	0.769	2.647	66.171	66.171	0.825	0.546
E36	0.889					
E37	0.789					
E38	0.802					

Source: Author compilation

5.4.3.6 Section E: Market fluctuations and volatility

Concerning the market fluctuations and volatility construct in Section E of the questionnaire, the KMO and Bartlett's test of sphericity produced acceptable results for factor analysis. Table 5-25 indicates the attained KMO index value of 0.819, which demonstrates great sampling adequacy, as it exceeds the minimum required value of 0.5 (Malhotra *et al.*, 2017:712). Bartlett's test of sphericity had an approximate chi-square statistic of 995.672 with 21 degrees of freedom and was statistically significant ($p = 0.000 < 0.05$). Thus, it can be denoted that the variables are related and that the data are greatly suitable for conducting factor analysis.

Table 5-25: KMO and Bartlett's test of sphericity for Section E: Market fluctuations and volatility

KMO and Bartlett's test of sphericity		Market fluctuations and volatility
KMO measure of sampling adequacy		0.819
Bartlett's test of sphericity	Approx. chi-square	995.672
	Degree of freedom (df)	21

	Significance (Sig.)	0.000

Source: Author compilation

The component matrix for the market fluctuations and volatility construct is typified in Table 5-26. Principal component analysis was used to extract the factors. Given that only one factor was extracted, the solution could not be rotated. As presented in Table 5-26, the desired results were achieved as all the items transpired into a single factor (market fluctuations and volatility) and explained 45.607 per cent of the variance with an eigenvalue of 3.192. All the items that loaded into the market fluctuations and volatility construct were considered appropriate, given that all item loadings were greater than 0.3 (Pallant, 2020:201).

Table 5-26: Component matrix for Section E: Market fluctuations and volatility

Items	Item loading	Eigenvalue	% of variance	Cumulative %	Cronbach's alpha	Average inter-item correlation
E39	0.791	3.192	45.607	45.607	0.817	0.426
E40	0.785					
E41	0.777					
E42	0.733					
E43	0.547					
E45	0.693					

Source: Author compilation

It was initially decided to remove an item (E44) from the scale for the reason that it had a low correlation of less than 0.3. This item was removed to improve the internal consistency reliability of the scale and ultimately, to achieve the adequate Cronbach's alpha value shown in Table 5-26. Consequently, the Cronbach's alpha value of 0.817 exhibited very good reliability and the average inter-item correlation of 0.426 showed a strong relationship among the items (Quinlan *et al*., 2015:114). As a result, the market fluctuations and volatility construct in Section E of the questionnaire has satisfactory internal consistency reliability and is deemed reliable.

5.4.3.7 Measurement model specification

Following the execution of EFA and internal reliability on the six sections of Section E of the questionnaire, CFA was performed to establish if the specified model is a good fit for the data (Mooi *et al.,* 2018:287). It is also applied to determine the factor and factor loading of the measured variables and to test the particular hypotheses relating to the structure underlying a set of variables (Sarstedt & Mooi, 2019:276; Pallant, 2020:188). The CFA for

Section E of the questionnaire relating to events occurring in the external environment is demonstrated in Figure 5-1.

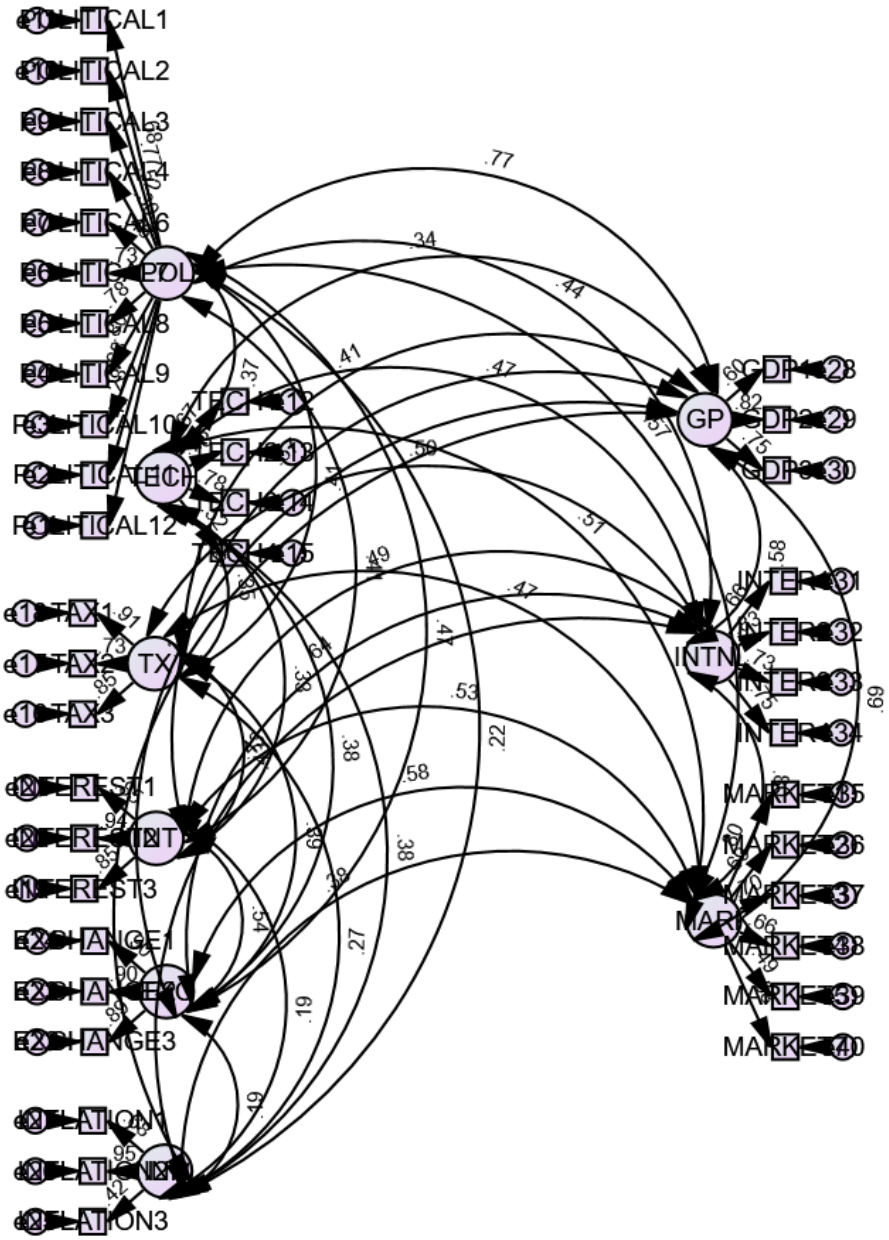

Figure 5-1: CFA for Section E relating to the external environment
Source: Author compilation

Two approaches were applied in the CFA to assess the measurement model. The reliability and validity of the measurement model followed by the assessment of the goodness-of-fit indices are discussed in the following subsections (Section 5.4.3.7.1–Section 5.4.3.7.2).

5.4.3.7.1 Reliability and validity of the measurement model

Table 5-27 indicates the standardised factor loading estimates and significance of the various constructs relating to the external environment in Section E of the questionnaire, which typified that the model is a good fit for the data. All the constructs relating to the external environment were statistically significant ($p = 0.000 < 0.001$). However, as seen in Table 5-27, for model identification purposes, in each construct, namely political-legal (E12), technological (E13), tax implications (E20), interest rates (E23), exchange rate volatility (E26), inflation (E29), GDP (E31), international events (E35) and market fluctuations and volatility (E39), an item loading was fixed to 1.0 to scale each construct. Therefore, no significance tests were applicable to the constrained estimates. It can further be seen from Table 5-27 that all the constructs indicated suitable standardised factor loading estimates with the majority of the constructs displaying factor loadings greater than the acceptable level of 0.5 (Hamdan *et al.,* 2011:1099). Only a few items relating to the political-legal construct (E4, E6, E11 and E12), inflation construct (E29) and market fluctuations and volatility construct (E43) had standardised factor loading estimates slightly below 0.5. However, these constructs were still deemed suitable. Moreover, as attended to in Section 5.4.3.1–Section 5.4.3.6, all the constructs relating to the external environment had satisfactory internal consistency reliability.

Table 5-27: Standardised factor loading estimates and p-values

External environment construct – Items	Estimate	P-value
Political-legal – E1	0.678	***
Political-legal – E2	0.772	***
Political-legal – E3	0.523	***
Political-legal – E4	0.304	***
Political-legal – E6	0.462	***
Political-legal – E7	0.726	***
Political-legal – E8	0.778	***
Political-legal – E9	0.798	***
Political-legal – E10	0.677	***
Political-legal – E11	0.281	***
Political-legal – E12	0.480	
Technological – E13	0.669	
Technological – E14	0.778	***
Technological – E15	0.777	***
Technological – E16	0.515	***
Tax implications – E18	0.914	***
Tax implications – E19	0.727	***
Tax implications – E20	0.845	

External environment construct – Items	Estimate	P-value
Interest rates – E21	0.849	***
Interest rates – E22	0.939	***
Interest rates – E23	0.847	
Exchange rate volatility – E24	0.897	***
Exchange rate volatility – E25	0.897	***
Exchange rate volatility – E26	0.892	
Inflation – E27	0.681	***
Inflation – E28	0.953	***
Inflation – E29	0.424	
GDP – E31	0.600	
GDP – E32	0.822	***
GDP – E33	0.746	***
International events – E35	0.657	
International events – E36	0.834	***
International events – E37	0.734	***
International events – E38	0.750	***
Market fluctuations and volatility – E39	0.802	
Market fluctuations and volatility – E40	0.691	***
Market fluctuations and volatility – E41	0.700	***
Market fluctuations and volatility – E42	0.659	***
Market fluctuations and volatility – E43	0.490	***
Market fluctuations and volatility – E45	0.580	***
***Significant at the 0.001 level		

Source: Author compilation

5.4.3.7.2 Assessment of goodness-of-fit indices

As discussed in Chapter 4 (Section 4.8.6.3.3), there are several fit indices that should be considered to determine whether the associations among measured and latent variables in the specified model adequately reflect the observed associations in the data (Weston & Gore, 2006:741). The following results of the model fit indices were attained to evaluate how well the specified model fits the data:

- The CMIN/DF (chi-square test statistics divided by the degrees of freedom) value of 3.506 exemplified good model fit, seeing that a standard for good fit entails values between 3–5 (Mueller, 1996:204; Plucker, 2003:28).
- A CFI value of 0.829 was obtained, which is slightly below the acceptable level of fit. CFI varies from 0–1, with values closer to 1, ideally greater than 0.90, indicates good model fit (Malhotra *et al.,* 2017:807).

- A RMSEA value of 0.074 was established at the 90 per cent confidence interval [0.071; 0.077]. This indicated good model fit, as values of 0.08 or less signify good model fit (Schreiber *et al.,* 2006:327; Malhotra *et al.,* 2017:807).

Although the CFI value was slightly below the acceptable level of fit, the CMIN/DF and RMSEA values exhibited good model fit. It can be concluded from the evaluation of the CFA conducted that the specified model for Section E of the questionnaire relating to events occurring in the external environment, as shown in Figure 5-1, is a good fit for the data. The next section illuminates upon the descriptive statistics applied in the research study (Section 5.5).

5.5 DESCRIPTIVE STATISTICS

Descriptive statistics were applied to present the data collected through the questionnaire from the representative sample in a well-organised and efficient manner (Creswell & Plano-Clark, 2011:31; Quinlan *et al*., 2015:359). The following subsections (Section 5.5.1–Section 5.5.4) present the descriptive statistics pertaining to the final sample measured in Section B (self-report on investor life cycle), Section C (self-report on risk tolerance behaviour), Section D (behavioural finance biases) and Section E (the external environment) of the questionnaire, respectively.

5.5.1 Section B: Self-report on investor life cycle

With reference to Section B of the questionnaire and the second empirical objective: Determine individual investors' phase in the investor life cycle*,* descriptive statistics, namely measures of central tendency and dispersion were applied to determine if individual investors would describe themselves to be in the growth phase or defensive (cautious) phase of the investor life cycle. Participants were asked to indicate based on a set of statements where they would describe themselves to be in the investor life cycle. The self-report on investor life cycle was measured on a six-point Likert scale (1 = strongly disagree, 6 = strongly agree). Table 5-28 illustrates the descriptive statistics for the self-report on investor life cycle in Section B of the questionnaire.

Table 5-28: Descriptive statistics for self-report on investor life cycle

Phase in the investor life cycle	N	Minimum	Maximum	Mean	Standard deviation
Growth investor phase	463	1.00	6.00	3.23	1.34
Defensive (cautious) investor phase	463	1.00	6.00	3.50	1.07

Source: Author compilation

As shown in Table 5-28, the questionnaire has been completed by 463 participants, which represents the final sample attained in the research study. The defensive (cautious) investor phase construct consisted of the highest mean (mean = 3.50). This indicated that the majority of individual investors classified themselves to be in the defensive (cautious) investor phase of the life cycle rather than in the growth investor phase of the life cycle. The growth investor phase construct recorded a mean of 3.23. The growth investor phase construct indicated the highest standard deviation (Std. Dev. = 1.34), indicating a greater dispersion in the responses to items in this construct than in the defensive (cautious) investor phase construct (Std. Dev. = 1.07).

5.5.2 Section C: Self-report on risk tolerance behaviour

With reference to Section C of the questionnaire and the first empirical objective: Report on the risk tolerance behaviour of individual investors in the sample, descriptive statistics, namely measures of central tendency and dispersion were applied to determine individual investors' level of risk tolerance behaviour. Participants were asked to indicate the degree to which they agree or disagree with a set of statements regarding the amount of financial risk they are willing to take when making an investment decision. The self-report on risk tolerance behaviour was measured on a six-point Likert scale (1 = strongly disagree, 6 = strongly agree). The descriptive statistics for the self-report on risk tolerance behaviour in Section C of the questionnaire are typified in Table 5-29.

Table 5-29: Descriptive statistics for self-report on risk tolerance behaviour

Risk tolerance behaviour category	N	Minimum	Maximum	Mean	Standard deviation
High risk	463	1.00	6.00	3.10	1.06
Average risk	463	1.00	6.00	3.58	1.02
Low risk	463	1.00	6.00	3.39	0.90

Source: Author compilation

As demonstrated in Table 5-29, the questionnaire has been completed by 463 participants, which represents the final sample attained in the research study. The average risk category reported the highest mean (mean = 3.58), indicating that the majority of individual investors have a propensity to take average risks when making investment decisions. This is followed by the low risk category (mean = 3.39), which is indicative of the propensities of individual investors to take low risks when making investment decisions. However, the high risk category recorded the lowest mean (mean = 3.10), indicating that the minority of individual investors have a propensity to take high risks when making investment decisions. Also, the

high risk category signified the highest standard deviation (Std. Dev. = 1.06), which signifies a greater dispersion in the responses to items in this category than in the average risk category (Std. Dev. = 1.02) and low risk category (Std. Dev. = 0.90).

5.5.3 Section D: Behavioural finance

With reference to Section D of the questionnaire and the third empirical objective: Identify the behavioural finance biases that drive individual investment decisions, descriptive statistics, namely frequencies and percentages, as well as measures of central tendency and dispersion, were applied to identify the behavioural finance biases that drive individual investment decisions. The extent to which the behavioural finance biases drive individual investors' investment decisions was measured using a six-point Likert scale (1 = strongly disagree, 6 = strongly agree). Table 5-30 reports on the frequencies and percentages of the behavioural finance biases in Section D of the questionnaire.

Table 5-30: Frequencies and percentages for behavioural finance biases

Representativeness – D1		
	Frequency (*f*)	**Percentage (%)**
Strongly disagree	17	3.7
Disagree	35	7.6
Somewhat disagree	50	10.8
Somewhat agree	202	43.6
Agree	135	29.2
Strongly agree	24	5.2
Total	**463**	**100**
Overconfidence – D2		
	Frequency (*f*)	**Percentage (%)**
Strongly disagree	50	10.8
Disagree	86	18.6
Somewhat disagree	114	24.6
Somewhat agree	129	27.9
Agree	68	14.7
Strongly agree	16	3.5
Total	**463**	**100**
Anchoring – D3		
	Frequency (*f*)	**Percentage (%)**
Strongly disagree	77	16.6
Disagree	154	33.3
Somewhat disagree	135	29.2
Somewhat agree	71	15.3
Agree	23	5.0
Strongly agree	3	0.6

Total	**463**	**100**
Gambler's fallacy – D4		
	Frequency (*f*)	**Percentage (%)**
Strongly disagree	20	4.3
Disagree	52	11.2
Somewhat disagree	77	16.6
Somewhat agree	202	43.6
Agree	91	19.7
Strongly agree	21	4.5
Total	**463**	**100**
Availability bias – D5		
	Frequency (*f*)	**Percentage (%)**
Strongly disagree	11	2.4
Disagree	34	7.3
Somewhat disagree	45	9.7
Somewhat agree	186	40.2
Agree	157	33.9
Strongly agree	30	6.5
Total	**463**	**100**
Loss aversion – D6		
	Frequency (*f*)	**Percentage (%)**
Strongly disagree	31	6.7
Disagree	81	17.5
Somewhat disagree	111	24.0
Somewhat agree	144	31.1
Agree	80	17.3
Strongly agree	16	3.5
Total	**463**	**100**
Regret aversion – D7		
	Frequency (*f*)	**Percentage (%)**
Strongly disagree	65	14.0
Disagree	91	19.7
Somewhat disagree	89	19.2
Somewhat agree	122	26.3
Agree	81	17.5
Strongly agree	15	3.2
Total	**463**	**100**
Mental accounting – D8		
	Frequency (*f*)	**Percentage (%)**
Strongly disagree	19	4.1
Disagree	34	7.3
Somewhat disagree	73	15.8
Somewhat agree	178	38.4
Agree	134	28.9
Strongly agree	25	5.4

Total	**463**	**100**
Self-control – D9		
	Frequency (*f*)	**Percentage (%)**
Strongly disagree	11	2.4
Disagree	14	3.0
Somewhat disagree	33	7.1
Somewhat agree	134	28.9
Agree	207	44.7
Strongly agree	64	13.8
Total	**463**	**100**

Source: Author compilation

As demonstrated in Table 5-30 and relating to the representativeness bias, the majority of the sample (43.6%), representing 202 out of the 463 participants, specified that they somewhat agree that their investment decisions are driven by this behavioural finance bias. The minority of the sample (3.7%), representing 17 out of the 463 participants, specified that they strongly disagree that their investment decisions are driven by the representativeness bias. In relation to the overconfidence bias, 129 out of the 463 participants, which represents the majority of the sample (27.9%), specified that they somewhat agree that their investment decisions are driven by this behavioural finance bias. The minority of the sample (3.5%), representing 16 out of the 463 participants, specified that they strongly agree that their investment decisions are driven by the overconfidence bias.

On the contrary, the majority of the sample (33.3%), which is 154 out of the 463 participants, stated that they disagree that their investment decisions are driven by the anchoring bias, while the minority of the sample (0.6%), which is 3 out of the 463 participants, stated that they strongly agree that their investment decisions are driven by this behavioural finance bias. Pertaining to the gambler's fallacy bias, the majority of the sample (43.6%) indicated that they somewhat agree that their investment decisions are driven by this behavioural finance bias, while the minority of the sample (4.3%) stated that they strongly disagree that their investment decisions are driven by this behavioural finance bias. Similarly, the majority of the sample (40.2%) indicated that they somewhat agree that their investment decisions are driven by the availability bias and the minority of the sample (2.4%) stated that they strongly disagree that their investment decisions are driven by this behavioural finance bias.

With regard to the loss aversion bias, 144 out of the 463 participants, which represent the majority of the sample (31.1%), specified that they somewhat agree that their investment decisions are driven by this behavioural finance bias. However, only 16 out of the 463 participants, which represent the minority of the sample (3.5%), specified that they strongly

agree that their investment decisions are driven by this behavioural finance bias. Also, the majority of the sample (26.3%) indicated that they somewhat agree that their investment decisions are driven by the regret aversion bias, while the minority of the sample (3.2%) indicated that they strongly agree that their investment decisions are driven by the regret aversion bias.

Concerning the mental accounting bias, 178 out of the 463 participants, representing the majority of the sample (38.4%), indicated that they somewhat agree that their investment decisions are driven by this behavioural finance bias. Only 19 out of the 463 participants, which is the minority of the sample (4.1%), indicated that they strongly disagree that their investment decisions are driven by the mental accounting bias. Lastly, the majority of the sample (44.7%), which is 207 out of the 463 participants, stated that they agree that their investment decisions are driven by the self-control bias. Only 11 out of the 463 participants, representing the minority of the sample (2.4%), stated that they strongly disagree that their investment decisions are driven by the self-control bias.

Derived from the above-mentioned discussion and results shown in Table 5-30, most individual investors specified that they somewhat agree that their investment decisions are driven by a particular behavioural finance bias. However, the contrary was true for the anchoring bias as most individual investors specified that they disagree that their investment decisions are driven by this behavioural finance bias, since they do not rely on a single piece of information (past or current information) to make investment decisions (Mazzoli & Marinelli, 2011:36). Thus, it can be inferred that the investment decisions of individual investors are driven to a rather great extent by the behavioural finance biases. Accordingly, the descriptive statistics for the behavioural finance biases in Section D of the questionnaire are illustrated in Table 5-31.

Table 5-31: Descriptive statistics for behavioural finance biases

Behavioural finance bias	Item	N	Minimum	Maximum	Mean	Standard deviation
Representativeness	D1	463	1.00	6.00	4.03	1.11
Overconfidence	D2	463	1.00	6.00	3.27	1.31
Anchoring	D3	463	1.00	6.00	2.61	1.12
Gambler's fallacy	D4	463	1.00	6.00	3.77	1.15
Availability bias	D5	463	1.00	6.00	4.15	1.09
Loss aversion	D6	463	1.00	6.00	3.45	1.25
Regret aversion	D7	463	1.00	6.00	3.23	1.40
Mental accounting	D8	463	1.00	6.00	3.97	1.15
Self-control	D9	463	1.00	6.00	4.52	1.07

Source: Author compilation

As demonstrated in Table 5-31, the highest mean (mean = 4.52) was recorded by the self-control bias, indicating that the investment decisions of individual investors are driven to the greatest extent by this behavioural finance bias. This is followed by the availability bias (mean = 4.15), the representativeness bias (mean = 4.03), the mental accounting bias (mean = 3.97), the gambler's fallacy bias (mean = 3.77), the loss aversion bias (mean = 3.45), the overconfidence bias (mean = 3.27) and the regret aversion bias (mean = 3.23). However, the lowest mean (mean = 2.61) was recorded by the anchoring bias, indicating that the investment decisions of individual investors are to the smallest extent driven by this behavioural finance bias. The regret aversion bias recorded the highest standard deviation (Std. Dev. = 1.40), which indicates a greater dispersion in the responses to items in this behavioural finance bias.

5.5.4 Section E: The external environment

With reference to Section E of the questionnaire and the fifth empirical objective: Identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour, descriptive statistics, namely measures of central tendency and dispersion were applied. Participants were asked to indicate the likelihood that the events occurring in the external environment are to influence their investment decisions by using a six-point Likert scale (1 = very unlikely, 6 = very likely). The descriptive statistics for the external environment in Section E of the questionnaire are shown in Table 5-32.

Table 5-32: Descriptive statistics for the external environment

External environment factors	N	Minimum	Maximum	Mean	Standard deviation
Political-legal	463	1.00	6.00	4.39	0.81
Technological	463	1.00	6.00	3.85	1.00
Tax implications	463	1.00	6.00	4.47	1.06
Interest rates	463	1.00	6.00	4.28	1.14
Exchange rate volatility	463	1.00	6.00	4.33	1.22
Inflation	463	1.00	6.00	3.69	1.00
GDP	463	1.00	6.00	4.26	1.04
International events	463	1.00	6.00	4.10	1.01
Market fluctuations and volatility	463	1.00	6.00	3.86	0.87

Source: Author compilation

As shown in Table 5-32, the questionnaire has been completed by 463 participants, which represents the final sample attained in the research study. The highest mean (mean = 4.47) was recorded by the tax implications construct, indicating that tax implications, as an exogenous factor, are most likely to influence the investment decisions of individual

investors. This is followed by political-legal factors (mean = 4.39), exchange rate volatility (mean = 4.33), interest rates (mean = 4.28), GDP (mean = 4.26), international events (mean = 4.10), market fluctuations and volatility (mean = 3.86) and technological factors (mean = 3.85). Nonetheless, the lowest mean (mean = 3.69) was recorded by the inflation construct, indicating that inflation, as an exogenous factor, is the least likely to influence the investment decisions of individual investors. Also, the highest standard deviation (Std. Dev. = 1.22) was recorded by the exchange rate volatility construct, which is depictive of a greater dispersion in the responses to items in this construct.

The next section illuminates upon the inferential statistics applied in the research study (Section 5.6).

5.6 INFERENTIAL STATISTICS

In order to accomplish the relevant empirical objectives and to test the hypotheses as set out in Chapter 1, inferential statistics, namely t-tests, one-way ANOVA and correlation analysis were applied. For each of these tests, the significance level was set at the traditional 5 per cent level, that is, α = 0.05. The decision rule applied is as follows (Malhotra *et al.*, 2017:567; Pallant, 2020:141):

- If the p-value is $>\alpha$, then conclude H_0.
- If the p-value is $\leq\alpha$, then conclude H_a.

The following subsections (Section 5.6.1–Section 5.6.4) attend to the achievement of the empirical objectives of the research study by means of the above-mentioned inferential statistics.

5.6.1 Determine individual investors' phase in the investor life cycle

In order to facilitate the achievement of the second empirical objective, determine individual investors' phase in the investor life cycle*,* correlation analysis was also applied. Non-parametric Spearman's rho correlation was utilised to determine the strength and direction of the relationship between individual investors' phase in the investor life cycle, their age and their net worth. The strength of the relationship is specified by the Spearman's rho correlation coefficient with values ranging from -1.0 to +1.0. A correlation value of -1.0 signifies a perfect negative relationship, a correlation value of 0 signifies no relationship and a correlation value of +1.0 signifies a perfect positive relationship. The direction of the relationship is signified by the positive correlation (as one variable increases, the other

variable also increases) or negative correlation (as one variable increases, the other variable decreases) (Pallant, 2020:140; Statistic Solutions, 2020a:1).

The following guiding principles are recommended by Cohen (1988:81) and Pallant (2020:140) to determine the strength of the relationship between variables:

- r = 0.10 to 0.29 point towards a small/weak strength relationship,
- r = 0.30 to 0.49 point towards a medium strength relationship and
- r = 0.50 to 1.00 point towards a large/strong strength relationship.

Table 5-33 demonstrates the results of the correlation analysis conducted to establish the relationship between individual investors' phase in the investor life cycle, their age and their net worth.

Table 5-33: Relationship between age, net worth and phase in the investor life cycle

Scale	Spearman's correlation	Age	Net worth	Growth investor phase	Defensive (cautious) investor phase
Age	Correlation coefficient	1.000	0.377**	-0.686**	0.284**
	Sig. (2-tailed)		0.000	0.000	0.000
	N	463	463	463	463
Net worth	Correlation coefficient	0.377**	1.000	-0.258**	0.455**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	463	463	463	463
Growth investor phase	Correlation coefficient	-0.686**	-0.258**	1.000	-0.023
	Sig. (2-tailed)	0.000	0.000		0.625
	N	463	463	463	463
Defensive (cautious) investor phase	Correlation coefficient	0.284**	0.455**	-0.023	1.000
	Sig. (2-tailed)	0.000	0.000	0.625	
	N	463	463	463	463
**Correlation is significant at the 0.01 level (2-tailed)					

Source: Author compilation

The following hypotheses were formulated to test the relationship between individual investors' phase in the investor life cycle, their age and net worth.

Null hypothesis ($H_0$1): There is no relationship between the growth investor phase of the life cycle and age.

Alternative hypothesis (H_a1): There is a relationship between the growth investor phase of the life cycle and age.

Null hypothesis ($H_0 2$): There is no relationship between the growth investor phase of the life cycle and net worth.

Alternative hypothesis (H_a2): There is a relationship between the growth investor phase of the life cycle and net worth.

Null hypothesis ($H_0 3$): There is no relationship between the defensive (cautious) investor phase of the life cycle and age.

Alternative hypothesis (H_a3): There is a relationship between the defensive (cautious) investor phase of the life cycle and age.

Null hypothesis ($H_0 4$): There is no relationship between the defensive (cautious) investor phase of the life cycle and net worth.

Alternative hypothesis (H_a4): There is a relationship between the defensive (cautious) investor phase of the life cycle and net worth.

As shown in Table 5-33, there is a strong, negative statistically significant relationship between the growth investor phase of the life cycle and age (rho = -0.686, p = 0.000 < 0.05). Accordingly, the null hypothesis ($H_0 1$) can be rejected and the alternative hypothesis (H_a1) can be concluded at the 5 per cent significance level. There is also a small, negative statistically significant relationship between the growth investor phase of the life cycle and net worth (rho = -0.258, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0 2$) can be rejected and the alternative hypothesis (H_a2) can be concluded at the 5 per cent significance level. Given that there is a negative relationship between the growth investor phase of the life cycle with age and net worth, it can be concluded that younger individual investors with a smaller net worth are classified into the growth investor phase of the life cycle. This is in accordance with the investor life cycle theory as discussed in Chapter 3 (Section 3.2), as young individuals in the early to middle years of their working careers are classified in the early phase of the investor life cycle. These individuals also have a smaller net worth due to the great amount of debt on the long-term assets purchased (Marx *et al.*, 2010:267; Reilly & Brown, 2012:33).

It is further evident in Table 5-33 that there is a small, positive statistically significant relationship between the defensive (cautious) investor phase of the life cycle and age (rho =

0.284, p = 0.000 < 0.05). Thus, the null hypothesis ($H_0$3) can be rejected and the alternative hypothesis (H_a3) can be concluded at the 5 per cent significance level. Regarding the relationship between the defensive (cautious) investor phase of the life cycle and net worth, a medium, positive statistically significant relationship (rho = 0.455, p = 0.000 < 0.05) was established. As a result, the null hypothesis ($H_0$4) can be rejected and the alternative hypothesis (H_a4) can be concluded at the 5 per cent significance level. Given that there is a positive relationship between the defensive (cautious) investor phase of the life cycle with age and net worth, it can be inferred that older individual investors with a greater net worth are classified into the defensive (cautious) investor phase of the life cycle. This also corresponds with the investor life cycle theory as discussed in Chapter 3 (Section 3.2), as older individuals who are past the midpoint of their working careers or those who have retired are classified in the ensuing phases of the investor life cycle. These individuals also hold a greater net worth, since most or all of their outstanding debt have been settled, they have accumulated financial assets and they are financially independent (Reilly & Brown, 2012:34; Kuzniak & Grable, 2017:321).

5.6.2 Identify the behavioural finance biases that drive individual investment decisions

Relating to the third empirical objective, identify the behavioural finance biases that drive individual investment decisions, correlation analysis was also applied. Non-parametric Spearman's rho correlation was applied to determine the strength and direction of the relationship between the behavioural finance biases and the investor life cycle. The strength of the relationship is specified by the Spearman's rho correlation coefficient with values ranging from -1.0 to +1.0. A correlation value of -1.0 signifies a perfect negative relationship, a correlation value of 0 signifies no relationship and a correlation value of +1.0 signifies a perfect positive relationship. The direction of the relationship is signified by the positive correlation (as one variable increases, the other variable also increases) or negative correlation (as one variable increases, the other variable decreases) (Pallant, 2020:140; Statistic Solutions, 2020a:1). The following guiding principles were utilised to determine the strength of the relationship between the behavioural finance biases and the investor life cycle (Cohen, 1988:81; Pallant, 2020:140):

- r = 0.10 to 0.29 point towards a small/weak strength relationship,
- r = 0.30 to 0.49 point towards a medium strength relationship and
- r = 0.50 to 1.00 point towards a large/strong strength relationship.

Table 5-34 demonstrates the results of the correlation analysis performed to establish the relationship between the behavioural finance biases and the investor life cycle.

Table 5-34: Relationship between the behavioural finance biases and the investor life cycle

Behavioural finance bias	Spearman's correlation	Growth investor phase	Defensive (cautious) investor phase
Representativeness	Correlation coefficient	0.122**	0.218**
	Sig. (2-tailed)	0.008	0.000
	N	463	463
Overconfidence	Correlation coefficient	0.153**	0.331**
	Sig. (2-tailed)	0.001	0.000
	N	463	463
Anchoring	Correlation coefficient	0.069	0.065
	Sig. (2-tailed)	0.138	0.164
	N	463	463
Gambler's fallacy	Correlation coefficient	0.054	0.272**
	Sig. (2-tailed)	0.243	0.000
	N	463	463
Availability bias	Correlation coefficient	-0.005	0.223**
	Sig. (2-tailed)	0.907	0.000
	N	463	463
Loss aversion	Correlation coefficient	-0.023	0.128**
	Sig. (2-tailed)	0.622	0.006
	N	463	463
Regret aversion	Correlation coefficient	0.038	0.065
	Sig. (2-tailed)	0.420	0.164
	N	463	463
Mental accounting	Correlation coefficient	0.026	0.189**
	Sig. (2-tailed)	0.582	0.000
	N	463	463
Self-control	Correlation coefficient	0.039	0.259**
	Sig. (2-tailed)	0.408	0.000
	N	463	463
**Correlation is significant at the 0.01 level (2-tailed)			

Source: Author compilation

The following hypotheses were formulated to test the relationship between the behavioural finance biases and the investor life cycle:

Null hypothesis ($H_0$5): There is no relationship between the behavioural finance biases and the growth investor phase of the life cycle.

Alternative hypothesis (H_a5): There is a relationship between the behavioural finance biases and the growth investor phase of the life cycle.

Null hypothesis ($H_0 6$): There is no relationship between the behavioural finance biases and the defensive (cautious) investor phase of the life cycle.

Alternative hypothesis (H_a6): There is a relationship between the behavioural finance biases and the defensive (cautious) investor phase of the life cycle.

Relating to the relationship between the behavioural finance biases and the growth investor phase of the life cycle, it can be seen from Table 5-34 that there is a small, positive statistically significant relationship between the representativeness bias and the growth investor phase of the life cycle (rho = 0.122, p = 0.008 < 0.05). Consequently, the null hypothesis ($H_0 5$) can be rejected and the alternative hypothesis (H_a5) can be concluded at the 5 per cent significance level. In addition, a small, positive statistically significant relationship was also established between the overconfidence bias and the growth investor phase of the life cycle (rho = 0.153, p = 0.001 < 0.05). Accordingly, the null hypothesis ($H_0 5$) can be rejected and the alternative hypothesis (H_a5) can be concluded at the 5 per cent significance level. On the other hand, it can be seen from Table 5-34 that no statistically significant relationship was found between the growth investor phase of the life cycle and the subsequent behavioural finance biases, namely anchoring (rho = 0.069, p = 0.138 > 0.05), gambler's fallacy (rho = 0.054, p = 0.243 > 0.05), availability bias (rho = -0.005, p = 0.907 > 0.05), loss aversion (rho = -0.023, p = 0.622 > 0.05), regret aversion (rho = 0.038, p = 0.420 > 0.05), mental accounting (rho = 0.026, p = 0.582 > 0.05) and self-control (rho = 0.039, p = 0.408 > 0.05). Consequently, for the relationship between the growth investor phase of the life cycle and these remaining behavioural finance biases, the null hypothesis ($H_0 5$) cannot be rejected at the 5 per cent significance level.

Concerning the relationship between the behavioural finance biases and the defensive (cautious) investor phase of the life cycle, it can be seen from Table 5-34 that there is a small, positive statistically significant relationship between the representativeness bias and the defensive (cautious) investor phase of the life cycle (rho = 0.218, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0 6$) can be rejected and the alternative hypothesis (H_a6) can be concluded at the 5 per cent significance level. A medium strength, positive statistically significant relationship (rho = 0.331, p = 0.000 < 0.05) was established between the overconfidence bias and the defensive (cautious) investor phase of the life cycle. Accordingly, the null hypothesis ($H_0 6$) can be rejected and the alternative hypothesis (H_a6) can be concluded at the 5 per cent significance level.

As shown in Table 5-34, there is also a small, positive statistically significant relationship between the gambler's fallacy bias and the defensive (cautious) investor phase of the life cycle (rho = 0.272, p = 0.000 < 0.05). Thus, the null hypothesis ($H_0$6) can be rejected and the alternative hypothesis (H_a6) can be concluded at the 5 per cent significance level. Likewise, a small, positive statistically significant relationship was also found between the availability bias and the defensive (cautious) investor phase of the life cycle (rho = 0.223, p = 0.000 < 0.05). Hence, the null hypothesis ($H_0$6) can be rejected and the alternative hypothesis (H_a6) can be concluded at the 5 per cent significance level. Relating to the relationship between the loss aversion bias and the defensive (cautious) investor phase of the life cycle, a small, positive statistically significant relationship was established (rho = 0.128, p = 0.006 < 0.05). Accordingly, the null hypothesis ($H_0$6) can be rejected and the alternative hypothesis (H_a6) can be concluded at the 5 per cent significance level. Also, a small, positive statistically significant relationship was found between the mental accounting bias and the defensive (cautious) investor phase of the life cycle (rho = 0.189, p = 0.000 < 0.05), as well as between the self-control bias and the defensive (cautious) investor phase of the life cycle (rho = 0.259, p = 0.000 < 0.05). Correspondingly, the null hypothesis ($H_0$6) can be rejected and the alternative hypothesis (H_a6) can be concluded at the 5 per cent significance level.

Conversely, as signified in Table 5-34, no statistical significant relationship was found between the anchoring bias and the defensive (cautious) investor phase of the life cycle (rho = 0.065, p = 0.164 > 0.05), as well as the regret aversion bias and the defensive (cautious) investor phase of the life cycle (rho = 0.065, p = 0.164 > 0.05). As a result, relating to the relationship between the anchoring bias and the defensive (cautious) investor phase of the life cycle, as well as the relationship between the regret aversion bias and the defensive (cautious) investor phase of the life cycle, the null hypothesis ($H_0$6) could not be rejected at the 5 per cent significance level.

It can be inferred from the above-mentioned findings that the investment decisions of individual investors in the growth investor phase of the life cycle are only driven by the representativeness bias and overconfidence bias when making investment decisions. On the other hand, the investment decisions of individual investors in the defensive (cautious) investor phase of the life cycle are driven by the representativeness bias, the overconfidence bias, the gambler's fallacy bias, the availability bias, the loss aversion bias, the mental accounting bias and the self-control bias when making investment decisions. Interestingly, no individual investors in the growth and defensive (cautious) investor phase of the life cycle are subject to the anchoring bias and regret aversion bias. This indicates that no individual

investors in the growth and defensive (cautious) investor phase of the life cycle tend to rely on a single piece of information when making investment decisions (anchoring bias), nor do they base their investment decisions on previously incorrect investment decisions, which led to a financial loss (regret aversion bias) (Mazzoli & Marinelli, 2011:36; Subash, 2012:21).

5.6.3 Identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour

The fourth empirical objective to be accomplished is to identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour. The influence of endogenous factors, namely demographical factors, socio-cultural factors, the investor life cycle and behavioural finance biases, on individual investor risk tolerance behaviour were identified and analysed using t-tests, ANOVA and correlation analysis. The following subsections (Section 5.6.3.1–Section 5.6.3.4) attend to the achievement of this empirical objective by means of the above-mentioned inferential statistics.

5.6.3.1 The effect of demographical factors on individual investor risk tolerance behaviour

In order to identify and analyse the effect of demographical factors, namely age, gender, ethnicity, marital status, education, employment status, annual income, income variability, net worth, homeownership, household size and number of financial dependants on individual investor risk tolerance behaviour, t-tests, ANOVA and correlation analysis were utilised. This is attended to in the following subsections (Section 5.6.3.1.1–Section 5.6.3.1.2).

5.6.3.1.1 Independent-samples t-test and one-way ANOVA

In this section, an independent-samples t-test was conducted to identify and analyse the effect of gender on individual investor risk tolerance behaviour, while one-way ANOVA was conducted to identify and analyse the effect of ethnicity, marital status, employment status, annual income and homeownership on individual investor risk tolerance behaviour.

A null hypothesis had to be stated to determine the statistical significant difference between demographical factors and risk tolerance behaviour, whereby the confidence level was set at 95 per cent. The following hypotheses were formulated:

Null hypothesis ($H_0$7): There is no statistically significant difference between demographical factors and risk tolerance behaviour.

Alternative hypothesis (H_a7): There is a statistically significant difference between demographical factors and risk tolerance behaviour.

Table 5-35 summarises the results of the independent-samples t-test conducted to identify and analyse the effect of gender on individual investor risk tolerance behaviour.

Table 5-35: Independent-samples t-test for gender and risk tolerance behaviour

Risk tolerance behaviour category	Gender	N	Mean	SD	t	df	Sig.	Mean difference	Effect size
High risk	Male	205	3.37	1.03	5.14	440.064	0.000*	0.50	0.48
	Female	258	2.88	1.04					
Average risk	Male	205	3.94	0.95	7.30	443.301	0.000*	0.66	0.67
	Female	258	3.29	0.98					
Low risk	Male	205	3.24	0.97	-3.08	401.074	0.002*	-0.26	0.27
	Female	258	3.50	0.82					
*Statistically significant at the 0.05 level (2-tailed)									

Source: Author compilation

The significance values for the Levene's test for equality of variances were less than 0.5, therefore, it was assumed that the variances for males and females were not the same (Pallant, 2020:254). The effect sizes, by means of Cohen's d, for the independent-samples t-test were also computed to establish if the statistical significant differences have practical significance and to provide an indication of the magnitude of the differences between the groups. Cohen's d exhibits differences between groups in terms of standard deviation units (Pallant, 2020:218). The following guidelines are provided by Cohen (1988:22) to interpret the strength of the Cohen's d effect sizes:

- $0.20 \leq d < 0.50$ point towards a small effect size,
- $0.50 \leq d < 0.80$ point towards a medium effect size and
- $0.80 \leq d$ point towards a large effect size.

It can be seen from Table 5-35 that there are statistically significant differences between gender and the high risk tolerance behaviour category ($p = 0.000 < 0.05$), gender and the average risk tolerance behaviour category ($p = 0.000 < 0.05$), as well as gender and the low risk tolerance behaviour category ($p = 0.002 < 0.05$). For that reason, the null hypothesis ($H_0 7$) can be rejected and the alternative hypothesis ($H_a 7$) can be concluded at the 5 per cent significance level. This indicates that the effect of gender on individual investor risk tolerance behaviour is statistically significant ($p < 0.05$).

Table 5-35 also indicates that males (mean = 3.37) have greater propensities to take high risks than females (mean = 2.88). Relating to the effect size, the Cohen's d value computed for the high risk tolerance behaviour category between male and female individual investors was 0.48, signifying a small effect size. Males (mean = 3.94) also have greater propensities to take average risks compared to females (mean = 3.29). The Cohen's d value computed for the average risk tolerance behaviour category between male and female individual investors was 0.67, which signifies a medium effect size. Conversely, females (mean = 3.50) have greater propensities to take low risks than males (mean = 3.24). The Cohen's d value computed for the low risk tolerance behaviour category between male and female individual investors was 0.27, which is also indicative of a small effect size.

The above-mentioned findings are supported by numerous international and national published research studies, as discussed in Chapter 2 (Section 2.5.1.1.2), that established male individual investors to have greater risk-taking propensities than female individual investors. Generally, it is presumed that gender affects individual investor risk tolerance behaviour and that males have greater risk-taking propensities than females (Grable *et al*., 2009:4). Grable and Roszkowzki (2007:801) affirmed that male individual investors do not only have greater risk-taking propensities than female individual investors, but they also have a greater likelihood to overestimate their propensity for taking risks.

Table 5-36 presents the results of the one-way ANOVA conducted to identify and analyse the effect of ethnicity on individual investor risk tolerance behaviour.

Table 5-36: ANOVA for ethnicity and risk tolerance behaviour

		Sum of squares	Df	Mean square	F-ratio	Sig.
High risk tolerance behaviour	Between groups	78.742	3	26.25	27.019	0.000*
	Within groups	442.001	455	0.97		
	Total	520.744	458			
Average risk tolerance behaviour	Between groups	5.909	3	1.97	1.922	0.125
	Within groups	466.271	455	1.02		
	Total	472.180	458			
Low risk tolerance behaviour	Between groups	4.113	3	1.37	1.703	0.166
	Within groups	366.288	455	0.81		
	Total	370.401	458			
*Statistically significant at the 0.05 level						

Source: Author compilation

Table 5-36 demonstrates a statistically significant difference between ethnicity and high risk tolerance behaviour ($p = 0.000 < 0.05$). Therefore, the null hypothesis ($H_0 7$) can be rejected and the alternative hypothesis ($H_a 7$) can be concluded at the 5 per cent significance level. However, no statistically significant differences were found between ethnicity and average risk tolerance behaviour ($p = 0.125 > 0.05$) and between ethnicity and low risk tolerance behaviour ($p = 0.166 > 0.05$). As a result, the null hypothesis ($H_0 7$) cannot be rejected at the 5 per cent significance level.

Table 5-37: Significant differences between ethnicity and high risk tolerance behaviour

Ethnicity	Mean	Effect sizes		
		African with	Asian with	Coloured with
African	3.93			
Asian	3.09	0.69		
Coloured	3.04	0.97	0.04	
White	2.86	1.10	0.19	0.18

Source: Author compilation

Furthermore, the propensities of African individual investors to take high risks were statistically significantly different from the propensities of Asian, Coloured and White individual investors to take high risks at the $p < 0.05$ level. It can be inferred from Table 5-37 that African (mean = 3.93) individual investors have greater propensities to take high risks than Asian (mean = 3.09), Coloured (mean = 3.04) and White (mean = 2.86) individual investors, respectively. Concerning the effect sizes, medium to large practically significant effect sizes were established for the high risk tolerance behaviour category between African individual investors with Asian ($d = 0.69$), Coloured ($d = 0.97$), and White ($d = 1.10$) individual investors. However, Asian with Coloured ($d = 0.04$) and White ($d = 0.19$) individual investors, as well as Coloured with White ($d = 0.18$) individual investors had small, practically non-significant effects on high risk tolerance behaviour.

The above-mentioned findings are in contrast with the main consensus that White individual investors have greater risk-taking propensities than non-White individual investors (Grable, 1997:15). However, with reference to Chapter 2 (Section 2.5.1.1.3), these findings are confirmed by international researchers, such as Leigh (1986:29); Barsky *et al.* (1997:550); Grable and Joo (1999:58), as well as Halek and Eisenhauer (2001:13) who found non-Whites, such as Africans, Native Americans, Asians and Hispanics, to have greater risk-taking propensities than Whites. From a South African point of view, the above-mentioned

findings are also supported by researchers, namely Van Schalkwyk (2012:286); Dickason (2017:165) and Van den Bergh (2018:176) who found African individual investors to have greater risk-taking propensities than Asian, Coloured and White individual investors.

Table 5-38 presents the results of the one-way ANOVA conducted to identify and analyse the effect of marital status on individual investor risk tolerance behaviour.

Table 5-38: ANOVA for marital status and risk tolerance behaviour

		Sum of squares	Df	Mean square	F-ratio	Sig.
High risk tolerance behaviour	Between groups	4.912	4	1.23	1.088	0.362
	Within groups	516.833	458	1.13		
	Total	521.745	462			
Average risk tolerance behaviour	Between groups	12.918	4	3.23	3.189	0.013*
	Within groups	463.870	458	1.01		
	Total	476.788	462			
Low risk tolerance behaviour	Between groups	3.094	4	0.77	0.956	0.431
	Within groups	370.452	458	0.81		
	Total	373.546	462			
*Statistically significant at the 0.05 level						

Source: Author compilation

Table 5-38 illustrates a statistically significant difference between marital status and average risk tolerance behaviour ($p = 0.013 < 0.05$). For that reason, the null hypothesis ($H_0 7$) can be rejected and the alternative hypothesis ($H_a 7$) can be concluded at the 5 per cent significance level. However, no statistically significant differences were found between marital status and high risk tolerance behaviour ($p = 0.362 > 0.05$) and between marital status and low risk tolerance behaviour ($p = 0.431 > 0.05$). Consequently, the null hypothesis ($H_0 7$) cannot be rejected at the 5 per cent significance level.

Table 5-39: Significant differences between marital status and average risk tolerance behaviour

Marital status	Mean	Effect sizes			
		Single with	Common-law spouse with	Married with	Divorced with
Single	3.34				
Common-law spouse	3.38	0.04			
Married	3.71	0.35	0.33		
Divorced	3.49	0.13	0.10	0.23	
Widowed	3.36	0.01	0.02	0.31	0.11

Source: Author compilation

Table 5-39 shows that individual investors who are married (mean = 3.71) have greater propensities to take average risks than divorced individual investors (mean = 3.49), individual investors who have common-law spouses (mean = 3.38), widowed individual investors (mean = 3.36) and single individual investors (mean = 3.34). However, a statistically significant difference was only found between single participants and married participants at the $p < 0.05$ level. Hence, the propensities of single individual investors and married individual investors to take average risks differ significantly. Relating to the effect sizes, small, practically non-significant effect sizes were established between the marital status categories for average risk tolerance behaviour. For that reason, although statistical significance was reached between marital status and average risk tolerance behaviour ($p = 0.013 < 0.05$), marital status had a small effect on average risk tolerance behaviour.

With reference to Chapter 2 (Section 2.5.1.1.4), the above-mentioned findings are supported by several researchers, namely Masters (1989:151); Mugenda *et al.* (1991:142); Hawley and Fujii (1993:200); Grable (1997:82); Grable (2000:625), as well as Schooley and Worden (2016:274), who found married individual investors to have greater risk-taking propensities than non-married individual investors when making investment decisions. Table 5-40 reports on the results of the one-way ANOVA conducted to identify and analyse the effect of employment status on individual investor risk tolerance behaviour.

Table 5-40: ANOVA for employment status and risk tolerance behaviour

		Sum of squares	Df	Mean square	F-ratio	Sig.
High risk tolerance behaviour	Between groups	22.159	5	4.43	4.054	0.001*
	Within groups	499.586	457	1.09		
	Total	521.745	462			

		Sum of squares	Df	Mean square	F-ratio	Sig.
Average risk tolerance behaviour	Between groups	11.283	5	2.26	2.215	0.052
	Within groups	465.505	457	1.02		
	Total	476.788	462			
Low risk tolerance behaviour	Between groups	4.944	5	0.99	1.226	0.296
	Within groups	368.602	457	0.81		
	Total	373.546	462			
*Statistically significant at the 0.05 level						

Source: Author compilation

Table 5-40 exhibits a statistically significant difference between employment status and high risk tolerance behaviour ($p = 0.001 < 0.05$). For that reason, the null hypothesis ($H_0 7$) can be rejected and the alternative hypothesis ($H_a 7$) can be concluded at the 5 per cent significance level. On the contrary, no statistically significant differences were found between employment status and average risk tolerance behaviour ($p = 0.052 > 0.05$) and between employment status and low risk tolerance behaviour ($p = 0.296 > 0.05$). Therefore, the null hypothesis ($H_0 7$) cannot be rejected at the 5 per cent significance level.

Table 5-41: Significant differences between employment status and high risk tolerance behaviour

Employment status	Mean	Effect sizes				
		Salaried employed with	Self-employed with	Unemployed – not looking for work with	Unemployed – looking for work with	Retired with
Salaried employed	3.11					
Self-employed	3.31	0.19				
Unemployed – not looking for work	3.05	0.05	0.26			
Unemployed – looking for work	3.79	0.57	0.40	0.62		
Retired	2.61	0.47	0.72	0.44	1.00	
Other	3.02	0.07	0.23	0.03	0.61	0.32

Source: Author compilation

It can be inferred from Table 5-41 that unemployed individuals who are looking for work (mean = 3.79) have greater propensities to take high risks than self-employed individuals (mean = 3.31), salaried employed individuals (mean = 3.11), unemployed individuals who are not looking for work (mean = 3.05), individuals with other employment statuses, for example, student or homemaker (mean = 3.02) and retired individuals (mean = 2.61), respectively. In addition, the propensities of retired individuals to take high risks were statistically significantly different from the propensities of salaried employed individuals, self-employed individuals and unemployed individuals who are looking for work to take high risks at the $p < 0.05$ level.

Concerning the effect sizes, small to large effect sizes were established between the employment status categories for high risk tolerance behaviour. Medium effect sizes were established for the high risk tolerance behaviour category between salaried employed individuals with unemployed individuals who are looking for work (d = 0.57), unemployed individuals who are looking for work with individuals with other employment statuses (d = 0.61), unemployed individuals who are not looking for work with unemployed individuals who are looking for work (d = 0.62) and self-employed individuals with retired individuals (d = 0.72). However, unemployed individuals who are looking for work with retired individuals (d = 1.00) has a large, practical significant effect on high risk tolerance behaviour.

The above-mentioned findings are in contrast with the general postulation that employed individuals have greater risk-taking propensities than unemployed individuals. As signified in Chapter 2 (Section 2.5.1.1.5), the mainstream of published research studies found entrepreneurs or self-employed individuals to have greater risk-taking propensities than salaried employed and unemployed individuals (Irwin, 1993; Anbar & Eker, 2010:515; Larkin *et al*., 2013:5).

Table 5-42 presents the results of the one-way ANOVA conducted to identify and analyse the effect of annual income on individual investor risk tolerance behaviour.

Table 5-42: ANOVA for annual income and risk tolerance behaviour

		Sum of squares	Df	Mean square	F-ratio	Sig.
High risk tolerance behaviour	Between groups	20.487	10	2.05	1.915	0.042*
	Within groups	389.471	364	1.07		
	Total	409.958	374			
Average risk	Between	70.965	10	7.10	8.148	0.000*

		Sum of squares	Df	Mean square	F-ratio	Sig.
tolerance behaviour	groups					
	Within groups	317.045	364	0.87		
	Total	388.011	374			
Low risk tolerance behaviour	Between groups	26.915	10	2.69	3.734	0.000*
	Within groups	262.387	364	0.72		
	Total	289.302	374			
*Statistically significant at the 0.05 level						

Source: Author compilation

Table 5-42 demonstrates statistically significant differences between annual income and high risk tolerance behaviour ($p = 0.042 < 0.05$), annual income and average risk tolerance behaviour ($p = 0.000 < 0.05$), as well as annual income and low risk tolerance behaviour ($p = 0.000 < 0.05$). As a result, the null hypothesis ($H_0 7$) can be rejected and the alternative hypothesis ($H_a 7$) can be concluded at the 5 per cent significance level.

Relating to the significant differences between annual income and high risk tolerance behaviour, Table 5-43 shows that individuals with higher income levels have greater propensities to take high risks than individuals with lower income levels. Individuals who earn an annual income of more than R1 million (mean = 3.59) have the greatest propensities to take high risks, which is followed by individuals who earn between R800 001–R900 000 (mean = 3.57), R500 001–R600 000 (mean = 3.55), R600 001–R700 000 (mean = 3.16), R400 001–R500 000 (mean = 3.14), R900 001–R1 million (mean = 3.10), R700 001–R800 000 (mean = 3.10), R200 001–R300 000 (mean = 3.09), below R100 000 (mean = 2.97) and R100 001–R200 000 (mean = 2.94), respectively. Nonetheless, individuals who earn an annual income between R300 001 and R400 000 (mean = 2.90) are the least likely to take high risks. However, the annual income categories did not differ significantly from one another in terms of high risk tolerance behaviour at the $p < 0.05$ level.

Table 5-43 further shows that small to medium effect sizes were established between the annual income categories for high risk tolerance behaviour. Medium effect sizes were established for the high risk tolerance behaviour category between individuals who earn R100 001–R200 000 with individuals who earn R500 001–R600 000 ($d = 0.53$); R800 001–R900 000 ($d = 0.50$) and more than R1 million ($d = 0.56$), individuals who earn R300 001–R400 000 with individuals who earn R500 001–R600 000 ($d = 0.64$); R800 001–R900 000 ($d = 0.54$) and more than R1 million ($d = 0.68$), individuals who earn R500 001–R600 000 with

individuals who earn R900 001–R1 million (d = 0.57), individuals who earn R700 001–R800 000 with individuals who earn more than R1 million (d = 0.51) and individuals who earn R900 001–R1 million with individuals who earn more than R1 million (d = 0.51).

Table 5-43: Significant differences between annual income and high risk tolerance behaviour

Annual income	Mean	Effect sizes									
		Below R100 000 with	R100 001–R200 000 with	R200 001–R300 000 with	R300 001–R400 000 with	R400 001–R500 000 with	R500 001–R600 000 with	R600 001–R700 000 with	R700 001–R800 000 with	R800 001–R900 000 with	R900 001–R1 000 000 with
Below R100 000	2.97										
R100 001–R200 000	2.94	0.02									
R200 001–R300 000	3.09	0.09	0.13								
R300 001–R400 000	2.90	0.05	0.04	0.18							
R400 001–R500 000	3.14	0.13	0.17	0.05	0.24						
R500 001–R600 000	3.55	0.45	0.53	0.45	0.64	0.43					
R600 001–R700 000	3.16	0.15	0.19	0.06	0.23	0.02	0.35				
R700 001–R800 000	3.10	0.10	0.14	0.01	0.20	0.04	0.48	0.05			
R800 001–R900 000	3.57	0.46	0.50	0.39	0.54	0.35	0.02	0.33	0.38		
R900 001–R1 000 000	3.10	0.10	0.14	0.01	0.20	0.04	0.57	0.05	0.00	0.38	
More than R1 000 000	3.59	0.48	0.56	0.49	0.68	0.47	0.04	0.39	0.51	0.02	0.51

Source: Author compilation

Concerning the significant differences between annual income and average risk tolerance behaviour, Table 5-44 signifies that individuals with higher income levels have greater propensities to take average risks than individuals with lower income levels. Individuals who earn an annual income of more than R1 million (mean = 4.31) have the greatest propensities to take average risks. This is followed by individuals who earn between R900 001–R1 million (mean = 4.12), R700 001–R800 000 (mean = 4.05), R500 001–R600 000 (mean = 3.97), R600 001–R700 000 (mean = 3.95), R800 001–R900 000 (mean = 3.71), R400 001–R500 000 (mean = 3.48), R300 001–R400 000 (mean = 3.43), R200 001–R300 000 (mean = 3.38) and R100 001–R200 000 (mean = 3.09), respectively. On the other hand, individuals who earn an annual income below R100 000 (mean = 2.80) are the least likely to take average risks.

The propensities of individuals who earn an annual income below R100 000 and between R100 001 and R200 000 to take average risks were statistically significantly different from the propensities of individuals who earn an annual income of R500 001–R600 000, R600 001–R700 000, R700 001–R800 000, R900 001–R1 million and more than R1 million to take average risks. In addition, the propensities of individuals who earn an annual income of R200 001–R300 000 to take average risks were statistically significantly different from the propensities of individuals who earns an annual income of R700 001–R800 000, R900 001–R1 million and more than R1 million to take average risks. Lastly, the propensities of individuals who earn an annual income of more than R1 million to take average risks were also statistically significantly different from the propensities of individuals who earn an annual income of R300 001–R400 000 and R400 001–R500 000 to take average risks.

Relating to the effect sizes, it can be seen from Table 5-44 that small to large effect sizes were established between the annual income categories for average risk tolerance behaviour. Firstly, individuals who earn an annual income below R100 000 with individuals who earn R500 001–R600 000 (d = 1.08), R600 001–R700 000 (d = 1.06), R700 001–R800 000 (d = 1.15), R900 001–R1 million (d = 1.21) and more than R1 million (d = 1.39) had large, practically significant effects on average risk tolerance behaviour. Secondly, individuals who earn an annual income between R100 001–R200 000 with individuals who earn R500 001–R600 000 (d = 0.88), R600 001–R700 000 (d = 0.86), R700 001–R800 000 (d = 0.96), R900 001–R1 million (d = 1.03) and more than R1 million (d = 1.22) had large, practically significant effects on average risk tolerance behaviour. Thirdly, individuals who earn an annual income between R200 001–R300 000 with individuals who earn R700 001–R800 000 (d = 0.82), R900 001–R1 million (d = 0.90) and more than R1 million (d = 1.14) had large, practically significant effects on average risk tolerance behaviour. Lastly,

individuals who earn an annual income between R300 001–R400 000 with individuals who earn more than R1 million (d = 0.80) and individuals who earn an annual income between R400 001–R500 000 with individuals who earn more than R1 million (d = 0.85) had large, practically significant effects on average risk tolerance behaviour.

Table 5-44: Significant differences between annual income and average risk tolerance behaviour

Annual income	Mean	Effect sizes									
		Below R100 000 with	R100 001–R200 000 with	R200 001–R300 000 with	R300 001–R400 000 with	R400 001–R500 000 with	R500 001–R600 000 with	R600 001–R700 000 with	R700 001–R800 000 with	R800 001–R900 000 with	R900 001–R1 000 000 with
Below R100 000	2.80										
R100 001–R200 000	3.09	0.27									
R200 001–R300 000	3.38	0.53	0.29								
R300 001–R400 000	3.43	0.57	0.31	0.04							
R400 001–R500 000	3.48	0.62	0.39	0.10	0.05						
R500 001–R600 000	3.97	1.08	0.88	0.69	0.50	0.51					
R600 001–R700 000	3.95	1.06	0.86	0.68	0.48	0.48	0.03				
R700 001–R800 000	4.05	1.15	0.96	0.82	0.56	0.58	0.08	0.12			
R800 001–R900 000	3.71	0.63	0.43	0.23	0.20	0.16	0.18	0.16	0.23		
R900 001–R1 000 000	4.12	1.21	1.03	0.90	0.63	0.65	0.16	0.20	0.12	0.28	
More than R1 000 000	4.31	1.39	1.22	1.14	0.80	0.85	0.39	0.43	0.38	0.41	0.28

Source: Author compilation

With reference to the significant differences between annual income and low risk tolerance behaviour, Table 5-45 shows that individuals who earn an annual income between R200 001 and R300 000 (mean = 3.72) have the greatest propensities to take low risks. Correspondingly, this is followed by individuals who earn between R300 001–R400 000 (mean = 3.51), R500 001–R600 000 (mean = 3.51), R400 001–R500 000 (mean = 3.49), R100 001–R200 000 (mean = 3.44), R900 001–R1 million (mean = 3.44), R700 001–R800 000 (mean = 3.39), R600 001–R700 000 (mean = 3.30), below R100 000 (mean = 3.26) and R800 001–R900 000 (mean = 3.18), respectively. However, individuals who earn an annual income of more than R1 million (mean = 2.67) are the least likely to take low risks. Moreover, the propensities of individuals who earn an annual income of more than R1 million to take low risks were statistically significantly different from the propensities of individuals who earn an annual income of R100 001–R200 000, R200 001–R300 000, R300 001–R400 000, R400 001–R500 000, R500 001–R600 000 and R900 001–R1 million to take low risk.

Table 5-45 also illustrates that small to large effect sizes were established between the annual income categories for low risk tolerance behaviour. Medium effect sizes were established for the low risk tolerance behaviour category between individuals who earn an annual income below R100 000 with individuals who earn more than R1 million (d = 0.53), individuals who earn R200 001–R300 000 with individuals who earn R800 001–R900 000 (d = 0.51) and individuals who earn R600 001–R700 000 with individuals who earn more than R1 million (d = 0.74). Large effect sizes were established for the low risk tolerance behaviour category between individuals who earn an annual income of R100 001–R200 000 with individuals who earn more than R1 million (d = 0.90), individuals who earn R200 001–R300 000 with individuals who earn more than R1 million (d = 1.11), individuals who earn R300 001–R400 000 with individuals who earn more than R1 million (d = 0.97), individuals who earn R400 001–R500 000 with individuals who earn more than R1 million (d = 0.95), individuals who earn R500 001–R600 000 with individuals who earn more than R1 million (d = 0.92), individuals who earn R700 001–R800 000 with individuals who earn more than R1 million (d = 0.83) and individuals who earn R900 001–R1 million with individuals who earn more than R1 million (d = 0.89).

Table 5-45: Significant differences between annual income and low risk tolerance behaviour

Annual income	Mean	Effect sizes									
		Below R100 000 with	R100 001–R200 000 with	R200 001–R300 000 with	R300 001–R400 000 with	R400 001–R500 000 with	R500 001–R600 000 with	R600 001–R700 000 with	R700 001–R800 000 with	R800 001–R900 000 with	R900 001–R1 000 000 with
Below R100 000	3.26										
R100 001–R200 000	3.44	0.17									
R200 001–R300 000	3.72	0.42	0.29								
R300 001–R400 000	3.51	0.23	0.07	0.23							
R400 001–R500 000	3.49	0.21	0.05	0.25	0.02						
R500 001–R600 000	3.51	0.23	0.08	0.22	0.01	0.03					
R600 001–R700 000	3.30	0.04	0.16	0.44	0.26	0.23	0.23				
R700 001–R800 000	3.39	0.12	0.06	0.35	0.15	0.13	0.14	0.11			
R800 001–R900 000	3.18	0.06	0.24	0.51	0.30	0.29	0.31	0.11	0.19		
R900 001–R1 000 000	3.44	0.17	0.01	0.30	0.09	0.08	0.08	0.17	0.06	0.24	
More than R1 000 000	2.67	0.53	0.90	1.11	0.97	0.95	0.92	0.74	0.83	0.49	0.89

Source: Author compilation

With reference to Chapter 2 (Section 2.5.1.1.7), it is primarily presumed that individuals with higher income levels have greater risk-taking propensities than individuals with lower income levels (Massol & Molines, 2015:13). The above-mentioned findings, with relation to the effect of annual income on individual investor risk tolerance behaviour, correspond to this postulation and are supported by several international and national published research studies, which also found individuals in higher income brackets to have greater risk-taking propensities than individuals in lower income brackets (Fan & Xiao, 2006:72; Al-Ajmi, 2008:21; Sages & Grable, 2010:63; Gibson *et al.*, 2013:45; Mabalane, 2015:106; Sharma *et al.*, 2017:68; Van den Bergh, 2018:177; Ferreira & Dickason-Koekemoer, 2019:15).

Table 5-46 reports on the results for the one-way ANOVA conducted to identify and analyse the effect of homeownership on individual investor risk tolerance behaviour.

Table 5-46: ANOVA for homeownership and risk tolerance behaviour

		Sum of squares	Df	Mean square	F-ratio	Sig.
High risk tolerance behaviour	Between groups	1.066	3	0.36	0.313	0.816
	Within groups	520.679	459	1.13		
	Total	521.745	462			
Average risk tolerance behaviour	Between groups	40.966	3	13.66	14.382	0.000*
	Within groups	435.823	459	0.95		
	Total	476.788	462			
Low risk tolerance behaviour	Between groups	1.376	3	0.46	0.566	0.638
	Within groups	372.170	459	0.81		
	Total	373.546	462			
*Statistically significant at the 0.05 level						

Source: Author compilation

Table 5-46 illustrates a statistically significant difference between homeownership and average risk tolerance behaviour ($p = 0.000 < 0.05$). Thus, the null hypothesis ($H_0 7$) can be rejected and the alternative hypothesis ($H_a 7$) can be concluded at the 5 per cent significance level. However, no statistically significant differences were found between homeownership and high risk tolerance behaviour ($p = 0.816 > 0.05$) and between homeownership and low risk tolerance behaviour ($p = 0.638 > 0.05$). As a result, the null hypothesis ($H_0 7$) cannot be rejected at the 5 per cent significance level.

Table 5-47: Significant differences between homeownership and average risk tolerance behaviour

Homeownership	Mean	Effect sizes		
		Living with relatives with	Renting with	Homeownership with a mortgage with
Living with relatives	3.12			
Renting	3.28	0.14		
Homeownership with a mortgage	3.63	0.44	0.37	
Homeownership without a mortgage	3.99	0.75	0.75	0.37

Source: Author compilation

Table 5-47 shows that homeowners without mortgages (mean = 3.99) have greater propensities to take average risks than homeowners with mortgages (mean = 3.63), individuals renting homes (mean = 3.28) and individuals living with relatives (mean = 3.12). Moreover, the propensities of homeowners without mortgages to take average risks were statistically significantly different from the propensities of individuals living with relatives, individuals renting homes and homeowners with mortgages to take average risks at the $p < 0.05$ level. The propensities of homeowners with mortgages to take average risks were also statistically significantly different from the propensities of individuals living with relatives and individuals renting homes to take average risks at the $p < 0.05$ level. Also, small to medium effect sizes were established between the homeownership categories for average risk tolerance behaviour. Medium effect sizes were established for the average risk tolerance behaviour category between living with relatives with homeownership without a mortgage ($d = 0.75$) and renting with homeownership without a mortgage ($d = 0.75$).

As specified in Chapter 2 (Section 2.5.1.1.8), homeownership is a less frequently studied demographical factor presumed to affect risk tolerance behaviour. However, in relation to the above-mentioned findings, Irwin (1993); Sung and Hanna (1996:17), as well as Olweny *et al.* (2013:142), found homeowners to have greater risk-taking propensities than non-homeowners. However, contrary to the above-mentioned findings, Sung and Hanna (1996:17) affirmed that homeowners with mortgages have greater risk-taking propensities than homeowners without mortgages.

5.6.3.1.2 Correlation analysis

In this section, correlation analysis was conducted to identify and analyse the effect of demographical factors, namely age, education, income variability, net worth, household size and number of financial dependants on individual investor risk tolerance behaviour. Non-

parametric Spearman's rho correlation was applied to determine the strength and direction of the relationship between demographical factors and individual investor risk tolerance behaviour. The strength of the relationship is specified by the Spearman's rho correlation coefficient with values ranging from -1.0 to +1.0. A correlation value of -1.0 signifies a perfect negative relationship, a correlation value of 0 signifies no relationship and a correlation value of +1.0 signifies a perfect positive relationship. The direction of the relationship is signified by the positive correlation (as one variable increases, the other variable also increases) or negative correlation (as one variable increases, the other variable decreases) (Pallant, 2020:140; Statistic Solutions, 2020a:1). The following guiding principles were utilised to determine the strength of the relationship between demographical factors and individual investor risk tolerance behaviour (Cohen, 1988:81; Pallant, 2020:140):

- r = 0.10 to 0.29 point towards a small/weak strength relationship,
- r = 0.30 to 0.49 point towards a medium strength relationship and
- r = 0.50 to 1.00 point towards a large/strong strength relationship.

The following hypotheses were formulated to test the relationship between demographical factors and individual investor risk tolerance behaviour:

Null hypothesis ($H_0$8): There is no relationship between demographical factors and individual investor risk tolerance behaviour.

Alternative hypothesis (H_a8): There is a relationship between demographical factors and individual investor risk tolerance behaviour.

Table 5-48 demonstrates the results of the correlation analysis performed to establish the relationship between demographical factors and individual investor risk tolerance behaviour.

Table 5-48: Relationship between demographical factors and individual investor risk tolerance behaviour

Risk tolerance behaviour category	Spearman's correlation	Age	Education	Income variability	Net worth	Household size	Number of financial dependants
High risk	Correlation coefficient	-0.141**	0.082	0,047	-0,007	0.119*	0.207**
	Sig. (2-tailed)	0.002	0.078	0.315	0.881	0.010	0.000
	N	463	463	463	463	463	463
Average risk	Correlation coefficient	0.151**	0.297**	-0,088	0.446**	-0,064	0.120**
	Sig. (2-tailed)	0.001	0.000	0.059	0.000	0.170	0.010
	N	463	463	463	463	463	463
Low risk	Correlation coefficient	-0,063	-0.136**	0,006	-0.148**	0,037	0,041
	Sig. (2-tailed)	0.173	0.003	0.893	0.001	0.425	0.374
	N	463	463	463	463	463	463
* Correlation is significant at the 0.05 level (2-tailed) **Correlation is significant at the 0.01 level (2-tailed)							

Source: Author compilation

Relating to the relationship between age and individual investor risk tolerance behaviour, it can be seen from Table 5-48 that there is a small, negative statistically significant relationship between age and high risk tolerance behaviour (rho = -0.141, p = 0.002 < 0.05). Accordingly, the null hypothesis ($H_0$8) can be rejected and the alternative hypothesis (H_a8) can be concluded at the 5 per cent significance level. The negative relationship between age and high risk tolerance behaviour denotes that the propensities of individual investors to take high risks decrease with age. Thus, younger individual investors have greater propensities to take high risks than older individual investors. A small, positive statistically significant relationship was established between age and average risk tolerance behaviour (rho = 0.151, p = 0.001 < 0.05). Therefore, the null hypothesis ($H_0$8) can be rejected and the alternative hypothesis (H_a8) can be concluded at the 5 per cent significance level. The positive relationship between age and average risk tolerance behaviour signifies that the propensities of individual investors to take average risks increase with age. Thus, older individual investors have greater propensities to take average risks than younger individual investors. However, no statistically significant relationship was found between age and low risk tolerance behaviour (rho = -0.063, p = 0.173 > 0.05). Consequently, for the relationship between age and low risk tolerance behaviour, the null hypothesis ($H_0$8) cannot be rejected at the 5 per cent significance level.

These findings correspond to the main postulation that the risk-taking propensities of individual investors decrease with age and accordingly, that younger individual investors have greater risk-taking propensities than older individual investors. With reference to Chapter 2 (Section 2.5.1.1.1), these findings are also supported by numerous international and national published research studies (Yao *et al*., 2011:883; Larkin *et al.,* 2013:3; Mabalane, 2015:102; Brooks *et al.,* 2018:53; Van den Bergh, 2018:175; Ferreira & Dickason-Koekemoer, 2019:15).

Concerning the relationship between education and individual investor risk tolerance behaviour, it is apparent from Table 5-48 that there is no statistically significant relationship between education and high risk tolerance behaviour (rho = 0.082, p = 0.078 > 0.05). Consequently, for the relationship between education and high risk tolerance behaviour, the null hypothesis ($H_0$8) cannot be rejected at the 5 per cent significance level. On the other hand, there is a medium, positive statistically significant relationship between education and average risk tolerance behaviour (rho = 0.297, p = 0.000 < 0.05). Thus, the null hypothesis ($H_0$8) can be rejected and the alternative hypothesis (H_a8) can be concluded at the 5 per cent significance level. The positive relationship between education and average risk tolerance behaviour denotes that the propensities of individual investors to take average

risks increase with higher educational levels. Accordingly, individual investors with higher educational levels have greater propensities to take average risks than individual investors with lower educational levels. A small, negative statistically significant relationship was established between education and low risk tolerance behaviour (rho = -0.136, p = 0.003 < 0.05). Therefore, the null hypothesis ($H_0$8) can be rejected and the alternative hypothesis (H_a8) can be concluded at the 5 per cent significance level. The negative relationship between education and low risk tolerance behaviour signifies that the propensities of individual investors to take low risks decline with higher educational levels. As a result, individual investors with lower educational levels have greater propensities to take low risks than individual investors with higher educational levels.

With reference to Chapter 2 (Section 2.5.1.1.6), these findings are similar to the general assumption that individual investors with higher educational levels have greater risk-taking propensities than individual investors with lower educational levels (Grable, 1997:15). These findings are also supported by numerous international and national published research studies that found individual investors with higher educational levels to have greater risk-taking propensities than individual investors with lower educational levels (Gilliam & Chatterjee, 2011:48; Larkin *et al.,* 2013:9; Kannadhasan, 2015:181; Mabalane, 2015:106; Schooley & Worden, 2016:274; Sharma *et al.*, 2017:67; Ferreira & Dickason-Koekemoer, 2019:15).

Regarding the relationship between income variability and individual investor risk tolerance behaviour, it is evident from Table 5-48 that no statistically significant relationship was established between income variability and high risk tolerance behaviour (rho = 0.047, p = 0.315 > 0.05), income variability and average risk tolerance behaviour (rho = -0.088, p = 0.059 > 0.05) and income variability and low risk tolerance behaviour (rho = 0.006, p = 0.893 > 0.05). Consequently, for the relationship between income variability and risk tolerance behaviour, the null hypothesis ($H_0$8) cannot be rejected at the 5 per cent significance level. The effect of income variability on individual investor risk tolerance behaviour is rather unexplored in research. However, as stipulated in Chapter 2 (Section 2.5.1.1.7), Irwin (1993) asserted that individuals receiving a stable and predictable income have greater risk-taking propensities than individuals that have variability in their income.

Pertaining to the relationship between net worth and individual investor risk tolerance behaviour, it can be seen from Table 5-48 that there is no statistically significant relationship between net worth and high risk tolerance behaviour (rho = -0.007, p = 0.881 > 0.05). For that reason, the null hypothesis ($H_0$8) cannot be rejected at the 5 per cent significance level

for the relationship between net worth and high risk tolerance behaviour. Alternatively, there is a medium, positive statistically significant relationship between net worth and average risk tolerance behaviour (rho = 0.446, p = 0.000 < 0.05). Accordingly, the null hypothesis ($H_0$8) can be rejected and the alternative hypothesis (H_a8) can be concluded at the 5 per cent significance level. The positive relationship between net worth and average risk tolerance behaviour indicates that the propensities of individual investors to take average risks increase when there is an increase in net worth. Hence, individual investors with a higher net worth have greater propensities to take average risks than individual investors with a lower net worth. In addition, a small, negative statistically significant relationship was established between net worth and low risk tolerance behaviour (rho = -0.148, p = 0.001 < 0.05). Therefore, the null hypothesis ($H_0$8) can be rejected and the alternative hypothesis (H_a8) can be concluded at the 5 per cent significance level. The negative relationship between net worth and low risk tolerance behaviour signifies that the propensities of individual investors to take low risks decline when there is an increase in net worth. Consequently, individual investors with a lower net worth have greater propensities to take low risks than individual investors with a higher net worth.

As specified in Chapter 2 (Section 2.5.1.1.7), these findings are supported by several international researchers that found individual investors with a higher net worth to have greater risk-taking propensities than individual investors with a lower net worth (Yao *et al*., 2004:259; Fan & Xiao, 2006:72; Al-Ajmi, 2008:21; Sages & Grable, 2010:63; Griesdorn *et al.*, 2014:38; Sharma *et al.*, 2017:68). From a South African perspective, Mabalane (2015:107) also established that individual investors with a higher net worth have greater risk-taking propensities than individual investors with a lower net worth.

Relating to the relationship between household size and individual investor risk tolerance behaviour, Table 5-48 demonstrates a small, positive statistically significant relationship between household size and high risk tolerance behaviour (rho = 0.119, p = 0.010 < 0.05). Therefore, the null hypothesis ($H_0$8) can be rejected and the alternative hypothesis (H_a8) can be concluded at the 5 per cent significance level. The positive relationship between household size and high risk tolerance behaviour implies that the propensities of individual investors to take high risks increase when household size increases. As a result, individual investors with larger households have greater propensities to take high risks than individual investors with smaller households. However, it can further be seen from Table 5-48 that no statistically significant relationship was established between household size and average risk tolerance behaviour (rho = -0.064, p = 0.170 > 0.05) and between household size and low

risk tolerance behaviour (rho = 0.037, p = 0.425 > 0.05). Consequently, the null hypothesis ($H_0$8) cannot be rejected at the 5 per cent significance level.

With reference to Chapter 2 (Section 2.5.1.1.9), the above-mentioned finding is in contrast with the general postulation that the risk-taking propensities of individual investors decline when household size increases (Van Schalkwyk, 2012:32). However, in line with the above-mentioned finding, Irwin (1993) also affirmed that individual investors with larger households have greater propensities to take high risks than individual investors with smaller households.

Concerning the relationship between the number of financial dependants and individual investor risk tolerance behaviour, Table 5-48 displays a small, positive statistically significant relationship between the number of financial dependants and high risk tolerance behaviour (rho = 0.207, p = 0.000 < 0.05). Accordingly, the null hypothesis ($H_0$8) can be rejected and the alternative hypothesis (H_a8) can be concluded at the 5 per cent significance level. The positive relationship between the number of financial dependants and high risk tolerance behaviour signifies that the propensities of individual investors to take high risks increase as the number of financial dependants increases. Thus, individual investors with more financial dependants have greater propensities to take high risks than individual investors with less or no financial dependants.

A small, positive statistically significant relationship was also established between the number of financial dependants and average risk tolerance behaviour (rho = 0.120, p = 0.010 < 0.05). Accordingly, the null hypothesis ($H_0$8) can be rejected and the alternative hypothesis (H_a8) can be concluded at the 5 per cent significance level. The positive relationship between the number of financial dependants and average risk tolerance behaviour denotes that the propensities of individual investors to take average risks increase as the number of financial dependants increases. Hence, individual investors with more financial dependants have greater propensities to take average risks than individual investors with less or no financial dependants. On the other hand, no statistically significant relationship was established between the number of financial dependants and low risk tolerance (rho = 0.041, p = 0.374 > 0.05). For that reason, the null hypothesis ($H_0$8) cannot be rejected at the 5 per cent significance level.

These findings are in contrast with the general postulation that the risk-taking propensities of individual investors decline when the number of financial dependants increases (Van Schalkwyk, 2012:32). It is noticeable from Chapter 2 (Section 2.5.1.1.9) that few studies have examined the relationship between the number of financial dependants and risk

tolerance behaviour. However, no international or national published research studies found individual investors with more financial dependants to have greater risk-taking propensities than individual investors with less or no financial dependants.

5.6.3.2 The effect of socio-cultural factors on individual investor risk tolerance behaviour

In order to identify and analyse the effect of socio-cultural factors, namely religion, financial and investment knowledge, as well as health status, on individual investor risk tolerance behaviour, ANOVA and correlation analysis were applied. This is attended to in the following subsections (Section 5.6.3.2.1–Section 5.6.3.2.2).

5.6.3.2.1 One-way ANOVA

In this section, one-way ANOVA was conducted to identify and analyse the effect of religion, as a socio-cultural factor, on individual investor risk tolerance behaviour. A null hypothesis had to be stated to determine the statistical significant difference between socio-cultural factors and risk tolerance behaviour, whereby the confidence level was set at 95 per cent. The following hypotheses were formulated:

Null hypothesis ($H_0$9): There is no statistically significant difference between socio-cultural factors and risk tolerance behaviour.

Alternative hypothesis (H_a9): There is a statistically significant difference between socio-cultural factors and risk tolerance behaviour.

Table 5-49 summarises the results of the one-way ANOVA conducted to identify and analyse the effect of religion on individual investor risk tolerance behaviour.

Table 5-49: ANOVA for religion and risk tolerance behaviour

		Sum of squares	Df	Mean square	F-ratio	Sig.
High risk tolerance behaviour	Between groups	10.674	5	2.13	1.909	0.091
	Within groups	511.071	457	1.12		
	Total	521.745	462			
Average risk tolerance behaviour	Between groups	6.047	5	1.21	1.174	0.321
	Within groups	470.741	457	1.03		
	Total	476.788	462			
Low risk	Between	13.112	5	2.62	3.325	0.006*

tolerance behaviour	groups					
	Within groups	360.434	457	0.79		
	Total	373.546	462			
*Statistically significant at the 0.05 level						

Source: Author compilation

Table 5-49 demonstrates a statistically significant difference between religion and low risk tolerance behaviour ($p = 0.006 < 0.05$). For that reason, the null hypothesis ($H_0 9$) can be rejected and the alternative hypothesis ($H_a 9$) can be concluded at the 5 per cent significance level. On the other hand, no statistically significant differences were found between religion and high risk tolerance behaviour ($p = 0.091 > 0.05$) and between religion and average risk tolerance behaviour ($p = 0.321 > 0.05$). Consequently, the null hypothesis ($H_0 9$) cannot be rejected at the 5 per cent significance level.

Table 5-50: Significant differences between religion and low risk tolerance behaviour

Religion	Mean	Effect sizes				
		None with	Christianity with	Judaism with	Hinduism with	Islam with
None	3.15					
Christianity	3.46	0.34				
Judaism	3.24	0.10	0.25			
Hinduism	3.53	0.29	0.05	0.22		
Islam	3.51	0.41	0.06	0.33	0.02	
Other	2.71	0.51	0.84	0.70	0.64	0.98

Source: Author compilation

It can be inferred from Table 5-50 that Hindus (mean = 3.53) have the greatest propensity to take low risks. Correspondingly, this is followed by Muslims (mean = 3.51), Christians (mean = 3.46), Jews (mean = 3.24) and individuals with no religion (mean = 3.15). Individuals of other religion (mean = 2.71) are the least likely to take low risks. However, only Christianity and other religion were found to be statistically significantly different from one another at $p < 0.05$ level. Hence, the propensities of Christians and individuals of other religion to take low risks differ significantly. Relating to the effect sizes, small ($0.20 \leq d < 0.50$), medium ($0.50 \leq d < 0.80$) and large ($0.80 \leq d$) effect sizes were established between the religion categories for low risk tolerance behaviour (Cohen, 1988:22; Pallant, 2020:218). Medium effect sizes were established for the low risk tolerance behaviour category between no religion with other religion ($d = 0.51$), Judaism with other religion ($d = 0.70$) and Hinduism with other religion (d

= 0.64). Large effect sizes were established for the low risk tolerance behaviour category between Christianity with other religion (d = 0.84) and Islam with other religion (d = 0.98).

With reference to Chapter 2 (Section 2.5.1.2.1), religion is a less commonly studied factor presumed to affect risk tolerance behaviour. Nonetheless, corresponding to the above-mentioned findings, several international researchers found religious individuals to have less risk-taking propensities than non-religious individuals (Irwin, 1993; Miller, 2000:17; Hilary & Hui, 2003:470; Dohmen *et al.*, 2011:545; Noussair *et al.*, 2013:167; Mansour & Jlassi, 2014:146). Similar to the above-mentioned findings, Miller (2000:6) affirmed that Christians have greater risk-taking propensities than Muslims, while Halek and Eisenhauer (2001:19) asserted that individuals of other religion have greater risk-taking propensities than Jews. From a South African point of view and quite the opposite of the above-mentioned findings, Strydom *et al.* (2009:18) affirmed that Hindus followed by Muslims have greater risk-taking propensities than Christians.

5.6.3.2.2 Correlation analysis

In this section, correlation analysis was conducted to identify and analyse the effect of socio-cultural factors, namely financial and investment knowledge, as well as health status, on individual investor risk tolerance behaviour. Non-parametric Spearman's rho correlation was applied to determine the strength and direction of the relationship between socio-cultural factors and individual investor risk tolerance behaviour. The strength of the relationship is specified by the Spearman's rho correlation coefficient with values ranging from -1.0 to +1.0. A correlation value of -1.0 signifies a perfect negative relationship, a correlation value of 0 signifies no relationship and a correlation value of +1.0 signifies a perfect positive relationship. The direction of the relationship is signified by the positive correlation (as one variable increases, the other variable also increases) or negative correlation (as one variable increases, the other variable decreases) (Pallant, 2020:140; Statistic Solutions, 2020a:1). The following guiding principles were used to determine the strength of the relationship between socio-cultural factors and individual investor risk tolerance behaviour (Cohen, 1988:81; Pallant, 2020:140):

- r = 0.10 to 0.29 point towards a small/weak strength relationship,
- r = 0.30 to 0.49 point towards a medium strength relationship and
- r = 0.50 to 1.00 point towards a large/strong strength relationship.

The following hypotheses were formulated to test the relationship between socio-cultural factors and individual investor risk tolerance behaviour:

Null hypothesis ($H_0$10): There is no relationship between socio-cultural factors and individual investor risk tolerance behaviour.

Alternative hypothesis (H_a10): There is a relationship between socio-cultural factors and individual investor risk tolerance behaviour.

Table 5-51 shows the results of the correlation analysis performed to establish the relationship between socio-cultural factors and individual investor risk tolerance behaviour.

Table 5-51: Relationship between socio-cultural factors and individual investor risk tolerance behaviour

Risk tolerance behaviour category	Spearman's correlation	Financial and investment knowledge	Health status
High risk	Correlation coefficient	0.235**	0.134**
	Sig. (2-tailed)	0,000	0,004
	N	463	463
Average risk	Correlation coefficient	0.431**	0.143**
	Sig. (2-tailed)	0,000	0,002
	N	463	463
Low risk	Correlation coefficient	-0.200**	-0,066
	Sig. (2-tailed)	0,000	0,154
	N	463	463
**Correlation is significant at the 0.01 level (2-tailed)			

Source: Author compilation

Concerning the relationship between financial and investment knowledge and individual investor risk tolerance behaviour, Table 5-51 demonstrates a small, positive statistically significant relationship between financial and investment knowledge and high risk tolerance behaviour (rho = 0.235, p = 0.000 < 0.05). As a result, the null hypothesis ($H_0$10) can be rejected and the alternative hypothesis (H_a10) can be concluded at the 5 per cent significance level. The positive relationship between financial and investment knowledge and high risk tolerance behaviour denotes that the propensities of individual investors to take high risks increase as financial and investment knowledge increases. Accordingly, individual investors with more financial and investment knowledge have greater propensities to take high risks than individual investors with less financial and investment knowledge.

A medium, positive statistically significant relationship was also established between financial and investment knowledge and average risk tolerance behaviour (rho = 0.431, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0$10) can be rejected and the alternative hypothesis (H_a10) can be concluded at the 5 per cent significance level. The positive

relationship between financial and investment knowledge and average risk tolerance behaviour indicates that the propensities of individual investors to take average risks increase as financial and investment knowledge increases. Thus, individual investors with more financial and investment knowledge have greater propensities to take average risks than individual investors with less financial and investment knowledge.

Lastly, a small, negative statistically significant relationship was also established between financial and investment knowledge and low risk tolerance behaviour (rho = -0.200, p = 0.000 < 0.05). As a result, the null hypothesis ($H_0$10) can be rejected and the alternative hypothesis (H_a10) can be concluded at the 5 per cent significance level. The negative relationship between financial and investment knowledge and low risk tolerance behaviour indicates that the propensities of individual investors to take low risks decrease as financial and investment knowledge increases. As a result, individual investors with less financial and investment knowledge have greater propensities to take low risks than individual investors with more financial and investment knowledge.

With reference to Chapter 2 (Section 2.5.1.2.2), these findings are similar to the general assumption that individual investors with more financial and investment knowledge have greater risk-taking propensities than individual investors with less financial and investment knowledge (Grable & Joo, 1999:53). Similarly, the mainstream of international and national published research studies also found that individual investors with more financial and investment knowledge have greater risk-taking propensities than individual investors with less financial and investment knowledge (Jacobs-Lawson & Hershey, 2005:338; Antonites & Wordsworth, 2009:82; Sages & Grable, 2010:63; Van Schalkwyk, 2012:295; Griesdorn *et al.,* 2014:36; Marinelli *et al.,* 2017:228).

With regard to the relationship between health status and individual investor risk tolerance behaviour, Table 5-51 exhibits a small, positive statistically significant relationship between health status and high risk tolerance behaviour (rho = 0.134, p = 0.004 < 0.05). Therefore, the null hypothesis ($H_0$10) can be rejected and the alternative hypothesis (H_a10) can be concluded at the 5 per cent significance level. The positive relationship between health status and high risk tolerance behaviour denotes that the propensities of individual investors to take high risks increase as health status increases. Thus, healthier individual investors have greater propensities to take high risks than less healthy individual investors.

A small, positive statistically significant relationship was also established between health status and average risk tolerance behaviour (rho = 0.143, p = 0.002 < 0.05). Therefore, the null hypothesis ($H_0$10) can be rejected and the alternative hypothesis (H_a10) can be

concluded at the 5 per cent significance level. The positive relationship between health status and average risk tolerance behaviour signifies that the propensities of individual investors to take average risks increase as health status increases. As a result, healthier individual investors have greater propensities to take average risks than less healthy individual investors. On the other hand, no statistically significant relationship was established between health status and low risk tolerance behaviour (rho = -0.066, p = 0.154 > 0.05). Consequently, for the relationship between health status and low risk tolerance behaviour, the null hypothesis ($H_0$10) cannot be rejected at the 5 per cent significance level.

It is apparent from Chapter 2 (Section 2.5.1.2.3) that health status is a less commonly studied factor assumed to affect individual investor risk tolerance behaviour. Nonetheless, there are several international researchers, such as Yao *et al.* (2004:259); Yao *et al.* (2005:57); Hammit *et al.* (2009:117); Yao *et al.* (2011:885); Schurer (2015:492) and Brooks *et al.* (2018:62), who have examined the relationship between health status and individual investor risk tolerance behaviour. Similar to the above-mentioned findings, they also established that healthier individual investors have greater risk-taking propensities than less healthy individual investors.

5.6.3.3 The effect of the investor life cycle on individual investor risk tolerance behaviour

In this section, correlation analysis was conducted to identify and analyse the effect of the investor life cycle on individual investor risk tolerance behaviour. Non-parametric Spearman's rho correlation was applied to determine the strength and direction of the relationship between the investor life cycle and individual investor risk tolerance behaviour. The strength of the relationship is specified by the Spearman's rho correlation coefficient with values ranging from -1.0 to +1.0. A correlation value of -1.0 signifies a perfect negative relationship, a correlation value of 0 signifies no relationship and a correlation value of +1.0 signifies a perfect positive relationship. The direction of the relationship is signified by the positive correlation (as one variable increases, the other variable also increases) or negative correlation (as one variable increases, the other variable decreases) (Pallant, 2020:140; Statistic Solutions, 2020a:1). The following guiding principles, as recommended by Cohen (1988:81), were used to determine the strength of the relationship between the investor life cycle and individual investor risk tolerance behaviour:

- r = 0.10 to 0.29 point towards a small/weak strength relationship,
- r = 0.30 to 0.49 point towards a medium strength relationship and
- r = 0.50 to 1.00 point towards a large/strong strength relationship.

The following hypotheses were formulated to test the relationship between the investor life cycle and individual investor risk tolerance behaviour:

Null hypothesis ($H_0$11): There is no relationship between the investor life cycle and individual investor risk tolerance behaviour.

Alternative hypothesis (H_a11): There is a relationship between the investor life cycle and individual investor risk tolerance behaviour.

Table 5-52 illustrates the results of the correlation analysis performed to establish the relationship between the investor life cycle and individual investor risk tolerance behaviour.

Table 5-52: Relationship between the investor life cycle and individual investor risk tolerance behaviour

Risk tolerance behaviour category	Spearman's correlation	Growth investor phase	Defensive (cautious) investor phase
High risk	Correlation coefficient	0.319**	0.170**
	Sig. (2-tailed)	0.000	0.000
	N	463	463
Average risk	Correlation coefficient	0,073	0.530**
	Sig. (2-tailed)	0,119	0.000
	N	463	463
Low risk	Correlation coefficient	0.103*	-0,001
	Sig. (2-tailed)	0,027	0,977
	N	463	463
* Correlation is significant at the 0.05 level (2-tailed) **Correlation is significant at the 0.01 level (2-tailed)			

Source: Author compilation

Relating to the relationship between the growth investor phase of the life cycle and individual investor risk tolerance behaviour, Table 5-52 exhibits a medium, positive statistically significant relationship between the growth investor phase of the life cycle and high risk tolerance behaviour (rho = 0.319, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0$11) can be rejected and the alternative hypothesis (H_a11) can be concluded at the 5 per cent significance level. The positive relationship between the growth investor phase of the life cycle and high risk tolerance behaviour indicates that individuals in the growth investor phase of the life cycle have a propensity to take high risks.

A small, positive statistically significant relationship was established between the growth investor phase of the life cycle and low risk tolerance behaviour (rho = 0.103, p = 0.027 <

0.05). Accordingly, the null hypothesis ($H_0$11) can be rejected and the alternative hypothesis (H_a11) can be concluded at the 5 per cent significance level. The positive relationship between the growth investor phase of the life cycle and low risk tolerance behaviour indicates that individuals in the growth investor phase of the life cycle also have a propensity to take low risks. However, no statistically significant relationship was established between the growth investor phase of the life cycle and average risk tolerance behaviour (rho = 0.073, p = 0.119 > 0.05). Consequently, for the relationship between the growth investor phase of the life cycle and average risk tolerance behaviour, the null hypothesis ($H_0$11) cannot be rejected at the 5 per cent significance level.

It can be inferred from the above-mentioned findings that individuals in the growth investor phase of the life cycle have a propensity to take high and low risks. The propensities of individuals in the growth investor phase of the life cycle to take high risks are in accordance with the investor life cycle theory discussed in Chapter 3 (Section 3.2), as these individuals have greater propensities to take higher risk than individuals in the defensive (cautious) investor phase of the life cycle (Hanna & Chen, 1997:17; Sheldon, 2018:1). However, although a positive statistically significant relationship was established between the growth investor phase of the life cycle and low risk tolerance behaviour, the strength of the relationship was small.

Concerning the relationship between the defensive (cautious) investor phase of the life cycle and individual investor risk tolerance behaviour, Table 5-52 illustrates a small, positive statistically significant relationship between the defensive (cautious) investor phase of the life cycle and high risk tolerance behaviour (rho = 0.170, p = 0.000 < 0.05). As a result, the null hypothesis ($H_0$11) can be rejected and the alternative hypothesis (H_a11) can be concluded at the 5 per cent significance level. The positive relationship between the defensive (cautious) investor phase of the life cycle and high risk tolerance behaviour indicates that individuals in the defensive (cautious) investor phase of the life cycle have a propensity to take high risks.

In addition, a large, positive statistically significant relationship was established between the defensive (cautious) investor phase of the life cycle and average risk tolerance behaviour (rho = 0.530, p = 0.000 < 0.05). For that reason, the null hypothesis ($H_0$11) can be rejected and the alternative hypothesis (H_a11) can be concluded at the 5 per cent significance level. The positive relationship between the defensive (cautious) investor phase of the life cycle and average risk tolerance behaviour indicates that individuals in the defensive (cautious) investor phase of the life cycle also have a propensity to take average risks. On the other hand, no statistically significant relationship was established between the defensive

(cautious) investor phase of the life cycle and low risk tolerance behaviour (rho = -0.001, p = 0.977 > 0.05). Consequently, for the relationship between the defensive (cautious) investor phase of the life cycle and low risk tolerance behaviour, the null hypothesis ($H_0$11) cannot be rejected at the 5 per cent significance level.

It can be concluded from the above-mentioned findings that individuals in the defensive (cautious) investor phase of the life cycle have a propensity to take high and average risks. Even though a positive statistically significant relationship was established between the defensive (cautious) investor phase of the life cycle and high risk tolerance behaviour, the strength of the relationship was small. On the other hand, the strength of the relationship between the defensive (cautious) investor phase of the life cycle and average risk tolerance behaviour was large. According to the investor life cycle theory discussed in Chapter 3 (Section 3.2), the propensities of individual investors to take high risks lessen as they pass through the various phases of the life cycle, since they have a shorter time horizon than individuals in the early phase of the life cycle (Kuzniak & Grable, 2017:321).

5.6.3.4 The effect of the behavioural finance biases on individual investor risk tolerance behaviour

In this section, correlation analysis was conducted to identify and analyse the effect of the behavioural finance biases on individual investor risk tolerance behaviour. Non-parametric Spearman's rho correlation was applied to determine the strength and direction of the relationship between the behavioural finance biases and individual investor risk tolerance behaviour. The strength of the relationship is specified by the Spearman's rho correlation coefficient with values ranging from -1.0 to +1.0. A correlation value of -1.0 signifies a perfect negative relationship, a correlation value of 0 signifies no relationship and a correlation value of +1.0 signifies a perfect positive relationship. The direction of the relationship is signified by the positive correlation (as one variable increases, the other variable also increases) or negative correlation (as one variable increases, the other variable decreases) (Pallant, 2020:140; Statistic Solutions, 2020a:1). The following guiding principles, as recommended by Cohen (1988:81), were used to determine the strength of the relationship between the behavioural finance biases and individual investor risk tolerance behaviour:

- r = 0.10 to 0.29 point towards a small/weak strength relationship,
- r = 0.30 to 0.49 point towards a medium strength relationship and
- r = 0.50 to 1.00 point towards a large/strong strength relationship.

The following hypotheses were formulated to test the relationship between the behavioural finance biases and individual investor risk tolerance behaviour:

Null hypothesis ($H_0$12): There is no relationship between the behavioural finance biases and individual investor risk tolerance behaviour.

Alternative hypothesis (H_a12): There is a relationship between the behavioural finance biases and individual investor risk tolerance behaviour.

Table 5-53 demonstrates the results of the correlation analysis performed to establish the relationship between the behavioural finance biases and individual investor risk tolerance behaviour.

Table 5-53: Relationship between the behavioural finance biases and individual investor risk tolerance behaviour

Risk tolerance behaviour category	Spearman's correlation	Representativeness	Overconfidence	Anchoring	Gambler's fallacy	Availability bias	Loss aversion	Regret aversion	Mental accounting	Self-control
High risk	Correlation coefficient	0.157**	0.411**	0.166**	0.298**	0.101*	0.084	0.184**	0.065	0.010
	Sig. (2-tailed)	0.001	0.000	0.000	0.000	0.030	0.071	0.000	0.163	0.825
	N	463	463	463	463	463	463	463	463	463
Average risk	Correlation coefficient	0.255**	0.328**	0.075	0.355**	0.262**	0.274**	0.126**	0.309**	0.262**
	Sig. (2-tailed)	0.000	0.000	0.107	0.000	0.000	0.000	0.006	0.000	0.000
	N	463	463	463	463	463	463	463	463	463
Low risk	Correlation coefficient	0.236**	0.029	0.235**	0.095*	0.166**	-0.020	0.189**	0.182**	0.030
	Sig. (2-tailed)	0.000	0.535	0.000	0.042	0.000	0.668	0.000	0.000	0.519
	N	463	463	463	463	463	463	463	463	463
* Correlation is significant at the 0.05 level (2-tailed) **Correlation is significant at the 0.01 level (2-tailed)										

Source: Author compilation

Concerning the relationship between the representativeness bias and individual investor risk tolerance behaviour, Table 5-53 shows a small, positive statistically significant relationship between the representativeness bias and high risk tolerance behaviour (rho = 0.157, p = 0.001 < 0.05). Therefore, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the representativeness bias and high risk tolerance behaviour indicates that individual investors who are subject to the representativeness bias have a propensity to take high risks. A small, positive statistically significant relationship was also established between the representativeness bias and average risk tolerance behaviour (rho = 0.255, p = 0.000 < 0.05). Accordingly, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the representativeness bias and average risk tolerance behaviour indicates that individual investors who are subject to the representativeness bias have a propensity to take average risks. Lastly, there is also a small, positive statistically significant relationship between the representativeness bias and low risk tolerance behaviour (rho = 0.236, p = 0.000 < 0.05). As a result, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the representativeness bias and low risk tolerance behaviour implies that individual investors who are subject to the representativeness bias have a propensity to take low risks.

It can be inferred from the above-mentioned findings that individual investors who are subject to the representativeness bias have a propensity to take high, average and low risks. However, relating to Chapter 3 (Section 3.6.2), Pompian (2012:225) found that individual investors who are subject to the representativeness bias have a propensity to take high risks, whereas Dickason and Ferreira (2018a:10) found that individual investors who are subject to the representativeness bias have a propensity to take average risks.

Regarding the relationship between the overconfidence bias and individual investor risk tolerance behaviour, Table 5-53 illustrates a medium, positive statistically significant relationship between the overconfidence bias and high risk tolerance behaviour (rho = 0.411, p = 0.000 < 0.05). Accordingly, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the overconfidence bias and high risk tolerance behaviour denotes that individual investors who are subject to the overconfidence bias have a propensity to take high risks. Similarly, a medium, positive statistically significant relationship was also established between the overconfidence bias and average risk tolerance behaviour (rho =

0.328, p = 0.000 < 0.05). Thus, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the overconfidence bias and average risk tolerance behaviour signifies that individual investors who are subject to the overconfidence bias have a propensity to take average risks. Conversely, no statistically significant relationship was established between the overconfidence bias and low risk tolerance behaviour (rho = 0.029, p = 0.535 > 0.05). Consequently, for the relationship between the overconfidence bias and low risk tolerance behaviour, the null hypothesis ($H_0$12) cannot be rejected at the 5 per cent significance level.

It can be concluded from the above-mentioned findings that individual investors who are subject to the overconfidence bias have a propensity to take high and average risks. However, in relation to Chapter 3 (Section 3.6.2), Pompian (2012:225) found that individual investors who are subject to the overconfidence bias have a propensity take high risks, while Dickason and Ferreira (2018a:10) found that individual investors who are subject to the overconfidence bias have a propensity to take average risks.

Pertaining to the relationship between the anchoring bias and individual investor risk tolerance behaviour, Table 5-53 exhibits a small, positive statistically significant relationship between the anchoring bias and high risk tolerance behaviour (rho = 0.166, p = 0.000 < 0.05). Consequently, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the anchoring bias and high risk tolerance behaviour signifies that individual investors who are subject to the anchoring bias have a propensity to take high risks. Also, a small, positive statistically significant relationship was established between the anchoring bias and low risk tolerance behaviour (rho = 0.235, p = 0.000 < 0.05). As a result, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the anchoring bias and low risk tolerance behaviour signifies that individual investors who are subject to the anchoring bias have a propensity to take low risks. On the other hand, no statistically significant relationship was established between the anchoring bias and average risk tolerance behaviour (rho = 0.075, p = 0.107 > 0.05). Therefore, for the relationship between the anchoring bias and average risk tolerance behaviour, the null hypothesis ($H_0$12) cannot be rejected at the 5 per cent significance level.

It can be construed from the above-mentioned findings that individual investors who are subject to the anchoring bias have a propensity to take high and low risks. Nonetheless, with

reference to Chapter 3 (Section 3.6.2), Pompian (2012:225), as well as Dickason and Ferreira (2018a:10), found that individual investors who are subject to the anchoring bias have a propensity to take low risks.

Relating to the relationship between the gambler's fallacy bias and individual investor risk tolerance behaviour, Table 5-53 illustrates a medium, positive statistically significant relationship between the gambler's fallacy bias and high risk tolerance behaviour (rho = 0.298, p = 0.000 < 0.05). Thus, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the gambler's fallacy bias and high risk tolerance behaviour denotes that individual investors who are subject to the gambler's fallacy bias have a propensity to take high risks. Likewise, a medium, positive statistically significant relationship was established between the gambler's fallacy bias and average risk tolerance behaviour (rho = 0.355, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the gambler's fallacy bias and average risk tolerance behaviour indicates that individual investors who are subject to the gambler's fallacy bias have a propensity to take average risks. Lastly, there is also a small, positive statistically significant relationship between the gambler's fallacy bias and low risk tolerance behaviour (rho = 0.095, p = 0.042 < 0.05). Consequently, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the gambler's fallacy bias and low risk tolerance behaviour implies that individual investors who are subject to the gambler's fallacy bias have a propensity to take low risks.

To conclude, the above-mentioned findings indicate that individual investors who are subject to the gambler's fallacy bias have a propensity to take high, average and low risks. However, relating to Chapter 3 (Section 3.6.2), Dickason and Ferreira (2018a:10) found that individual investors who are subject to the gambler's fallacy bias have a propensity to take average risks.

Concerning the relationship between the availability bias and individual investor risk tolerance behaviour, Table 5-53 exhibits a small, positive statistically significant relationship between the availability bias and high risk tolerance behaviour (rho = 0.101, p = 0.030 < 0.05). Accordingly, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the availability bias and high risk tolerance behaviour implies that individual

investors who are subject to the availability bias have a propensity to take high risks. A small, positive statistically significant relationship was also established between the availability bias and average risk tolerance behaviour (rho = 0.262, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the availability bias and average risk tolerance behaviour signifies that individual investors who are subject to the availability bias have a propensity to take average risks. Lastly, a small, positive statistically significant relationship was also established between the availability bias and low risk tolerance behaviour (rho = 0.166, p = 0.000 < 0.05). Consequently, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the availability bias and low risk tolerance behaviour indicates that individual investors who are subject to the availability bias have a propensity to take low risks.

In conclusion, the above-mentioned findings signify that individual investors who are subject to the availability bias have a propensity to take high, average and low risks. Nonetheless, with reference to Chapter 3 (Section 3.6.2), Pompian (2012:225) found that individual investors who are subject to the availability bias have a propensity to take high risks, whereas Dickason and Ferreira (2018a:10) found that individual investors who are subject to the availability bias have a propensity to take average risks.

Relating to the relationship between the loss aversion bias and individual investor risk tolerance behaviour, Table 5-53 shows a small, positive statistically significant relationship between the loss aversion bias and average risk tolerance behaviour (rho = 0.274, p = 0.000 < 0.05). Accordingly, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the loss aversion bias and average risk tolerance behaviour signifies that individual investors who are subject to the loss aversion bias have a propensity to take average risks. However, no statistically significant relationship was established between the loss aversion bias and high risk tolerance behaviour (rho = 0.084, p = 0.071 > 0.05) and between the loss aversion bias and low risk tolerance behaviour (rho = -0.020, p = 0.668 > 0.05). As a result, for the relationship between the loss aversion bias and high risk tolerance behaviour, as well as the loss aversion bias and low risk tolerance behaviour, the null hypothesis ($H_0$12) cannot be rejected at the 5 per cent significance level.

It can be construed from the above-mentioned findings that individual investors who are subject to the loss aversion bias have a propensity to take average risks. In contrast with this

finding and with reference to Chapter 3 (Section 3.6.2), Pompian (2012:225), as well as Dickason and Ferreira (2018a:10), found that individual investors who are subject to the loss aversion bias have a propensity to take low risks.

Regarding the relationship between the regret aversion bias and individual investor risk tolerance behaviour, Table 5-53 illustrates a small, positive statistically significant relationship between the regret aversion bias and high risk tolerance behaviour (rho = 0.184, p = 0.000 < 0.05). Thus, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the regret aversion bias and high risk tolerance behaviour denotes that individual investors who are subject to the regret aversion bias have a propensity to take high risks. Likewise, a small, positive statistically significant relationship was established between the regret aversion bias and average risk tolerance behaviour (rho = 0.126, p = 0.006 < 0.05). Therefore, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the regret aversion bias and average risk tolerance behaviour indicates that individual investors who are subject to the regret aversion bias have a propensity to take average risks. Lastly, there is also a small, positive statistically significant relationship between the regret aversion bias and low risk tolerance behaviour (rho = 0.189, p = 0.000 < 0.05). Consequently, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the regret aversion bias and low risk tolerance behaviour implies that individual investors who are subject to the regret aversion bias have a propensity to take low risks.

To conclude, the above-mentioned findings indicate that individual investors who are subject to the regret aversion bias have a propensity to take high, average and low risks. However, relating to Chapter 3 (Section 3.6.2), Pompian (2012:225), as well as Dickason and Ferreira (2018a:10), found that individual investors who are subject to the regret aversion bias have a propensity to take average risks.

Concerning the relationship between the mental accounting bias and individual investor risk tolerance behaviour, Table 5-53 shows a medium, positive statistically significant relationship between the mental accounting bias and average risk tolerance behaviour (rho = 0.309, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the mental accounting bias and average risk tolerance

behaviour implies that individual investors who are subject to the mental accounting bias have a propensity to take average risks. There is also a small, positive statistically significant relationship between the mental accounting bias and low risk tolerance behaviour (rho = 0.182, p = 0.000 < 0.05). As a result, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the mental accounting bias and low risk tolerance behaviour signifies that individual investors who are subject to the mental accounting bias have a propensity to take low risks. However, no statistically significant relationship was established between the mental accounting bias and high risk tolerance behaviour (rho = 0.065, p = 0.163 > 0.05). Consequently, for the relationship between the mental accounting bias and high risk tolerance behaviour, the null hypothesis ($H_0$12) cannot be rejected at the 5 per cent significance level.

It can be concluded from the above-mentioned findings that individual investors who are subject to the mental accounting bias have a propensity to take average and low risks. Nonetheless, relating to Chapter 3 (Section 3.6.2), Pompian (2012:225), as well as Dickason and Ferreira (2018a:10), found that individual investors who are subject to the mental accounting bias have a propensity to take low risks.

With reference to the relationship between the self-control bias and individual investor risk tolerance behaviour, Table 5-53 illustrates a small, positive statistically significant relationship between the self-control bias and average risk tolerance behaviour (rho = 0.262, p = 0.000 < 0.05). Thus, the null hypothesis ($H_0$12) can be rejected and the alternative hypothesis (H_a12) can be concluded at the 5 per cent significance level. The positive relationship between the self-control bias and average risk tolerance behaviour denotes that individual investors who are subject to the self-control bias have a propensity to take average risks. Conversely, no statistically significant relationship was established between the self-control bias and high risk tolerance behaviour (rho = 0.010, p = 0.825 > 0.05), as well as between the self-control bias and low risk tolerance behaviour (rho = 0.030, p = 0.519 > 0.05). Consequently, for the relationship between the self-control bias and high risk tolerance behaviour, as well as the self-control bias and low risk tolerance behaviour, the null hypothesis ($H_0$12) cannot be rejected at the 5 per cent significance level. It can be construed from the above-mentioned findings that individual investors who are subject to the self-control bias have a propensity to take average risks. Contrary to this finding and with reference to Chapter 3 (Section 3.6.2), Pompian (2012:225), as well as Dickason and Ferreira (2018a:10), found that individual investors who are subject to the self-control bias have a propensity to take high risks.

5.6.4 Identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour

The fifth empirical objective to be fulfilled is to identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour. The influence of exogenous factors, namely political-legal, technological, tax implications, macroeconomic factors (interest rates, exchange rates, inflation and GDP), international events and market fluctuations and volatility, on individual investor risk tolerance behaviour, were identified and analysed by means of correlation analysis. Non-parametric Spearman's rho correlation was applied to determine the strength and direction of the relationship between the exogenous factors and individual investor risk tolerance behaviour. The strength of the relationship is specified by the Spearman's rho correlation coefficient with values ranging from -1.0 to +1.0. A correlation value of -1.0 signifies a perfect negative relationship, a correlation value of 0 signifies no relationship and a correlation value of +1.0 signifies a perfect positive relationship. Additionally, the direction of the relationship is signified by the positive correlation (as one variable increases, the other variable also increases) or negative correlation (as one variable increases, the other variable decreases) (Pallant, 2020:140; Statistic Solutions, 2020a:1). The following guiding principles, as recommended by Cohen (1988:81), were used to determine the strength of the relationship between the exogenous factors and individual investor risk tolerance behaviour:

- r = 0.10 to 0.29 point towards a small/weak strength relationship,
- r = 0.30 to 0.49 point towards a medium strength relationship and
- r = 0.50 to 1.00 point towards a large/strong strength relationship.

The following hypotheses were formulated to test the relationship between the exogenous factors and individual investor risk tolerance behaviour:

Null hypothesis ($H_0$13): There is no relationship between the exogenous factors and individual investor risk tolerance behaviour.

Alternative hypothesis (H_a13): There is a relationship between the exogenous factors and individual investor risk tolerance behaviour.

Table 5-54 demonstrates the results of the correlation analysis performed to establish the relationship between the exogenous factors and individual investor risk tolerance behaviour.

Table 5-54: Relationship between the exogenous factors and individual investor risk tolerance behaviour

Risk tolerance behaviour category	Spearman's correlation	Political-legal factors	Technological factors	Tax implications	Interest rates	Exchange rate volatility	Inflation	GDP	International events	Market fluctuations and volatility
High risk	Correlation coefficient	-0,004	0.358**	0.113*	0.126**	0.133**	0.425**	-0,062	0.275**	0.245**
	Sig. (2-tailed)	0,925	0,000	0,015	0,007	0,004	0,000	0,183	0,000	0,000
	N	463	463	463	463	463	463	463	463	463
Average risk	Correlation coefficient	0,089	0.118*	0.219**	-0,009	0,052	0.335**	-0,075	0.214**	0,085
	Sig. (2-tailed)	0,055	0,011	0,000	0,841	0,267	0,000	0,109	0,000	0,067
	N	463	463	463	463	463	463	463	463	463
Low risk	Correlation coefficient	0.219**	0,054	0,054	0.196**	0.156**	-0,068	0.270**	0,023	0.239**
	Sig. (2-tailed)	0,000	0,243	0,243	0,000	0,001	0,143	0,000	0,621	0,000
	N	463	463	463	463	463	463	463	463	463

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

Source: Author compilation

Regarding the relationship between political-legal factors and individual investor risk tolerance behaviour, it can be seen from Table 5-54 that there is a small, positive statistically significant relationship between political-legal factors and low risk tolerance behaviour (rho = 0.219, p = 0.000 < 0.05). Accordingly, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between political-legal factors and low risk tolerance behaviour denotes that individual investors whose investment decisions are influenced by political-legal factors have a propensity to take low risks. On the other hand, no statistically significant relationship was established between political-legal factors and high risk tolerance behaviour (rho = -0.004, p = 0.925 > 0.05), as well as between political-legal factors and average risk tolerance behaviour (rho = 0.089, p = 0.055 > 0.05). As a result, for the relationship between political-legal factors and high risk tolerance behaviour, as well as political-legal factors and average risk tolerance behaviour, the null hypothesis ($H_0$13) cannot be rejected at the 5 per cent significance level. It can be derived from these findings that individual investors whose investment decisions are influenced by political-legal factors have a propensity to take low risks.

Concerning the relationship between technological factors and individual investor risk tolerance behaviour, Table 5-54 exhibits a medium, positive statistically significant relationship between technological factors and high risk tolerance behaviour (rho = 0.358, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between technological factors and high risk tolerance behaviour signifies that individual investors whose investment decisions are influenced by technological factors have a propensity to take high risks. A small, positive statistically significant relationship was also established between technological factors and average risk tolerance behaviour (rho = 0.118, p = 0.011 < 0.05). Therefore, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between technological factors and average risk tolerance behaviour indicates that individual investors whose investment decisions are influenced by technological factors have a propensity to take average risks. Conversely, no statistically significant relationship was established between technological factors and low risk tolerance behaviour (rho = 0.054, p = 0.243 > 0.05). Thus, for the relationship between technological factors and low risk tolerance behaviour, the null hypothesis ($H_0$13) cannot be rejected at the 5 per cent significance level. In conclusion, individual investors whose investment decisions are influenced by technological factors have a propensity to take high and average risks.

With reference to the relationship between tax implications and individual investor risk tolerance behaviour, Table 5-54 demonstrates a small, positive statistically significant relationship between

tax implications and high risk tolerance behaviour (rho = 0.113, p = 0.015 < 0.05). Therefore, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between tax implications and high risk tolerance behaviour signifies that individual investors whose investment decisions are influenced by tax implications have a propensity to take high risks. Likewise, a small, positive statistically significant relationship was also established between tax implications and average risk tolerance behaviour (rho = 0.219, p = 0.000 < 0.05). For that reason, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between tax implications and average risk tolerance behaviour specifies that individual investors whose investment decisions are influenced by tax implications have a propensity to take average risks. However, no statistically significant relationship was established between tax implications and low risk tolerance behaviour (rho = 0.054, p = 0.243 > 0.05). Accordingly, for the relationship between tax implications and low risk tolerance behaviour, the null hypothesis ($H_0$13) cannot be rejected at the 5 per cent significance level. It can be inferred from these findings that individual investors whose investment decisions are influenced by tax implications have a propensity to take high and average risks.

Regarding the relationship between the macroeconomic factor, i.e. interest rates, and individual investor risk tolerance behaviour, it is apparent form Table 5-54 that there is a small, positive statistically significant relationship between interest rates and high risk tolerance behaviour (rho = 0.126, p = 0.007 < 0.05). As a result, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between interest rates and high risk tolerance behaviour specifies that individual investors whose investment decisions are influenced by interest rates have a propensity to take high risks. Similarly, a small, positive statistically significant relationship was also established between interest rates and low risk tolerance behaviour (rho = 0.196, p = 0.000 < 0.05). Consequently, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between interest rates and low risk tolerance behaviour denotes that individual investors whose investment decisions are influenced by interest rates have a propensity to take low risks. On the other hand, no statistically significant relationship was established between interest rates and average risk tolerance behaviour (rho = -0.009, p = 0.841 > 0.05). As a result, for the relationship between interest rates and average risk tolerance behaviour, the null hypothesis ($H_0$13) cannot be rejected at the 5 per cent significance level. It can be concluded from these findings that individual investors whose investment decisions are influenced by interest rates have a propensity to take high and low risks.

Concerning the relationship between the macroeconomic factor, i.e. exchange rate volatility, and individual investor risk tolerance behaviour, Table 5-54 illustrates a small, positive statistically significant relationship between exchange rate volatility and high risk tolerance behaviour (rho = 0.133, p = 0.004 < 0.05). Accordingly, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between exchange rate volatility and high risk tolerance behaviour indicates that individual investors whose investment decisions are influenced by exchange rate volatility have a propensity to take high risks. Also, a small, positive statistically significant relationship was established between exchange rate volatility and low risk tolerance behaviour (rho = 0.156, p = 0.001 < 0.05). Therefore, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between exchange rate volatility and low risk tolerance behaviour specifies that individual investors whose investment decisions are influenced by exchange rate volatility have a propensity to take low risks. Conversely, there is no statistically significant relationship between exchange rate volatility and average risk tolerance behaviour (rho = 0.052, p = 0.267 > 0.05). Consequently, for the relationship between exchange rate volatility and average risk tolerance behaviour, the null hypothesis ($H_0$13) cannot be rejected at the 5 per cent significance level. It can be inferred from these findings that individual investors whose investment decisions are influenced by exchange rate volatility have a propensity to take high and low risks.

Relating to the relationship between the macroeconomic factor, i.e. inflation, and individual investor risk tolerance behaviour, it is evident from Table 5-54 that there is a medium, positive statistically significant relationship between inflation and high risk tolerance behaviour (rho = 0.425, p = 0.000 < 0.05). Thus, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between inflation and high risk tolerance behaviour signifies that individual investors whose investment decisions are influenced by inflation have a propensity to take high risks. Likewise, a medium, positive statistically significant relationship was also established between inflation and average risk tolerance behaviour (rho = 0.335, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between inflation and average risk tolerance behaviour specifies that individual investors whose investment decisions are influenced by inflation have a propensity to take average risks. On the other hand, there is no statistically significant relationship between inflation and low risk tolerance behaviour (rho = -0.068, p = 0.143 > 0.05). Consequently, for the relationship between inflation and low risk tolerance behaviour, the null hypothesis ($H_0$13) cannot be rejected at the 5 per cent significance level. To conclude, these findings indicate that individual

investors whose investment decisions are influenced by inflation have a propensity to take high and average risks.

With reference to the relationship between the macroeconomic factor, i.e. GDP, and individual investor risk tolerance behaviour, Table 5-54 demonstrates a small, positive statistically significant relationship between GDP and low risk tolerance behaviour (rho = 0.270, p = 0.000 < 0.05). Accordingly, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between GDP and low risk tolerance behaviour implies that individual investors whose investment decisions are influenced by GDP have a propensity to take low risks. However, no statistically significant relationship was established between GDP and high risk tolerance behaviour (rho = -0.062, p = 0.183 > 0.05), as well as GDP and average risk tolerance behaviour (rho = -0.075, p = 0.109 > 0.05). As a result, for the relationship between GDP and high risk tolerance behaviour, as well as GDP and average risk tolerance behaviour, the null hypothesis ($H_0$13) cannot be rejected at the 5 per cent significance level. In conclusion, these findings show that individual investors whose investment decisions are influenced by GDP have a propensity to take low risks.

Concerning the relationship between international events and individual investor risk tolerance behaviour, Table 5-54 illustrates a small, positive statistically significant relationship between international events and high risk tolerance behaviour (rho = 0.275, p = 0.000 < 0.05). Consequently, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between international events and high risk tolerance behaviour stipulates that individual investors whose investment decisions are influenced by international events have a propensity to take high risks. A small, positive statistically significant relationship was also established between international events and average risk tolerance behaviour (rho = 0.214, p = 0.000 < 0.05). Accordingly, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between international events and average risk tolerance behaviour denotes that individual investors whose investment decisions are influenced by international events have a propensity to take average risks. Conversely, no statistically significant relationship was established between international events and low risk tolerance behaviour (rho = 0.023 p = 0.621 > 0.05). As a result, for the relationship between international events and low risk tolerance behaviour, the null hypothesis ($H_0$13) cannot be rejected at the 5 per cent significance level. It can be concluded from these findings that individual investors whose investment decisions are influenced by international events have a propensity to take high and average risks.

Relating to the relationship between market fluctuations and volatility and individual investor risk tolerance behaviour, it is shown in Table 5-54 that there is a small, positive statistically significant relationship between market fluctuations and volatility and high risk tolerance behaviour (rho = 0.245, p = 0.000 < 0.05). Therefore, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between market fluctuations and volatility and high risk tolerance behaviour specifies that individual investors whose investment decisions are influenced by market fluctuations and volatility have a propensity to take high risks. Additionally, a small, positive statistically significant relationship was also established between market fluctuations and volatility and low risk tolerance behaviour (rho = 0.239, p = 0.000 < 0.05). For that reason, the null hypothesis ($H_0$13) can be rejected and the alternative hypothesis (H_a13) can be concluded at the 5 per cent significance level. The positive relationship between market fluctuations and volatility and low risk tolerance behaviour stipulates that individual investors whose investment decisions are influenced by market fluctuations and volatility have a propensity to take low risks. On the contrary, no statistically significant relationship was established between market fluctuations and volatility and average risk tolerance behaviour (rho = 0.085 p = 0.067 > 0.05). Thus, for the relationship between market fluctuations and volatility and average risk tolerance behaviour, the null hypothesis ($H_0$13) cannot be rejected at the 5 per cent significance level. In conclusion, these findings show that individual investors whose investment decisions are influenced by market fluctuations and volatility have a propensity to take high and low risks.

In the following section (Section 5.7), the utilisation of SEM to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors are presented to facilitate the achievement of the sixth empirical objective, and ultimately, the primary objective of the research study.

5.7 STRUCTURAL EQUATION MODELLING

The sixth and final empirical objective to be achieved is to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors. This objective incorporates pre-identified endogenous and exogenous factors and individual investor risk tolerance behaviour. SEM was applied to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors. Taking into consideration the sample size, Hox and Bechger (1998:361), as well as Weston and Gore (2006:738), affirmed that a sample size of 200 is adequate for multivariate normal data, whereas a sample size of 400 is adequate for non-normal data. Given that maximum likelihood estimation, which assumes multivariate normal data, was used to estimate the model, the sample size of 463 individual investors was considered adequate

for conducting SEM with IBM SPSS® Amos™, Version 26 (IBM SPSS Amos, 2020). The execution of SEM to achieve the sixth and final empirical objective is attended to in the following subsections (Section 5.7.1–Section 5.7.3).

5.7.1 Indicate structural model

After the validity of the measurement model has been assessed and found satisfactory (Section 5.4), the structural model can be indicated and laid out for specification (Statistic Solutions, 2020c:2). Figure 5-2 illustrates the detailed specified structural model, which signifies the influence of the pre-identified endogenous factors and exogenous factors on individual investor risk tolerance behaviour.

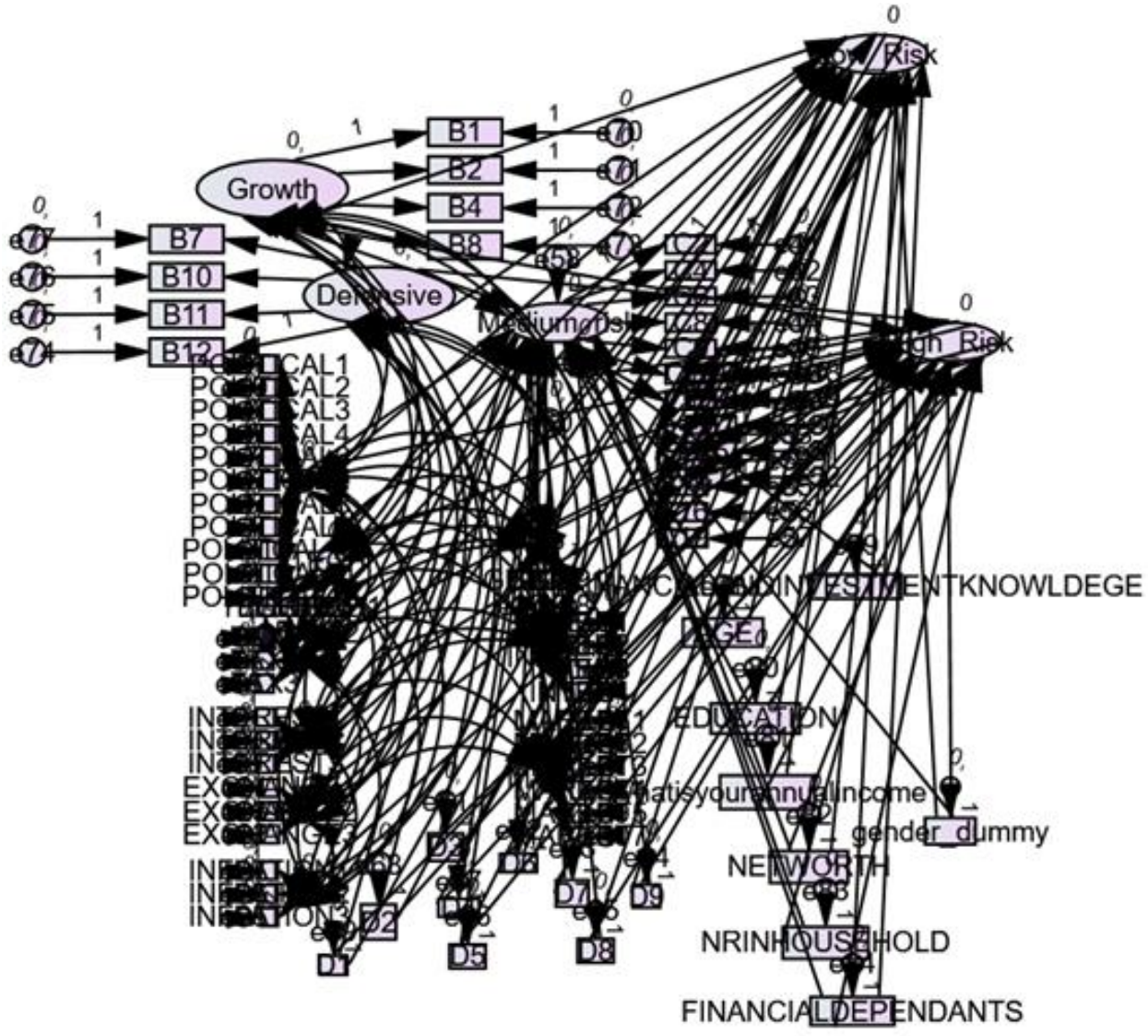

Figure 5-2: Specified structural model
Source: Author compilation

5.7.2 Assess structural model validity

In this section, the validity of the structural model is assessed. This step seeks to establish the validity of the structural model and the corresponding hypothesised theoretical relationships between the multiple variables (Kline, 2011:94). Section 5.4 provided sufficing evidence of the measuring scales' validity and reliability, which was deemed satisfactory and reliable. To evaluate how well the specified structural model illustrated in Figure 5-2 fits the data, the following model fit indices results were attained:

- The CMIN/DF (chi-square test statistics divided by the degrees of freedom) value of 3.121 represented good model fit, since a standard for good fit entails values between 3─5 (Mueller, 1996:204; Plucker, 2003:28).
- A CFI value of 0.651 was obtained. CFI varies from 0─1, with values closer to 1, preferably greater than 0.90, indicates good model fit (Malhotra *et al.,* 2017:807).
- The RMSEA value of 0.068, with a 90 per cent confidence interval [0.066; 0.069], points towards good model fit, as values of 0.08 or less indicate good model fit (Schreiber *et al.,* 2006:327; Malhotra *et al.,* 2017:807).

Even though the CFI value was below the ideal value of greater than 0.9, the CMIN/DF and RMSEA values exhibited good model fit. For that reason, the specified structural model is a good fit for the data. Moreover, there is satisfactory evidence of construct validity and accordingly, the specified structural model is deemed valid.

Table 5-55 exemplifies the standardised regression weight results for the specified structural model.

Table 5-55: Standardised regression weight results for the specified structural model

Constructs			Estimate	P-value
High risk	**Demographical factors**			
	←	Age	-0.016	0.704
	←	Gender	0.108	0.011**
	←	Education	-0.062	0.145
	←	Annual income	0.091	0.053*
	←	Net worth	-0.117	0.006**
	←	Household size	-0.032	0.451
	←	Number of financial dependants	0.058	0.171
	Socio-cultural factors			
	←	Financial and investment knowledge	0.057	0.177
	Investor life cycle			
	←	Growth investor phase	0.190	***
	←	Defensive (cautious) investor phase	0.177	0.003**
	Behavioural finance biases			
	←	Representativeness	-0.005	0.898

Constructs			Estimate	P-value
	←	Overconfidence	0.181	***
	←	Anchoring	0.101	0.018**
	←	Gambler's fallacy	0.169	***
	←	Availability bias	-0.113	0.008**
	←	Loss aversion	-0.031	0.467
	←	Regret aversion	0.122	0.004**
	←	Mental accounting	0.020	0.633
	←	Self-control	-0.081	0.056*
	Factors pertaining to the external environment			
	←	Political-legal factors	0.160	0.111
	←	Technological factors	0.255	***
	←	Tax implications	-0.129	0.038**
	←	Interest rates	0.054	0.406
	←	Exchange rate volatility	0.159	0.044**
	←	Inflation	0.177	0.008**
	←	GDP	-0.589	***
	←	International events	-0.052	0.670
	←	Market fluctuations and volatility	0.281	0.033**
Average risk	**Demographical factors**			
	←	Age	0.045	0.248
	←	Gender	0.097	0.013**
	←	Education	0.058	0.136
	←	Annual income	0.081	0.061*
	←	Net worth	0.130	***
	←	Household size	-0.087	0.025**
	←	Number of financial dependants	0.129	0.001**
	Socio-cultural factors			
	←	Financial and investment knowledge	0.237	***
	Investor life cycle			
	←	Growth investor phase	0.138	0.007**
	←	Defensive (cautious) investor phase	0.541	***
	Behavioural finance biases			
	←	Representativeness	0.069	0.073*
	←	Overconfidence	-0.095	0.015**
	←	Anchoring	0.082	0.034**
	←	Gambler's fallacy	0.104	0.008**
	←	Availability bias	0.011	0.775
	←	Loss aversion	0.130	***
	←	Regret aversion	0.028	0.472
	←	Mental accounting	0.185	***
	←	Self-control	0.020	0.597
	Factors pertaining to the external environment			
	←	Political-legal factors	0.304	0.002**
	←	Technological factors	-0.085	0.157
	←	Tax implications	0.004	0.945
	←	Interest rates	-0.101	0.090*
	←	Exchange rate volatility	0.119	0.097*
	←	Inflation	0.083	0.156
	←	GDP	-0.448	0.001**
	←	International events	0.057	0.611
	←	Market fluctuations and volatility	0.077	0.516

Constructs			Estimate	P-value
Low risk	**Demographical factors**			
	←	Age	0.110	0.013**
	←	Gender	-0.007	0.875
	←	Education	-0.026	0.548
	←	Annual income	-0.048	0.317
	←	Net worth	-0.134	0.003**
	←	Household size	0.043	0.327
	←	Number of financial dependants	-0.030	0.485
	Socio-cultural factors			
	←	Financial and investment knowledge	-0.165	***
	Investor life cycle			
	←	Growth investor phase	0.138	0.016**
	←	Defensive (cautious) investor phase	-0.007	0.904
	Behavioural finance biases			
	←	Representativeness	0.185	***
	←	Overconfidence	0.117	0.008**
	←	Anchoring	0.304	***
	←	Gambler's fallacy	0.027	0.540
	←	Availability bias	0.127	0.004**
	←	Loss aversion	-0.243	***
	←	Regret aversion	0.033	0.448
	←	Mental accounting	0.146	0.001**
	←	Self-control	0.017	0.692
	Factors pertaining to the external environment			
	←	Political-legal factors	-0.101	0.307
	←	Technological factors	0.010	0.878
	←	Tax implications	-0.027	0.667
	←	Interest rates	0.107	0.105
	←	Exchange rate volatility	-0.001	0.992
	←	Inflation	-0.206	0.003**
	←	GDP	0.309	0.033**
	←	International events	-0.468	***
	←	Market fluctuations and volatility	0.470	***
***Significant at the 0.001 level ** Significant at the 0.05 level * Significant at the 0.1 level				

Source: Author compilation

Taking into consideration the high risk tolerance behaviour category, it can be seen from Table 5-55 that demographical factors, namely gender (standardised regression coefficient = 0.108) and net worth (standardised regression coefficient = -0.117) contributed significantly towards explaining high risk tolerance behaviour at the $p < 0.05$ level. Annual income (standardised regression coefficient = 0.091) also contributed significantly towards explaining high risk tolerance behaviour at the $p < 0.10$ level. The remaining demographical factors, namely age, education, household size and the number of financial dependants, as well as the socio-cultural factor, namely financial and investment knowledge, did not significantly contribute towards explaining high risk tolerance behaviour ($p > 0.10$). Furthermore, the growth investor phase of the life cycle (standardised

regression coefficient = 0.190) contributed significantly towards explaining high risk tolerance behaviour at the $p < 0.001$ level, whereas the defensive (cautious) investor phase of the life cycle (standardised regression coefficient = 0.177) contributed significantly towards explaining high risk tolerance behaviour at $p < 0.05$ level.

Relating to the behavioural finance biases, Table 5-55 indicates that the overconfidence bias (standardised regression coefficient = 0.181) and the gambler's fallacy bias (standardised regression coefficient = 0.169) contributed significantly towards explaining high risk tolerance behaviour at the $p < 0.001$ level. The anchoring bias (standardised regression coefficient = 0.101), the availability bias (standardised regression coefficient = -0.113) and the regret aversion bias (standardised regression coefficient = 0.122) contributed significantly towards explaining high risk tolerance behaviour at $p < 0.05$ level, while the self-control bias (standardised regression coefficient = -0.081) contributed significantly towards explaining high risk tolerance behaviour at the $p < 0.10$ level. However, the representativeness bias, the loss aversion bias and the mental accounting bias did not significantly contribute towards explaining high risk tolerance behaviour ($p > 0.10$).

Considering the factors pertaining to the external environment, Table 5-55 demonstrates that technological factors (standardised regression coefficient = 0.255) and GDP (standardised regression coefficient = -0.589) contributed significantly towards explaining high risk tolerance behaviour at the $p < 0.001$ level. Additionally, tax implications (standardised regression coefficient = -0.129), exchange rate volatility (standardised regression coefficient = 0.159), inflation (standardised regression coefficient = 0.177), as well as market fluctuations and volatility (standardised regression coefficient = 0.281) contributed significantly towards explaining high risk tolerance behaviour at $p < 0.05$ level. On the other hand, political-legal factors, interest rates and international events did not significantly contribute towards explaining high risk tolerance behaviour ($p > 0.10$).

These results led to the following proposed model to profile high risk tolerance behaviour based on the endogenous and exogenous factors that contributed significantly towards explaining high risk tolerance behaviour, which is depicted in Figure 5-3. Concerning the endogenous factors, it can be inferred from Figure 5-3 that the demographical factor, namely net worth (standardised regression coefficient = -0.117) contributed the greatest degree towards explaining high risk tolerance behaviour, followed by gender (standardised regression coefficient = 0.108) and annual income (standardised regression coefficient = 0.091), respectively. Considering the investor life cycle as an endogenous factor, the growth investor phase (standardised regression coefficient = 0.190) contributed the greatest degree towards explaining high risk tolerance behaviour, while the defensive (cautious) investor phase (standardised regression coefficient = 0.177) explains high risk

tolerance behaviour to a slightly lesser degree. Taking into account the behavioural finance biases as endogenous factors, the overconfidence bias (standardised regression coefficient = 0.181) contributed the greatest degree towards explaining high risk tolerance behaviour, followed by the gambler's fallacy bias (standardised regression coefficient = 0.169), the regret aversion bias (standardised regression coefficient = 0.122), the availability bias (standardised regression coefficient = -0.113), the anchoring bias (standardised regression coefficient = 0.101) and the self-control bias (standardised regression coefficient = -0.081), respectively.

Concerning the exogenous factors, which comprise factors pertaining to the external environment, it can be inferred from Figure 5-3 that GDP (standardised regression coefficient = -0.589) contributed the greatest degree towards explaining high risk tolerance behaviour, followed by market fluctuations and volatility (standardised regression coefficient = 0.281), technological factors (standardised regression coefficient = 0.255), inflation (standardised regression coefficient = 0.177), exchange rate volatility (standardised regression coefficient = 0.159) and tax implications (standardised regression coefficient = -0.129), respectively.

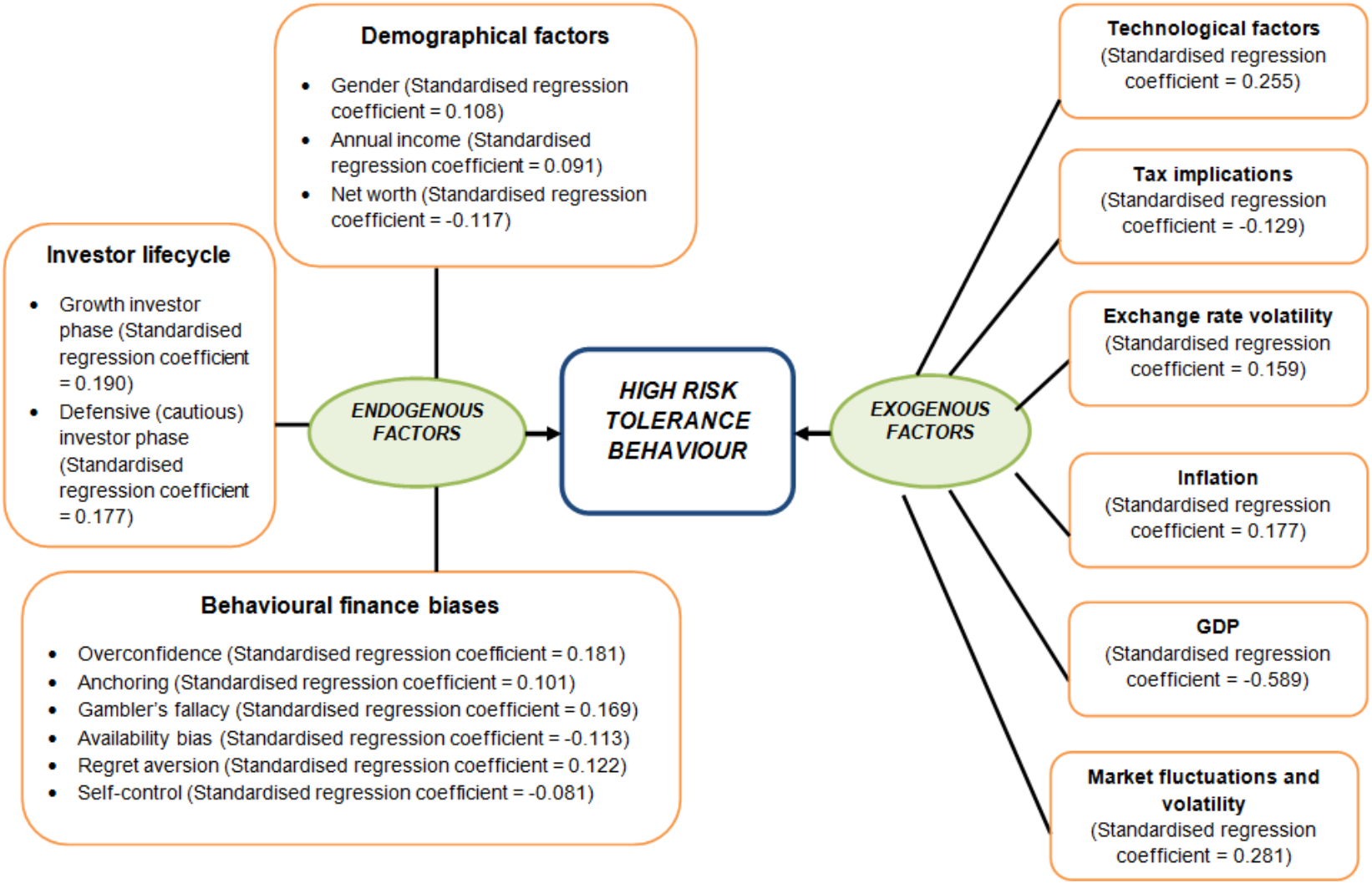

Figure 5-3: Proposed model to profile high risk tolerance behaviour based on endogenous and exogenous factors
Source: Author compilation

In view of the average risk tolerance behaviour category, it is apparent from Table 5-55 that the demographical factor, namely net worth (standardised regression coefficient = 0.130) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.001$ level. Furthermore, gender (standardised regression coefficient = 0.097), household size (standardised regression coefficient = -0.087) and the number of financial dependants (standardised regression coefficient = 0.129) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.05$ level, whereas annual income (standardised regression coefficient = 0.081) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.10$ level. On the contrary, the remaining demographical factors, namely age and education, did not significantly contribute towards explaining average risk tolerance behaviour ($p > 0.10$). The socio-cultural factor, namely financial and investment knowledge (standardised regression coefficient = 0.237) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.001$ level. Relating to the investor life cycle, the defensive (cautious) investor phase (standardised regression coefficient = 0.541) did significantly contribute towards explaining average risk tolerance behaviour to a strong degree at the $p < 0.001$ level, while the growth investor phase (standardised regression coefficient = 0.138) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.05$ level.

With reference to the behavioural finance biases, Table 5-55 shows that the loss aversion bias (standardised regression coefficient = 0.130) and the mental accounting bias (standardised regression coefficient = 0.185) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.001$ level. The overconfidence bias (standardised regression coefficient = -0.095), the anchoring bias (standardised regression coefficient = 0.082) and the gambler's fallacy bias (standardised regression coefficient = 0.104) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.05$ level, while the representativeness bias (standardised regression coefficient = 0.069) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.10$ level. However, the availability bias, the regret aversion bias and the self-control bias did not significantly contribute towards explaining average risk tolerance behaviour ($p > 0.10$).

Taking into account the factors pertaining to the external environment, Table 5-55 exhibits that political-legal factors (standardised regression coefficient = 0.304) and GDP (standardised regression coefficient = -0.448) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.05$ level. Interest rates (standardised regression coefficient = -0.101) and exchange rate volatility (standardised regression coefficient = 0.119) contributed significantly towards explaining average risk tolerance behaviour at the $p < 0.10$ level. Nonetheless, technological factors, tax implications, inflation, international events, as well as market fluctuations

and volatility, did not significantly contribute towards explaining average risk tolerance behaviour ($p > 0.10$).

These results led to the following proposed model to profile average risk tolerance behaviour based on the endogenous and exogenous factors that contributed significantly towards explaining average risk tolerance behaviour, which is depicted in Figure 5-4. Concerning the endogenous factors, it can be inferred from Figure 5-4 that the demographical factor, namely net worth (standardised regression coefficient = 0.130) contributed the greatest degree towards explaining average risk tolerance behaviour, followed by the number of financial dependants (standardised regression coefficient = 0.129), gender (standardised regression coefficient = 0.097), household size (standardised regression coefficient = -0.087) and annual income (standardised regression coefficient = 0.081), respectively. The socio-cultural factor, namely financial and investment knowledge (standardised regression coefficient = 0.237) was the only pre-identified socio-cultural factor that contributed significantly towards explaining average risk tolerance behaviour and explained average risk tolerance behaviour to a relatively moderate degree.

Considering the investor life cycle as an endogenous factor, the defensive (cautious) investor phase (standardised regression coefficient = 0.541) contributed the greatest degree towards explaining average risk tolerance behaviour, while the growth investor phase (standardised regression coefficient = 0.138) explains average risk tolerance behaviour to a considerably smaller degree. Taking into consideration the behavioural finance biases as endogenous factors, the mental accounting bias (standardised regression coefficient = 0.185) contributed the greatest degree towards explaining average risk tolerance behaviour, followed by the loss aversion bias (standardised regression coefficient = 0.130), the gambler's fallacy bias (standardised regression coefficient = 0.104), the overconfidence bias (standardised regression coefficient = -0.095), the anchoring bias (standardised regression coefficient = 0.082) and the representativeness bias (standardised regression coefficient = 0.069), respectively.

Concerning the exogenous factors, which comprise factors pertaining to the external environment, it can be inferred from Figure 5-4 that GDP (standardised regression coefficient = -0.448) contributed the greatest degree towards explaining average risk tolerance behaviour, followed by political-legal factors (standardised regression coefficient = 0.304), exchange rate volatility (standardised regression coefficient = 0.119) and interest rates (standardised regression coefficient = -0.101), respectively.

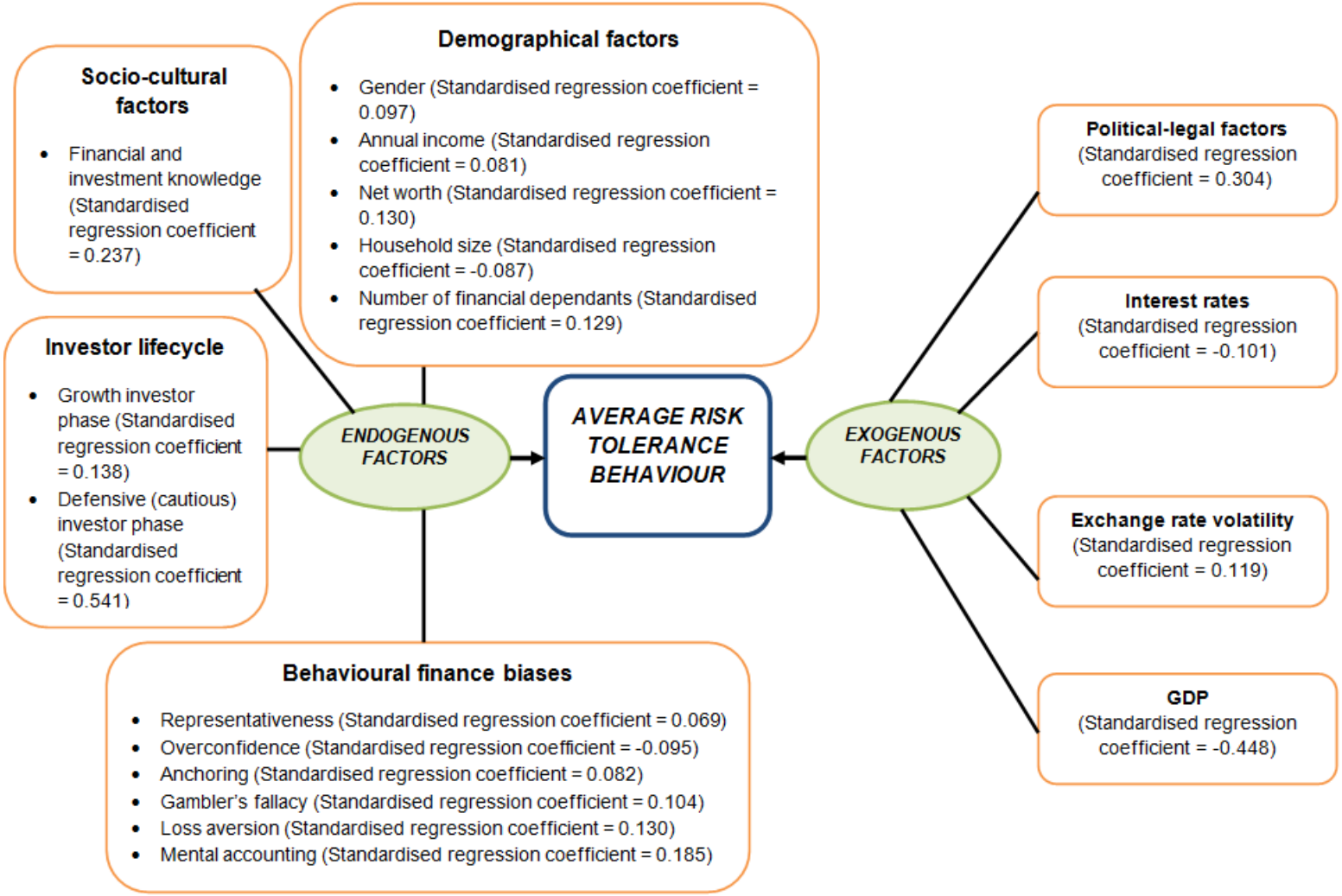

Figure 5-4: Proposed model to profile average risk tolerance behaviour based on endogenous and exogenous factors
Source: Author compilation

Taking into account the low risk tolerance behaviour category, Table 5-55 demonstrates that demographical factors, namely age (standardised regression coefficient = 0.110) and net worth (standardised regression coefficient = -0.134) contributed significantly towards explaining low risk tolerance behaviour at the $p < 0.05$ level. However, the remaining demographical factors, namely gender, education, annual income, household size and the number of financial dependants, did not significantly contribute towards explaining low risk tolerance behaviour ($p > 0.10$). The socio-cultural factor, namely financial and investment knowledge (standardised regression coefficient = -0.165) contributed significantly towards explaining low risk tolerance behaviour at the $p < 0.001$ level. Regarding the investor life cycle, the growth investor phase (standardised regression coefficient = 0.138) contributed significantly towards explaining low risk tolerance behaviour at the $p < 0.05$ level. On the contrary, the defensive (cautious) investor phase did not significantly contribute towards explaining low risk tolerance behaviour ($p > 0.10$).

Relating to the behavioural finance biases, it can be seen from Table 5-55 that the representativeness bias (standardised regression coefficient = 0.185), the anchoring bias (standardised regression coefficient = 0.304) and the loss aversion bias (standardised regression coefficient = -0.243) contributed significantly towards explaining low risk tolerance behaviour at the $p < 0.001$ level. The overconfidence bias (standardised regression coefficient = 0.117), the availability bias (standardised regression coefficient = 0.127) and the mental accounting bias (standardised regression coefficient = 0.146) contributed significantly towards explaining low risk tolerance behaviour at the $p < 0.05$ level. However, the gambler's fallacy bias, the regret aversion bias and the self-control bias did not significantly contribute towards explaining low risk tolerance behaviour ($p > 0.10$).

With reference to the factors pertaining to the external environment, Table 5-55 illustrates that international events (standardised regression coefficient = -0.468), as well as market fluctuations and volatility (standardised regression coefficient = 0.470), contributed significantly towards explaining low risk tolerance behaviour at the $p < 0.001$ level. Also, inflation (standardised regression coefficient = -0.206) and GDP (standardised regression coefficient = 0.309) contributed significantly towards explaining low risk tolerance behaviour at the $p < 0.05$ level. On the other hand, political-legal factors, technological factors, tax implications, interest rates and exchange rate volatility did not significantly contribute towards explaining low risk tolerance behaviour ($p > 0.10$).

These results led to the following proposed model to profile low risk tolerance behaviour based on the endogenous and exogenous factors that contributed significantly towards explaining low risk tolerance behaviour, which is depicted in Figure 5-5. Concerning the endogenous factors, it can be inferred from Figure 5-5 that the demographical factor, namely net worth (standardised regression coefficient = -0.134) contributed the greatest degree towards explaining low risk tolerance

behaviour, while age (standardised regression coefficient = 0.110) contributed to a lesser degree towards explaining low risk tolerance behaviour. The socio-cultural factor, namely financial and investment knowledge (standardised regression coefficient = -0.165) was the only pre-identified socio-cultural factor that contributed significantly towards explaining low risk tolerance behaviour and explained low risk tolerance behaviour to a rather small degree.

Considering the investor life cycle as an endogenous factor, only the growth investor phase (standardised regression coefficient = 0.138) contributed significantly towards explaining low risk tolerance behaviour and explained low risk tolerance behaviour to a rather small degree. Regarding the behavioural finance biases as endogenous factors, the anchoring bias (standardised regression coefficient = 0.304) contributed the greatest degree towards explaining low risk tolerance behaviour, followed by the loss aversion bias (standardised regression coefficient = -0.243), the representativeness bias (standardised regression coefficient = 0.185), the mental accounting bias (standardised regression coefficient = 0.146), the availability bias (standardised regression coefficient = 0.127) and the overconfidence bias (standardised regression coefficient = 0.117), respectively.

Concerning the exogenous factors, which comprise factors pertaining to the external environment, it can be inferred from Figure 5-5 that market fluctuations and volatility (standardised regression coefficient = 0.470) contributed the greatest degree towards explaining low risk tolerance behaviour, followed by international events (standardised regression coefficient = -0.468), GDP (standardised regression coefficient = 0.309) and inflation (standardised regression coefficient = -0.206), respectively.

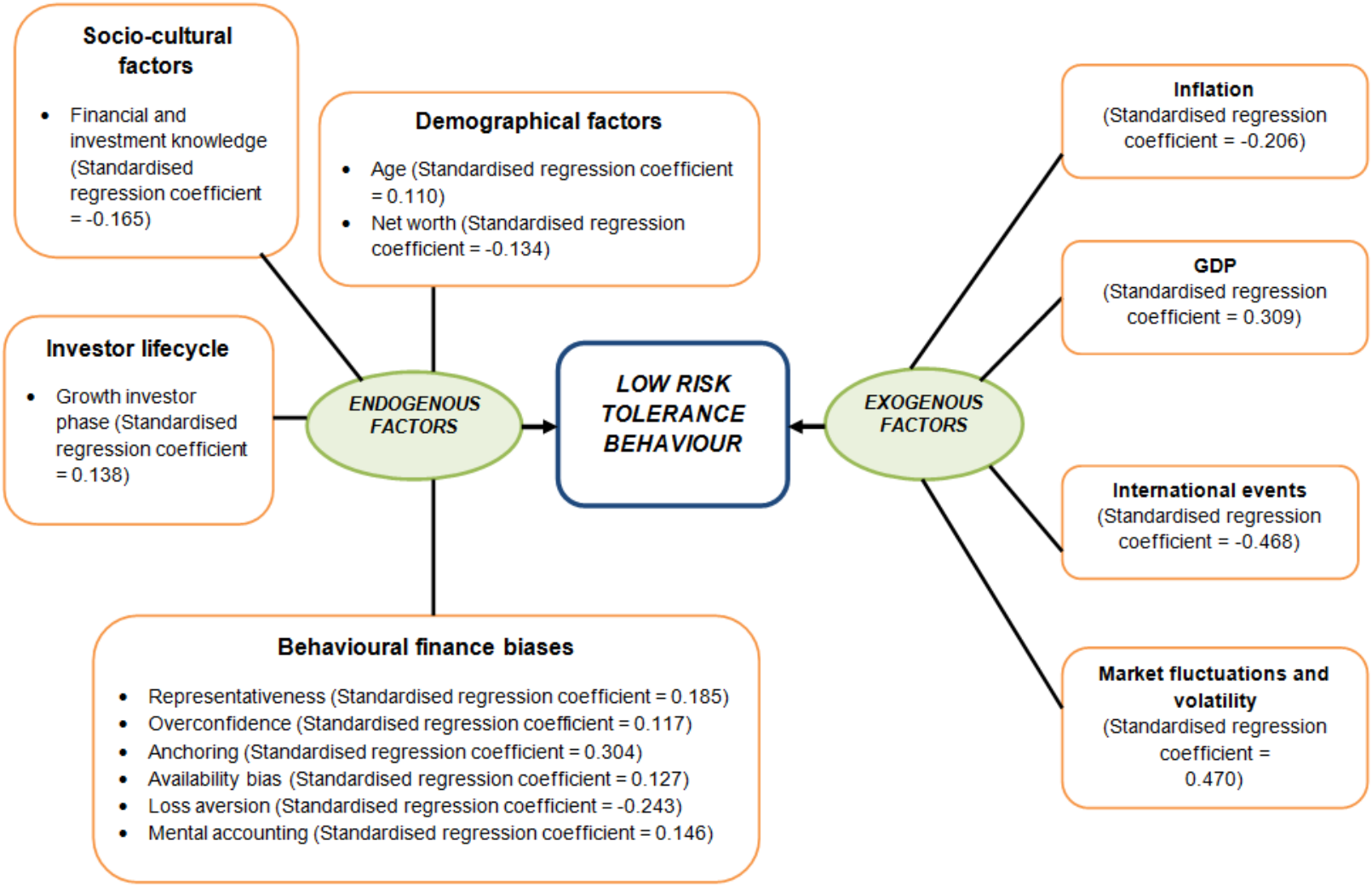

Figure 5-5: Proposed model to profile low risk tolerance behaviour based on endogenous and exogenous factors
Source: Author compilation

5.7.3 Forecasting model conclusions and recommendations

Once the validity of the structural model has been assessed and found to be satisfactory, the final step in executing SEM entails drawing noteworthy conclusions and providing recommendations on the specified structured model for future research (Malhotra *et al.,* 2012:812; Kline, 2016:120). Table 5-56 provides an overall summary of the pre-identified endogenous factors and exogenous factors that contributed towards explaining individual investor risk tolerance behaviour and the degree to which each of these factors explains risk tolerance behaviour.

Table 5-56: Summary of SEM

	Constructs	Summary
Risk tolerance behaviour	**Endogenous factors**	
	Demographical factors	
	Age	Age contributed significantly towards explaining low risk tolerance behaviour to a rather small degree.
	Gender	Gender contributed significantly towards explaining high and average risk tolerance behaviour to a rather small degree.
	Education	Education did not significantly contribute towards explaining risk tolerance behaviour.
	Annual income	Annual income contributed significantly towards explaining high and average risk tolerance behaviour to a small degree.
	Net worth	Net worth contributed significantly towards explaining high, average and low risk tolerance behaviour to a rather small degree.
	Household size	Household size contributed significantly towards explaining average risk tolerance behaviour to a small degree.
	Number of financial dependants	Number of financial dependants contributed significantly towards explaining average risk tolerance behaviour to a rather small degree.
	Socio-cultural factors	
	Financial and investment knowledge	Financial and investment knowledge contributed significantly towards explaining average risk tolerance behaviour to a rather moderate degree and low risk tolerance behaviour to a rather small degree.
	Investor life cycle	
	Growth investor phase	The growth investor phase contributed significantly towards explaining high, average and low risk tolerance behaviour to a rather small degree.
	Defensive (cautious) investor phase	The defensive (cautious) investor phase contributed significantly towards explaining high risk tolerance behaviour to a rather small degree and average risk tolerance behaviour to a large degree.
	Behavioural finance biases	
	Representativeness	The representativeness bias contributed significantly towards explaining average risk tolerance behaviour to a small degree and low risk tolerance behaviour to a rather small degree.

	Overconfidence	The overconfidence bias contributed significantly towards explaining high, average and low risk tolerance behaviour to a rather small degree.
	Anchoring	The anchoring bias contributed significantly towards explaining high risk tolerance behaviour to a rather small degree, average risk tolerance behaviour to a small degree and low risk tolerance behaviour to a moderate degree.
	Gambler's fallacy	The gambler's fallacy bias contributed significantly towards explaining high and average risk tolerance behaviour to a rather small degree.
	Availability bias	The availability bias contributed significantly towards explaining high and low risk tolerance behaviour to a rather small degree.
	Loss aversion	The loss aversion bias contributed significantly towards explaining average risk tolerance behaviour to a rather small degree and low risk tolerance behaviour to a rather moderate degree.
	Regret aversion	The regret aversion bias contributed significantly towards explaining high risk tolerance behaviour to a rather small degree.
	Mental accounting	The mental accounting bias contributed significantly towards explaining average and low risk tolerance behaviour to a rather small degree.
	Self-control	The self-control bias contributed significantly towards explaining high risk tolerance behaviour to a small degree.
	Exogenous factors	
	Factors pertaining to the external environment	
	Political-legal factors	Political-legal factors contributed significantly towards explaining average risk tolerance behaviour to a moderate degree.
	Technological factors	Technological factors contributed significantly towards explaining high risk tolerance behaviour to a rather moderate degree.
	Tax implications	Tax implications contributed significantly towards explaining high risk tolerance behaviour to a rather small degree.
	Interest rates	Interest rates contributed significantly towards explaining average risk tolerance behaviour to a rather small degree.
	Exchange rate volatility	Exchange rate volatility contributed significantly towards explaining high and average risk tolerance behaviour to a rather small degree.
	Inflation	Inflation contributed significantly towards explaining high risk tolerance behaviour to a rather small degree and low risk tolerance behaviour to a rather moderate degree.
	GDP	GDP contributed significantly towards explaining high risk tolerance behaviour to a large degree and average and low risk tolerance behaviour to a moderate degree.
	International events	International events contributed significantly towards explaining low risk tolerance behaviour to a moderate degree.
	Market fluctuations and volatility	Market fluctuations and volatility contributed significantly towards explaining high risk tolerance behaviour to a rather moderate degree and low risk tolerance behaviour to a moderate degree.

Source: Author compilation

Considering the endogenous factors, it can be concluded from Table 5-56 that demographical factors, namely age, gender, annual income, net worth, household size and the number of financial dependants explain risk tolerance behaviour to a small degree and to a relatively small degree. However, only the demographical factor, namely education, did not significantly contribute towards explaining risk tolerance behaviour. The socio-cultural factor, namely financial and investment knowledge, explains risk tolerance behaviour to a rather small degree and to a rather moderate degree. The growth investor phase of the life cycle explains risk tolerance behaviour to a rather small degree, while the defensive (cautious) investor phase of the life cycle explains risk tolerance behaviour to a rather small degree and to a large degree. The behavioural finance biases, namely the representativeness bias, the overconfidence bias, the gambler's fallacy bias, the availability bias, the regret aversion bias, the mental accounting bias and the self-control bias explain risk tolerance behaviour to a small degree and to a relatively small degree. However, the anchoring bias explains risk tolerance behaviour to a small, relatively small and moderate degree, whereas the loss aversion bias explains risk tolerance behaviour to a relatively small degree and to a relatively moderate degree.

Considering the exogenous factors, it can be concluded from Table 5-56 that the factors pertaining to the external environment, namely tax implications, interest rates and exchange rate volatility explain risk tolerance behaviour to a rather small degree. Furthermore, political-legal factors, technological factors, international events and market fluctuations and volatility explain risk tolerance behaviour to a rather moderate degree and to a moderate degree. Moreover, inflation explains risk tolerance behaviour to a rather small degree and to a rather moderate degree, while GDP explains risk tolerance behaviour to a moderate degree and to a large degree.

Overall, as illustrated in Figure 5-3 to Figure 5-5 and summarised in Table 5-56, the endogenous and exogenous factors that contributed significantly towards explaining risk tolerance behaviour, as well as the degree to which each of these factors explains risk tolerance behaviour, ought to be considered by individual investors, financial planners, investment companies and researchers not only within South Africa, but also internationally. In particular, the endogenous and exogenous factors that contributed a relatively great degree towards explaining risk tolerance behaviour should be considered by investment companies to guide them and assist with the improvement of existing and conventional risk assessment forms to profile the risk tolerance behaviour of individual investors more accurately. The SEM conducted in this research study make a notable contribution to the field of study, seeing that no other researcher has developed a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors to improve existing and conventional risk assessment forms and accordingly, to profile the risk tolerance behaviour of

individual investors more accurately to ensure the successful implementation of investment strategies.

5.8 SYNOPSIS

A comprehensive discussion on the empirical results and findings of the research study were presented in this chapter. The analysis and interpretation of the empirical results were conferred in such a manner to ensure that all the empirical objectives, as well as the primary objective, of the research study were achieved. Section 5.2 attended to the preliminary data analysis, which provided a summary of the data gathering process and the coding of data. Section 5.3 presented the demographical and socio-cultural characteristics of the final sample in the research study.

Section 5.4 attended to the factor analysis, namely EFA and CFA, applied to ensure reliability and validity of the scales. EFA was applied on Section B (self-report on investor life cycle) and Section C (self-report on risk tolerance behaviour) of the questionnaire, while EFA and CFA were applied on Section E (the external environment) of the questionnaire. Regarding Section B of the questionnaire, the self-report on investor life cycle, two factors, labelled as the growth investor phase and the defensive (cautious) investor phase, were extracted to classify individual investors into one of the two newly developed phases of the investor life cycle. Regarding Section C of the questionnaire, the self-report on risk tolerance behaviour, three factors, labelled as high risk, average risk and low risk, were extracted to report on the risk tolerance behaviour of individual investors in the sample. Regarding Section E of the questionnaire, the six sections relating to events occurring in the external environment, namely political-legal, technological, tax implications, macroeconomic factors (interest rates, exchange rates, inflation and GDP), international stock market and economic events, as well as reactions to market fluctuations and volatility, each resulted in single factors. CFA was also performed on Section E of the questionnaire to establish if the specified model is a good fit for the data and to test the particular hypotheses relating to the structure underlying the set of variables. It was concluded from the evaluation of the measurement model that the specified model for Section E of the questionnaire relating to events occurring in the external environment is a good fit for the data. Besides, all the newly developed scales in relation to the various sections of the questionnaire were considered valid and also deemed reliable as the internal consistency reliability of the scales produced satisfactory results.

The descriptive statistics, namely frequencies and percentages, as well as measures of central tendency and dispersion, applied in the research study to achieve the relevant empirical objectives were reported on in Section 5.5. On the other hand, the inferential statistics, namely t-tests, ANOVA and correlation analysis, applied in the research study to achieve the relevant empirical objectives were reported on in Section 5.6. Lastly, the SEM performed to achieve the last empirical

objective, and ultimately, the primary objective of the research study, were presented and discussed in Section 5.7. Thus, SEM was performed to construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors. The validity and reliability of the SEM were assessed and accordingly, deemed valid and reliable as it produced satisfactory results. Also, only the demographical factor, namely education, as an endogenous factor did not significantly contribute towards explaining risk tolerance behaviour. However, all the other pre-identified endogenous factors and exogenous factors significantly contributed towards explaining risk tolerance behaviour. The SEM conducted in this research study make a notable contribution to the field of study, seeing that no other researcher has developed a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors.

In conclusion, all the empirical objectives, as well as the primary objective, were successfully achieved in this chapter by means of the various statistical techniques applied in the research study. In view of this, Chapter 6 presents the final conclusion of the research study with a summary on the achievement of the primary, theoretical and empirical objectives. Chapter 6 further presents a comprehensive overview of the contribution of the research study to the field of research. Thus, the limitations of the research study are also highlighted to make recommendations and contribute towards possibilities for future research endeavours.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

Chapter 6 provides a final synopsis of the research study, whereby a summary of the research study regarding the achievement of the primary, theoretical and empirical objectives are presented in Section 6.2. The main findings of the empirical objectives are summarised in Section 6.3 to illuminate the general conclusions drawn and the main contributions of the research study in Section 6.4. Finally, the limitations and implications of the research study are also highlighted to make recommendations and contribute towards possibilities for future research endeavours in Section 6.5.

6.2 SUMMARY OF THE RESEARCH STUDY

As stipulated in Chapter 1, individual investors anticipate that investment companies should construct, measure and evaluate strategies that will assist them to make successful investment decisions. Financial planners are operating in an environment where it is prudent and legally required to be acquainted with the financial, attitudinal and emotional circumstances of their clients before providing recommendations regarding investment decisions. Risk assessment forms, which are constructed on the basis of institutional intellect regarding rational investor behaviour, are utilised by financial planners to measure the risk tolerance of individual investors. However, a lack of regulatory guidance on risk profiling in the financial industry resulted in a diverse approach to risk profiling evaluations. Consequently, existing and conventional risk assessment forms used by practitioners in the financial industry have shortcomings, seeing that it is not comprehensive enough to consider all the factors that may affect the risk tolerance behaviour of individual investors when making investment decisions. Thus, existing risk assessment forms can be improved through the recommendation of a framework that makes provision for client-specific questions by considering pre-identified endogenous and exogenous factors that influence risk tolerance behaviour. As a result, the primary objective of this research study was to construct a model that will assist in profiling investor risk tolerance behaviour based on endogenous and exogenous factors.

Chapter 1 presented an introduction and background to the research study, whereby the problem statement, motivation and aim of the research study were also discussed. The primary, theoretical and empirical objectives of the research study were formulated and stipulated to fulfil the purpose of the research study. A brief overview of the research design

and methodology, contribution, ethical considerations and classification of chapters of the research study were also provided. In order to facilitate the achievement of the primary objective, the following theoretical objectives were formulated and stipulated in Chapter 1:

- Provide an in-depth theoretical analysis of risk tolerance and risk behaviour.
- Contextualise a theoretical framework pertaining to individual investment decision-making.
- Examine the theoretical theories and previous studies relating to the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions.

The above-mentioned theoretical objectives were attended to and attained in Chapter 2 and Chapter 3. Chapter 2 presented a thorough analysis of the theory of risk tolerance and risk behaviour by defining and elucidating risk tolerance and risk behaviour. Accordingly, the theoretical objective to provide an in-depth analysis of risk tolerance and risk behaviour was achieved in this chapter. This chapter also introduced the theoretical objective to examine the theoretical theories and previous studies relating to the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions. A summary of previous research conducted on risk tolerance was provided, which was followed by the examination of the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors. The endogenous factors, namely demographical and socio-cultural factors, were comprehensively discussed in Chapter 2. However, the theoretical aspects of the investor life cycle and behavioural finance biases, as endogenous factors influencing risk tolerance behaviour when making investment decisions, were attended to in Chapter 3. Lastly, the exogenous factors relating to the external environment, namely political-legal, technological, tax implications, macroeconomic factors, international stock market and economic events, as well as reactions to market fluctuations and volatility, were discussed comprehensively in Chapter 2. The first section of the theoretical framework of the research study was encompassed in this chapter.

Chapter 3 provided an overview of the important investment decisions that should be made by individuals when investing. Hence, the theoretical objective to contextualise a theoretical framework pertaining to individual investment decision-making was achieved in this chapter. Furthermore, the theoretical objective to examine the theoretical theories relating to the endogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions was finalised in this chapter. Given that the endogenous factors, namely demographical and socio-cultural factors, were discussed in Chapter 2, the

theoretical aspects of the investor life cycle and behavioural finance biases, as endogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions, were discussed comprehensively in Chapter 3. This chapter elucidated the individual investor life cycle theory, investment objectives and constraints, as well as the risk profiling categories of individual investors. A summary of the traditional and non-traditional asset classes was also provided. This chapter further elaborated on the role of behavioural finance in individual investment decision-making. This chapter encompassed the final section of the theoretical framework of the research study.

Chapter 4 provided an outline of the quantitative research process applied in the research study with comprehensive discussions about the research design, research approach, sampling procedure, measuring instrument and data collection method, the data collection procedure and the statistical analysis of the quantitative data. This research study entailed a descriptive research design, whereby a positivist research paradigm was employed and a quantitative research approach was followed. A non-probability purposive sampling method was used to filter the individual investors from the investment company, who meet the inclusion criteria of 18 years and older, a current investor with some form of a formal investment product with the investment company and lives in Gauteng, to obtain the representative sample. The sample size of 463 individual investors was considered adequate for the analysis of the quantitative data, as it sufficiently met all the requirements for the statistical analysis employed to facilitate the investigation of the underlying phenomena and attainment of the empirical objectives. The primary quantitative data were collected through a self-administered questionnaire and validated scales were utilised.

Chapter 5 presented comprehensive discussions on the empirical results and findings of the research study. The analysis and interpretation of the empirical results were conferred in such a manner to ensure that all the empirical objectives as well as the primary objective of the research study were achieved. Thus, the main findings of the research study in accordance with the empirical objectives as stipulated in Chapter 1 are summarised in the following section (Section 6.3).

6.3 MAIN FINDINGS OF THE RESEARCH STUDY

In order to facilitate the achievement of the primary objective, to construct a model that will assist to profile investor risk tolerance behaviour based on endogenous and exogenous factors, the following empirical objectives were formulated in Chapter 1 and attained in Chapter 5. The attainment of the empirical objectives contributed to the achievement of the primary objective and successful findings of the research study.

6.3.1 Empirical objective 1: Report on the risk tolerance behaviour of individual investors in the sample

The first empirical objective of the research study, report on the risk tolerance behaviour of individual investors in the sample, was attained in Chapter 5 (Section 5.4.2 and 5.5.2). EFA was performed in Section 5.4.2 to identify the financial risk events that influence the risk tolerance behaviour of individual investors. This factored the most significant financial risk events according to three risk tolerance behaviour categories, namely high risk, average risk and low risk, to report on the risk tolerance behaviour of individual investors in the sample. The three extracted factors had satisfactory internal consistency reliability and were deemed appropriate and best fit to explain the newly developed self-report on risk tolerance behaviour scale and to report on the risk tolerance behaviour of individual investors in the sample. It was established from the descriptive statistics employed in Section 5.5.2 that the majority of individual investors have a propensity to take average risks when making investment decisions. This was followed by individual investors who have a propensity to take low risks when making investment decisions. However, the minority of individual investors have a propensity to take high risks when making investment decisions.

6.3.2 Empirical objective 2: Determine individual investors' phase in the investor life cycle

The second empirical objective, determine individual investors' phase in the investor life cycle, was attained in Chapter 5 (Section 5.4.1, Section 5.5.1 and Section 5.6.1). EFA was performed in Section 5.4.1 to identify the most significant statements that contribute to individual investors being classified into one of the phases of the investor life cycle. This factored the most significant statements that contributed to individual investors being classified into one of the newly established phases of the investor life cycle, namely the growth investor phase or defensive (cautious) investor phase. The two extracted factors had satisfactory internal consistency reliability and were appropriate and best fit to explain the newly developed self-report on investor life cycle scale and to classify individual investors into one of the two phases of the investor life cycle. It was established from the descriptive statistics applied in Section 5.5.1 that the majority of individual investors classified themselves to be in the defensive (cautious) investor phase of the life cycle rather than in the growth investor phase of the life cycle.

Non-parametric Spearman's correlation was also applied in Section 5.6.1 to determine the strength and direction of the relationship between individual investors' phase in the investor

life cycle, their age, and their net worth. Regarding the growth investor phase of the life cycle, a strong, negative statistically significant relationship was established between the growth investor phase of the life cycle and age, while a small, negative statistically significant relationship was established between the growth investor phase of the life cycle and net worth. Given that there is a negative relationship between the growth investor phase of the life cycle with age and net worth, it can be concluded that younger individual investors with a smaller net worth are classified into the growth investor phase of the life cycle. Regarding the defensive (cautious) investor phase of the life cycle, a small, positive statistically significant relationship was established between the defensive (cautious) investor phase of the life cycle and age, while a medium, positive statistically significant relationship was established between the defensive (cautious) investor phase of the life cycle and net worth. Given that there is a positive relationship between the defensive (cautious) investor phase of the life cycle with age and net worth, it can be inferred that older individual investors with a greater net worth are classified into the defensive (cautious) investor phase of the life cycle. These above-mentioned findings correspond with the investor life cycle theory as discussed in Chapter 3 (Section 3.2).

6.3.3 Empirical objective 3: Identify the behavioural finance biases that drive individual investment decisions

The third empirical objective, identify the behavioural finance biases that drive individual investment decisions, was attained in Chapter 5 (Section 5.5.3 and Section 5.6.2). Descriptive statistics, namely frequencies and percentages, as well as measures of central tendency and dispersion, were employed in Section 5.5.3 to identify the behavioural finance biases that drive individual investment decisions. It was established from the descriptive statistics employed that most individual investors specified that they somewhat agree that their investment decisions are driven by a particular behavioural finance bias. However, the contrary was true for the anchoring bias, as most individual investors specified that they disagree that their investment decisions are driven by this behavioural finance bias. Thus, it can be inferred that the investment decisions of individual investors are driven to a rather great extent by the behavioural finance biases. It was also established that the investment decisions of individual investors are driven to the greatest extent by the self-control bias. This was followed by the availability bias, the representativeness bias, the mental accounting bias, the gambler's fallacy bias, the loss aversion bias, the overconfidence bias and the regret aversion bias. However, the investment decisions of individual investors are to the smallest extent driven by the anchoring bias.

Non-parametric Spearman's correlation was also applied in Section 5.6.2 to determine the strength and direction of the relationship between the behavioural finance biases and the investor life cycle. Regarding the relationship between the behavioural finance biases and the growth investor phase of the life cycle, small, positive statistically significant relationships were established between the growth investor phase of the life cycle and behavioural finance biases, namely the representativeness bias and the overconfidence bias. On the other hand, no statistically significant relationships were established between the growth investor phase of the life cycle and the subsequent behavioural finance biases, namely the anchoring bias, the gambler's fallacy bias, the availability bias, the loss aversion bias, the regret aversion bias, the mental accounting bias and the self-control bias.

Regarding the relationship between the behavioural finance biases and the defensive (cautious) investor phase of the life cycle, small, positive statistically significant relationships were established between the defensive (cautious) investor phase of the life cycle and behavioural finance biases, namely the representativeness bias, the gambler's fallacy bias, the availability bias, the loss aversion bias, the mental accounting bias and the self-control bias. A medium strength, positive statistically significant relationship was established between the defensive (cautious) investor phase of the life cycle and the overconfidence bias. On the other hand, no statistically significant relationships were established between the defensive (cautious) investor phase of the life cycle and behavioural finance biases, namely the anchoring bias and the regret aversion bias.

To summarise, it can be inferred that the investment decisions of individual investors in the growth investor phase of the life cycle are only driven by the representativeness bias and the overconfidence bias when making investment decisions. On the other hand, the investment decisions of individual investors in the defensive (cautious) investor phase of the life cycle are driven by the representativeness bias, the overconfidence bias, the gambler's fallacy bias, the availability bias, the loss aversion bias, the mental accounting bias and the self-control bias when making investment decisions.

6.3.4 Empirical objective 4: Identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour

The fourth empirical objective, identify and analyse the effect of endogenous factors on individual investor risk tolerance behaviour, was attained in Chapter 5 (Section 5.6.3). The influence of endogenous factors, namely demographical factors, socio-cultural factors, the investor life cycle and behavioural finance biases, on individual investor risk tolerance

behaviour were identified and analysed by employing t-tests, ANOVA and correlation analysis. The main findings are summarised in the following subsections (Section 6.3.4.1–Section 6.3.4.4).

6.3.4.1 The effect of demographical factors on individual investor risk tolerance behaviour

Descriptive statistics, namely frequencies and percentages, were applied in Section 5.3 to describe the demographical information of the participants in the research study. In order to identify and analyse the effect of demographical factors, namely age, gender, ethnicity, marital status, education, employment status, annual income, income variability, net worth, homeownership, household size and number of financial dependants on individual investor risk tolerance behaviour, t-tests, ANOVA and correlation analysis were utilised in Section 5.6.3.1. An independent-samples t-test was conducted to identify and analyse the effect of gender on individual investor risk tolerance behaviour, while one-way ANOVA was conducted to identify and analyse the effect of ethnicity, marital status, employment status, annual income and homeownership on individual investor risk tolerance behaviour.

Regarding the effect of gender on individual investor risk tolerance behaviour, statistically significant differences were established between gender and high risk tolerance behaviour, average risk tolerance behaviour and low risk tolerance behaviour. As a result, the effect of gender on individual investor risk tolerance behaviour was found to be statistically significant, with small to medium effect sizes. It was further established that males have greater propensities to take high and average risks than females, whereas females have greater propensities to take low risks than males. These findings correspond to the main postulation and mainstream of previous research studies that found males to have greater risk-taking propensities than females.

Regarding the effect of ethnicity on individual investor risk tolerance behaviour, a statistically significant difference was established between ethnicity and high risk tolerance behaviour. Accordingly, the effect of ethnicity on high risk tolerance behaviour was found to be statistically significant, with small to large effect sizes. African individual investors also have greater propensities to take high risks than Asian, Coloured and White individual investors, respectively. This finding is in contrast to the main postulation and mainstream of previous research studies that found White individual investors to have greater risk-taking propensities than non-White individual investors. However, no statistically significant differences were established between ethnicity and average risk tolerance behaviour, as well as between ethnicity and low risk tolerance behaviour.

Regarding the effect of marital status on individual investor risk tolerance behaviour, a statistically significant difference was established between marital status and average risk tolerance behaviour. Even tough the effect of marital status on average risk tolerance behaviour was found to be statistically significant, the effect sizes were small. In contrast to the main postulation and mainstream of previous research studies, it was also established that individual investors who are married have greater propensities to take average risks than divorced individual investors, individual investors who have common-law spouses, widowed individual investors and single individual investors, respectively. However, no statistically significant differences were found between marital status and high risk tolerance behaviour, as well as between marital status and low risk tolerance behaviour.

Regarding the effect of employment status on individual investor risk tolerance behaviour, a statistically significant difference was established between employment status and high risk tolerance behaviour. Thus, the effect of employment status on high risk tolerance behaviour was found to be statistically significant, with small to large effect sizes. Furthermore, unemployed individuals who are looking for work have greater propensities to take high risks than self-employed individuals, salaried employed individuals, unemployed individuals who are not looking for work, individuals with other employment statuses and retired individuals, respectively. This finding is in contrast to the main postulation and previous research studies that found employed individuals to have greater risk-taking propensities than unemployed individuals. However, no statistically significant differences were found between employment status and average risk tolerance behaviour, and between employment status and low risk tolerance behaviour.

Regarding the effect of annual income on individual investor risk tolerance behaviour, statistically significant differences were established between annual income and high risk tolerance behaviour, average risk tolerance behaviour and low risk tolerance behaviour. Accordingly, the effect of annual income on individual investor risk tolerance behaviour was found to be statistically significant, with small to large effect sizes. Corresponding to the main postulation and mainstream of previous research studies, it was established that individuals with higher income levels have greater propensities to take high and average risks than individuals with lower income levels. Conversely, individuals with lower income levels have greater propensities to take low risks than individuals with higher income levels.

Regarding the effect of homeownership on individual investor risk tolerance behaviour, a statistically significant difference was established between homeownership and average risk tolerance behaviour. As a result, the effect of homeownership on average risk tolerance

behaviour was found to be statistically significant, with small to medium effect sizes. It was also established that homeowners without mortgages have greater propensities to take average risks than homeowners with mortgages, individuals renting homes and individuals living with relatives, respectively. Even though homeownership is a less studied factor, this finding is similar to previous research studies that found homeowners to have greater risk-taking propensities than non-homeowners. However, no statistically significant differences were established between homeownership and high risk tolerance behaviour, as well as between homeownership and low risk tolerance behaviour.

Non-parametric Spearman's correlation was also applied to identify and analyse the effect of demographical factors, namely age, education, income variability, net worth, household size and number of financial dependants on individual investor risk tolerance behaviour. Regarding the effect of age on individual investor risk tolerance behaviour, a small, negative statistically significant relationship was established between age and high risk tolerance behaviour, indicating that the propensities of individual investors to take high risks decrease with age. Therefore, younger individual investors have greater propensities to take high risks than older individual investors. A small, positive statistically significant relationship was also established between age and average risk tolerance behaviour, indicating that the propensities of individual investors to take average risks increase with age. Thus, older individual investors have greater propensities to take average risks than younger individual investors. These findings correspond to the main postulation and mainstream of previous research studies that found the risk-taking propensities of individual investors to decrease with age and accordingly, that younger individual investors have greater risk-taking propensities than older individual investors. However, no statistically significant relationship was established between age and low risk tolerance behaviour.

Regarding the effect of education on individual investor risk tolerance behaviour, a medium, positive statistically significant relationship was established between education and average risk tolerance behaviour, indicating that the propensities of individual investors to take average risks increase with higher educational levels. For that reason, individual investors with higher educational levels have greater propensities to take average risks than individual investors with lower educational levels. Also, a small, negative statistically significant relationship was established between education and low risk tolerance behaviour, indicating that the propensities of individual investors to take low risks decline with higher educational levels. As a result, individual investors with lower educational levels have greater propensities to take low risks than individual investors with higher educational levels. These findings are similar to the main postulation and mainstream of previous research studies that

found individual investors with higher educational levels to have greater risk-taking propensities than individual investors with lower educational levels. However, no statistically significant relationship was established between education and high risk tolerance behaviour.

Regarding the effect of income variability on individual investor risk tolerance behaviour, no statistically significant relationships were established between income variability and the risk tolerance behaviour categories, namely high risk, average risk and low risk. Thus, it can be inferred that income variability did not have a statistically significant effect on individual investor risk tolerance behaviour.

Regarding the effect of net worth on individual investor risk tolerance behaviour, a medium, positive statistically significant relationship was established between net worth and average risk tolerance behaviour, indicating that the propensities of individual investors to take average risks increase when there is an increase in net worth. Accordingly, individual investors with a higher net worth have greater propensities to take average risks than individual investors with a lower net worth. A small, negative statistically significant relationship was established between net worth and low risk tolerance behaviour, indicating that the propensities of individual investors to take low risks decline when there is an increase in net worth. Consequently, individual investors with a lower net worth have greater propensities to take low risks than individual investors with a higher net worth. These findings are supported by the mainstream of previous research studies that found individual investors with a higher net worth to have greater risk-taking propensities than individual investors with a lower net worth. However, no statistically significant relationship was established between net worth and high risk tolerance behaviour.

Regarding the effect of household size on individual investor risk tolerance behaviour, a small, positive statistically significant relationship was established between household size and high risk tolerance behaviour, indicating that the propensities of individual investors to take high risks increase when household size increases. Hence, individual investors with larger households have greater propensities to take high risks than individual investors with smaller households, which is contrary to the main postulation and previous research studies. However, no statistically significant relationships were established between household size and average risk tolerance behaviour, and between household size and low risk tolerance behaviour.

Regarding the effect of the number of financial dependants on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established

between the number of financial dependants and high risk tolerance behaviour, as well as between the number of financial dependants and average risk tolerance behaviour. This signifies that the propensities of individual investors to take high and average risks increase as the number of financial dependants increases. Thus, individual investors with more financial dependants have greater propensities to take high and average risks than individual investors with less or no financial dependants, which is contrary to the main postulation and previous research studies. However, no statistically significant relationship was established between the number of financial dependants and low risk tolerance behaviour.

To summarise, it can be inferred that all the demographical factors, except for income variability, had significant effects on individual investor risk tolerance behaviour.

6.3.4.2 The effect of socio-cultural factors on individual investor risk tolerance behaviour

Descriptive statistics, namely frequencies and percentages, were applied in Section 5.3 to describe the socio-cultural information of the participants in the research study. In order to identify and analyse the effect of socio-cultural factors, namely religion, financial and investment knowledge, as well as health status on individual investor risk tolerance behaviour, ANOVA and correlation analysis were employed in Section 5.6.3.2. One-way ANOVA was conducted to identify and analyse the effect of religion on individual investor risk tolerance behaviour, while non-parametric Spearman's correlation was employed to identify and analyse the effect of financial and investment knowledge, as well as health status, on individual investor risk tolerance behaviour.

Regarding the effect of religion on individual investor risk tolerance behaviour, a statistically significant difference was established between religion and low risk tolerance behaviour. As a result, the effect of religion on low risk tolerance behaviour was found to be statistically significant, with small to large effect sizes. Similar to a few previous research studies conducted, it was also established that Hindus have greater propensities to take low risks than Muslims, Christians, Jews, individuals with no religion and individuals of other religion, respectively. However, no statistically significant differences were found between religion and high risk tolerance behaviour, and between religion and average risk tolerance behaviour.

Regarding the effect of financial and investment knowledge on individual investor risk tolerance behaviour, a small, positive statistically significant relationship was established between financial and investment knowledge and high risk tolerance behaviour, while a

medium, positive statistically significant relationship was established between financial and investment knowledge and average risk tolerance behaviour. This signifies that the propensities of individual investors to take high and average risks increase as financial and investment knowledge increases. A small, negative statistically significant relationship was also established between financial and investment knowledge and low risk tolerance behaviour, indicating that the propensities of individual investors to take low risks decrease as financial and investment knowledge increases. It can be inferred that individual investors with more financial and investment knowledge have greater propensities to take high and average risks, whereas individual investors with less financial and investment knowledge have greater propensities to take low risks. These findings correspond to the general postulation and mainstream of previous research studies that found individual investors with more financial and investment knowledge to have greater risk-taking propensities than individual investors with less financial and investment knowledge.

Regarding the effect of health status on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between health status and high risk tolerance behaviour, and between health status and average risk tolerance behaviour. This signifies that the propensities of individual investors to take high and average risks increase as health status increases. Corresponding to previous research studies, it was established that healthier individual investors have greater propensities to take high and average risks than less healthy individual investors. However, no statistically significant relationship was established between health status and low risk tolerance behaviour.

To summarise, it can be inferred that all the socio-cultural factors had significant effects on individual investor risk tolerance behaviour.

6.3.4.3 The effect of the investor life cycle on individual investor risk tolerance behaviour

In order to identify and analyse the effect of the investor life cycle on individual investor risk tolerance behaviour, non-parametric Spearman's correlation was applied in Section 5.6.3.3. Concerning the effect of the growth investor phase of the life cycle on individual investor risk tolerance behaviour, a medium, positive statistically significant relationship was established between the growth investor phase of the life cycle and high risk tolerance behaviour. Also, a small, positive statistically significant relationship was established between the growth investor phase of the life cycle and low risk tolerance behaviour. Accordingly, it can be inferred that individuals in the growth investor phase of the life cycle have propensities to take high and low risks. The propensities of individuals in the growth investor phase of the

life cycle to take high risks are in line with the investor life cycle theory, as these individuals have greater propensities to take higher risk than individuals in the defensive (cautious) investor phase of the life cycle. Conversely, the propensities of individuals in the growth investor phase of the life cycle to take low risks are in contrast with the investor life cycle theory, however, the strength of the relationship was small. On the other hand, no statistically significant relationship was established between the growth investor phase of the life cycle and average risk tolerance behaviour.

Concerning the effect of the defensive (cautious) investor phase of the life cycle on individual investor risk tolerance behaviour, a small, positive statistically significant relationship was established between the defensive (cautious) investor phase of the life cycle and high risk tolerance behaviour. A large, positive statistically significant relationship was also established between the defensive (cautious) investor phase of the life cycle and average risk tolerance behaviour. Therefore, it can be inferred that individuals in the defensive (cautious) investor phase of the life cycle have propensities to take high and average risks. The propensities of individuals in the defensive (cautious) investor phase of the life cycle to take high risks are in contrast with the investor life cycle theory, however, the strength of the relationship was small. Alternatively, the propensities of individuals in the defensive (cautious) investor phase of the life cycle to take average risks are more in line with the investor life cycle theory, as the propensities of individual investors to take high risks lessen as they pass through the various phases of the life cycle. However, no statistically significant relationship was established between the defensive (cautious) investor phase of the life cycle and low risk tolerance behaviour.

To summarise, it can be concluded that the investor life cycle had significant effects on individual investor risk tolerance behaviour.

6.3.4.4 The effect of the behavioural finance biases on individual investor risk tolerance behaviour

In order to identify and analyse the effect of the behavioural finance biases on individual investor risk tolerance behaviour, non-parametric Spearman's correlation was employed in Section 5.6.3.4. Concerning the effect of the representativeness bias on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between the representativeness bias and high risk tolerance behaviour, average risk tolerance behaviour and low risk tolerance behaviour. Therefore, it can be inferred that individual investors who are subject to the representativeness bias have a propensity to take

high, average and low risks. Previous research studies affirmed that individual investors who are subject to the representativeness bias have a propensity to take high and average risks.

Concerning the effect of the overconfidence bias on individual investor risk tolerance behaviour, medium, positive statistically significant relationships were established between the overconfidence bias and high risk tolerance behaviour, as well as between the overconfidence bias and average risk tolerance behaviour. It can be inferred that individual investors who are subject to the overconfidence bias have a propensity to take high and average risks, which is similar to the findings of previous research studies. However, no statistically significant relationship was established between the overconfidence bias and low risk tolerance behaviour. Concerning the effect of the anchoring bias on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between the anchoring bias and high risk tolerance behaviour, as well as between the anchoring bias and low risk tolerance behaviour. It can be inferred that individual investors who are subject to the anchoring bias have a propensity to take high and low risks. However, no statistically significant relationship was established between the anchoring bias and average risk tolerance behaviour. Previous research studies affirmed that individual investors who are subject to the anchoring bias have a propensity to take low risks.

Concerning the effect of the gambler's fallacy bias on individual investor risk tolerance behaviour, medium, positive statistically significant relationships were established between the gambler's fallacy bias and high risk tolerance behaviour, as well as between the gambler's fallacy bias and average risk tolerance behaviour. Also, a small, positive statistically significant relationship was established between the gambler's fallacy bias and low risk tolerance behaviour. Consequently, it can be inferred that individual investors who are subject to the gambler's fallacy bias have a propensity to take high, average and low risks. Previous research studies affirmed that individual investors who are subject to the gambler's fallacy bias have a propensity to take average risks. Concerning the effect of the availability bias on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between the availability bias and high risk tolerance behaviour, average risk tolerance behaviour and low risk tolerance behaviour. As a result, it can be inferred that individual investors who are subject to the availability bias have a propensity to take high, average and low risks. Previous research studies affirmed that individual investors who are subject to the availability bias have a propensity to take high and average risks.

Concerning the effect of the loss aversion bias on individual investor risk tolerance behaviour, a small, positive statistically significant relationship was established between the loss aversion bias and average risk tolerance behaviour. Therefore, it can be inferred that individual investors who are subject to the loss aversion bias have a propensity to take average risks. However, no statistically significant relationships were established between the loss aversion bias and high risk tolerance behaviour, as well as between the loss aversion bias and low risk tolerance behaviour. Previous research studies affirmed that individual investors who are subject to the loss aversion bias have a propensity to take low risks. Concerning the effect of the regret aversion bias on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between the regret aversion bias and high risk tolerance behaviour, average risk tolerance behaviour and low risk tolerance behaviour. Accordingly, it can be inferred that individual investors who are subject to the regret aversion bias have a propensity to take high, average and low risks. Previous research studies affirmed that individual investors who are subject to the regret aversion bias have a propensity to take average risks.

Concerning the effect of the mental accounting bias on individual investor risk tolerance behaviour, a medium, positive statistically significant relationship was established between the mental accounting bias and average risk tolerance behaviour, whereas a small, positive statistically significant relationship was established between the mental accounting bias and low risk tolerance behaviour. Thus, it can be inferred that individual investors who are subject to the mental accounting bias have a propensity to take average and low risks. However, no statistically significant relationship was established between the mental accounting bias and high risk tolerance behaviour. Previous research studies affirmed that individual investors who are subject to the mental accounting bias have a propensity to take low risks. Concerning the effect of the self-control bias on individual investor risk tolerance behaviour, a small, positive statistically significant relationship was established between the self-control bias and average risk tolerance behaviour. It can be inferred that individual investors who are subject to the self-control bias have a propensity to take average risks. However, no statistically significant relationships were established between the self-control bias and high risk tolerance behaviour, as well as between the self-control bias and low risk tolerance behaviour. Previous research studies affirmed that individual investors who are subject to the self-control bias have a propensity to take high risks.

To summarise, it can be concluded that the behavioural finance biases had significant effects on individual investor risk tolerance behaviour.

6.3.5 Empirical objective 5: Identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour

The fifth empirical objective, identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour, was attained in Chapter 5 (Section 5.4.3, Section 5.5.4 and Section 5.6.4). EFA and CFA were performed in Section 5.4.3 to identify the most significant financial risk events relating to the external environment that are likely to influence the investment decisions of individual investors and to establish if the specified model is a good fit for the data. For each of the external environment constructs, only one factor per construct was extracted, as all the scaled items loaded into a single factor for each of the constructs. Hence, all the constructs had satisfactory internal consistency reliability and were deemed reliable and best fit to explain the events occurring in the external environment, namely political-legal, technological, tax implications, macroeconomic factors (interest rates, exchange rates, inflation and GDP), international stock market and economic events, as well as reactions to market fluctuations and volatility. It was also established from the CFA conducted that all the constructs had suitable standardised factor loadings and that the specified model relating to events occurring in the external environment is a good fit for the data.

The descriptive statistics applied in Section 5.5.4 indicated that tax implications are most likely to influence the investment decisions of individual investors, followed by political-legal factors, exchange rate volatility, interest rates, GDP, international events, market fluctuations and volatility, technological factors and inflation, respectively. In order to identify and analyse the effect of exogenous factors on individual investor risk tolerance behaviour, non-parametric Spearman's correlation was applied in Section 5.6.4. Concerning the effect of political-legal factors on individual investor risk tolerance behaviour, a small, positive statistically significant relationship was established between political-legal factors and low risk tolerance behaviour. Accordingly, individual investors whose investment decisions are influenced by political-legal factors have a propensity to take low risks. However, no statistically significant relationships were established between political-legal factors and high risk tolerance behaviour, and between political-legal factors and average risk tolerance behaviour.

Concerning the effect of technological factors on individual investor risk tolerance behaviour, a medium, positive statistically significant relationship was established between technological factors and high risk tolerance behaviour. A small, positive statistically significant relationship was also established between technological factors and average risk

tolerance behaviour. Thus, individual investors whose investment decisions are influenced by technological factors have a propensity to take high and average risks. However, no statistically significant relationship was established between technological factors and low risk tolerance behaviour. Concerning the effect of tax implications on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between tax implications and high risk tolerance behaviour, and between tax implications and average risk tolerance behaviour. As a result, individual investors whose investment decisions are influenced by tax implications have a propensity to take high and average risks. However, no statistically significant relationship was established between tax implications and low risk tolerance behaviour.

Concerning the effect of the macroeconomic factor, i.e. interest rates, on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between interest rates and high risk tolerance behaviour, as well as between interest rates and low risk tolerance behaviour. Hence, individual investors whose investment decisions are influenced by interest rates have a propensity to take high and low risks. However, no statistically significant relationship was established between interest rates and average risk tolerance behaviour. Concerning the effect of the macroeconomic factor, i.e. exchange rate volatility, on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between exchange rate volatility and high risk tolerance, and between exchange rate volatility and low risk tolerance behaviour. Accordingly, individual investors whose investment decisions are influenced by exchange rate volatility have a propensity to take high and low risks. However, no statistically significant relationship was established between exchange rate volatility and average risk tolerance behaviour.

Concerning the effect of the macroeconomic factor, i.e. inflation, on individual investor risk tolerance behaviour, medium, positive statistically significant relationships were established between inflation and high risk tolerance, and between inflation and average risk tolerance behaviour. Consequently, individual investors whose investment decisions are influenced by inflation have a propensity to take high and average risks. However, no statistically significant relationship was established between inflation and low risk tolerance behaviour. Concerning the effect of the macroeconomic factor, i.e. GDP, on individual investor risk tolerance behaviour, a small, positive statistically significant relationship was established between GDP and low risk tolerance behaviour. Thus, individual investors whose investment decisions are influenced by GDP have a propensity to take low risks. However, no statistically significant relationships were established between GDP and high risk tolerance behaviour, as well as between GDP and average risk tolerance behaviour.

Concerning the effect of international events on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between international events and high risk tolerance behaviour, and between international events and average risk tolerance behaviour. Accordingly, individual investors whose investment decisions are influenced by international events have a propensity to take high and average risks. However, no statistically significant relationship was established between international events and low risk tolerance behaviour. Concerning the effect of market fluctuations and volatility on individual investor risk tolerance behaviour, small, positive statistically significant relationships were established between market fluctuations and volatility and high risk tolerance behaviour, and between market fluctuations and volatility and low risk tolerance behaviour. Hence, individual investors whose investment decisions are influenced by market fluctuations and volatility have a propensity to take high and low risks. However, no statistically significant relationship was established between market fluctuations and volatility and average risk tolerance behaviour.

To summarise, it can be concluded that all the exogenous factors had significant effects on individual investor risk tolerance behaviour.

6.3.6 Empirical objective 6: Construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors

The sixth and final empirical objective, construct a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors, was attained in Chapter 5 (Section 5.7) by making use of SEM. The intent was to determine if the pre-identified endogenous factors and exogenous factors incorporated into the model can contribute towards explaining individual investor risk tolerance behaviour. The refinement and validation of the SEM comprised accurate statistical methods, such as EFA and CFA to ensure the reliability, validity and robustness of the model. The SEM, which is illustrated in Chapter 5 (Figure 5-2), provided sufficing evidence of validity and reliability and exhibited good model fit. Therefore, the SEM was deemed valid and reliable, and was also a good fit for the data.

According to the results found, the proposed model to profile investor risk tolerance behaviour based on the endogenous and exogenous factors that contributed significantly towards explaining risk tolerance behaviour is summarised in Figure 6-1.

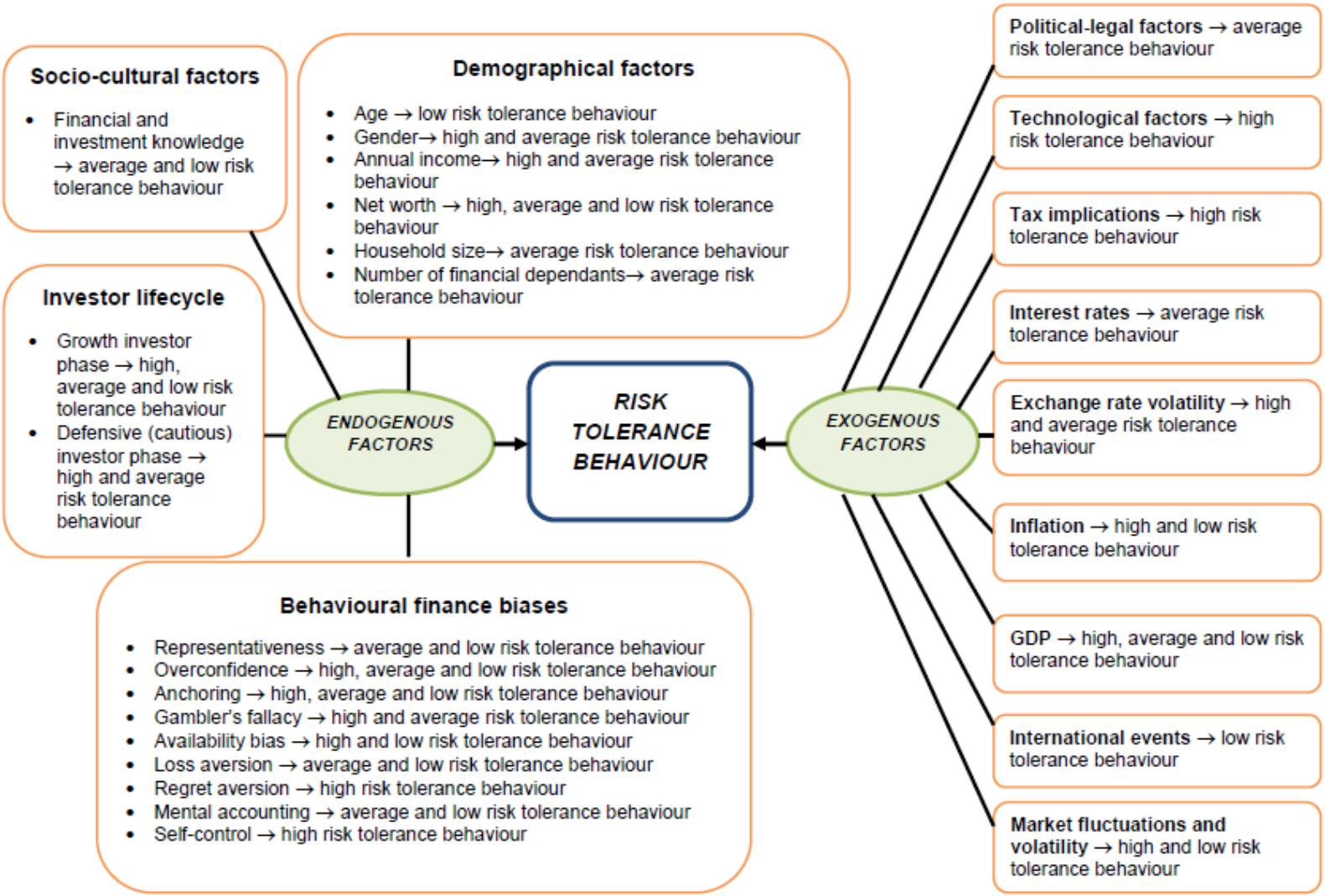

Figure 6-1: Model to profile investor risk tolerance behaviour based on endogenous and exogenous factors
Source: Author compilation

The endogenous factors, namely demographical factors, socio-cultural factors, the investor life cycle and behavioural finance biases, and the exogenous factors, namely political-legal factors, technological factors, tax implications, macroeconomic factors (interest rates, exchange rate volatility, inflation and GDP), international events, and market fluctuations and volatility, uniquely contributed towards explaining individual investor risk tolerance behaviour.

Figure 6-1 provides individual investors, financial planners, investment companies and researchers with an indication regarding the endogenous and exogenous factors that uniquely contribute towards explaining risk tolerance behaviour. In particular, these endogenous and exogenous factors should be considered by investment companies to improve existing and conventional risk assessment forms to profile the risk tolerance behaviour of individual investors more accurately and accordingly, to bring about more successful investment decision-making. However, the degree to which each of these endogenous and exogenous factors explains risk tolerance behaviour should also be considered. Hence, Table 6-1 provides a summary of the proposed weights assigned to the endogenous and exogenous factors for the risk tolerance behaviour categories.

Table 6-1: Proposed weights assigned to the endogenous and exogenous factors to profile investor risk tolerance behaviour

Constructs		Risk tolerance behaviour categories		
Endogenous factors	**Demographical factors**	**High risk**	**Average risk**	**Low risk**
	Age	–	–	0.110
	Gender	0.108	0.097	–
	Annual income	0.091	0.081	–
	Net worth	-0.117	0.130	-0.134
	Household size	–	-0.087	–
	Number of financial dependants	–	0.129	–
	Socio-cultural factors	**High risk**	**Average risk**	**Low risk**
	Financial and investment knowledge	–	0.237	-0.165
	Investor life cycle	**High risk**	**Average risk**	**Low risk**
	Growth investor phase	0.190	0.138	0.138
	Defensive (cautious) investor phase	0.177	0.541	–
	Behavioural finance biases	**High risk**	**Average risk**	**Low risk**
	Representativeness	–	0.069	0.185
	Overconfidence	0.181	-0.095	0.117
	Anchoring	0.101	0.082	0.304
	Gambler's fallacy	0.169	0.104	–
	Availability bias	-0.113	–	0.127
	Loss aversion	–	0.130	-0.243
	Regret aversion	0.122	–	–
	Mental accounting	–	0.185	0.146
	Self-control	-0.081	–	–

	Factors pertaining to the external environment	High risk	Average risk	Low risk
Exogenous factors	Political-legal factors	–	0.304	–
	Technological factors	0.255	–	–
	Tax implications	-0.129	–	–
	Interest rates	–	-0.101	–
	Exchange rate volatility	0.159	0.119	–
	Inflation	0.177	–	-0.206
	GDP	-0.589	-0.448	0.309
	International events	–	–	-0.468
	Market fluctuations and volatility	0.281	–	0.470

Source: Author compilation

In view of the high risk tolerance behaviour category, it can be inferred from Table 6-1 by considering the endogenous factors that the demographical factor, namely net worth contributed the greatest degree towards explaining high risk tolerance behaviour, followed by gender and annual income, respectively. Furthermore, the growth investor phase of the life cycle contributed the greatest degree towards explaining high risk tolerance behaviour, while the defensive (cautious) investor phase of the life cycle explains high risk tolerance behaviour to a slightly lesser degree. Regarding the behavioural finance biases, the overconfidence bias contributed the greatest degree towards explaining high risk tolerance behaviour, followed by the gambler's fallacy bias, the regret aversion bias, the availability bias, the anchoring bias and the self-control bias, respectively. These above-mentioned endogenous factors that uniquely contributed towards explaining risk tolerance behaviour, explain high risk tolerance behaviour to a rather small degree. Considering the exogenous factors, which comprise factors regarding the external environment, it can be inferred from Table 6-1 that GDP explains high risk tolerance behaviour to a large degree. Accordingly, GDP contributed the greatest degree towards explaining high risk tolerance behaviour, followed by market fluctuations and volatility, technological factors, inflation, exchange rate volatility and tax implications, respectively. Thus, the exogenous factors explain high risk tolerance behaviour from a rather small to a large degree.

With reference to the average risk tolerance behaviour category, it can be inferred from Table 6-1 by considering the endogenous factors that the demographical factor, namely net worth also contributed the greatest degree towards explaining average risk tolerance behaviour, followed by the number of financial dependants, gender, household size and annual income, respectively. However, these demographical factors explain average risk tolerance behaviour to a rather small degree. The socio-cultural factor, namely financial and investment knowledge was the only pre-identified socio-cultural factor that contributed significantly towards explaining average risk tolerance behaviour and explained average risk tolerance behaviour to a relatively moderate

degree. Also, the defensive (cautious) investor phase of the life cycle contributed the greatest and a large degree towards explaining average risk tolerance behaviour, while the growth investor phase of the life cycle explains average risk tolerance behaviour to a considerably smaller degree. Taking into consideration the behavioural finance biases, the mental accounting bias contributed the greatest degree towards explaining average risk tolerance behaviour, followed by the loss aversion bias, the gambler's fallacy bias, the overconfidence bias, the anchoring bias and the representativeness bias, respectively. However, these behavioural finance biases explain average risk tolerance behaviour to a rather small degree. Considering the exogenous factors, which comprise factors pertaining to the external environment, it can be inferred from Table 6-1 that GDP and political-legal factors explain average risk tolerance behaviour to a moderate degree. Consequently, GDP contributed the greatest degree towards explaining average risk tolerance behaviour, followed by political-legal factors, exchange rate volatility and interest rates, respectively. Nonetheless, exchange rate volatility and interest rates explain average risk tolerance behaviour to a relatively small degree.

Relating to the low risk tolerance behaviour category, it can be inferred from Table 6-1 by considering the endogenous factors that the demographical factor, namely net worth also contributed the greatest degree towards explaining low risk tolerance behaviour, while age contributed a slightly lesser degree towards explaining low risk tolerance behaviour. However, these demographical factors explain low risk tolerance behaviour to a rather small degree. Financial and investment knowledge, which was the only pre-identified socio-cultural factor that contributed significantly towards explaining low risk tolerance behaviour, explains low risk tolerance behaviour to a rather small degree. Also, only the growth investor phase of the life cycle contributed significantly towards explaining low risk tolerance behaviour and explains low risk tolerance behaviour to a rather small degree. Relating to the behavioural finance biases, the anchoring bias contributed the greatest degree towards explaining low risk tolerance behaviour, followed by the loss aversion bias, the representativeness bias, the mental accounting bias, the availability bias and the overconfidence bias, respectively. The anchoring bias explains low risk tolerance behaviour to a moderate degree, the loss aversion bias explains low risk tolerance behaviour to a relatively moderate degree and the remaining behavioural finance biases explain low risk tolerance behaviour to a rather small degree. Concerning the exogenous factors, which comprise factors about the external environment, it can be inferred from Table 6-1 that market fluctuations and volatility, international events and GDP explain low risk tolerance behaviour to a moderate degree, while inflation explains low risk tolerance behaviour to a rather moderate degree. Accordingly, market fluctuations and volatility contributed the greatest degree towards explaining low risk tolerance behaviour, followed by international events, GDP and inflation, respectively.

To conclude, all the pre-identified endogenous factors and exogenous factors significantly contributed towards explaining investor risk tolerance behaviour. Only the demographical factor, namely education, did not significantly contribute towards explaining individual investor risk tolerance behaviour. The endogenous and exogenous factors that contributed the greatest degree towards explaining the risk tolerance behaviour categories should mainly be considered by individual investors, financial planners, investment companies and researchers. Although some of the endogenous and exogenous factors contributed a relatively small degree towards explaining risk tolerance behaviour, given the complexity of the SEM, they should not be disregarded as they also uniquely contributed towards explaining risk tolerance behaviour.

Overall, the attainment of the theoretical and empirical objectives contributed to the achievement of the primary objective and successful findings of the research study. The following section provides a discussion on the general conclusion and remarkable contributions made by the research study to the field of study and the financial industry (Section 6.4).

6.4 GENERAL CONCLUSION AND CONTRIBUTION OF THE RESEARCH STUDY

The successful attainment of the theoretical and empirical objectives, and accordingly the primary objective of the research study contributes considerably to the field of study and the financial industry, both nationally and internationally. Firstly, the research study makes a notable contribution by providing a comprehensive theoretical analysis of risk tolerance and risk behaviour, and by contextualising a theoretical framework for individual investment decision-making. Furthermore, the successful attainment of the significant results concerning the empirical objectives of the research study also makes a notable contribution. Especially, the identification and analysis of the effect of the endogenous and exogenous factors on the risk tolerance behaviour of individual investors make a noteworthy contribution. This can be attributed to the fact that all the endogenous factors, except for the demographical factor, namely income variability, and all the exogenous factors had significant effects on individual investor risk tolerance behaviour. Most of the endogenous factors and all of the exogenous factors incorporated and examined in the research study are less studied factors in the field of research and therefore, also contributed to the limited literature.

However, the main contribution of the research study lies in the development and validation of the model to profile investor risk tolerance behaviour based on endogenous and exogenous factors. The SEM conducted in this research study makes a remarkable and unique contribution to the field of study and the financial industry. The risk profiling model is multifaceted and sophisticated, as it incorporated a multitude of pre-identified endogenous and exogenous factors into the model to profile individual investor risk tolerance behaviour. The research study and the risk profiling model also mainly comprised newly developed scales that consisted of self-structured questions that

were derived from theory and where relevant, existing risk scales. Furthermore, no other researcher has developed a model to profile investor risk tolerance behaviour based on endogenous and exogenous factors to improve existing and conventional risk assessment forms and accordingly, to profile the risk tolerance behaviour of individual investors more accurately to ensure the successful implementation of investment strategies.

As summarised by Figure 6-1 and Table 6-1, the endogenous and exogenous factors that uniquely contributed towards explaining risk tolerance behaviour, as well as the degree to which each of these factors explains risk tolerance behaviour, ought to be considered by individual investors, financial planners, investment companies and researchers not only within South Africa, but also internationally. In particular, investment companies should give careful consideration to these endogenous and exogenous factors to guide them and assist with the improvement of existing and conventional risk assessment forms to profile the risk tolerance behaviour of individual investors more accurately and to bring about more successful investment decision-making. The endogenous and exogenous factors that contributed the greatest degree towards explaining the risk tolerance behaviour categories should mainly be considered. However, the endogenous and exogenous factors that explain risk tolerance behaviour to a relatively small degree, given the complexity of the SEM, should not be disregarded as they also uniquely contributed towards explaining risk tolerance behaviour.

Overall, it can be concluded that the research study contributed to the enhancement of existing literature regarding the various aspects of individual investor risk tolerance behaviour and investment decision-making. The research study provides individual investors, financial planners and investment companies with better insights and comprehension regarding the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors when making investment decisions. The risk profiling model will contribute significantly to the improvement of existing and conventional risk assessment forms by considering the pre-identified endogenous and exogenous factors that explain investor risk tolerance behaviour. As a result, this will bring about more successful financial and investment planning. Ultimately, it will reform and enhance how the risk tolerance behaviour of individual investors is profiled when making investment decisions.

The following section highlights the limitations and implications of the research study to make ensuing recommendations and contribute towards possibilities for future research endeavours (Section 6.5).

6.5 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

With any research study there are certain limitations, which provide new opportunities for future research endeavours. Taking into consideration the literature review and empirical portion of the

research study, the limitations of the research study are highlighted to make ensuing recommendations and contribute towards possibilities for future research. The primary quantitative data of the research study were collected from a South African investment company with a sample size of 463 individual investors. Accordingly, it can be recommended to engage several investment companies to take part in the research study to analyse the effect of endogenous and exogenous factors on individual investor risk tolerance behaviour from the databases and perspectives of several investment companies. The participation of several investment companies in the research study will also bring about a larger sample size. The sample size of 463 individual investors utilised in the research study correspond to prior developed and validated scales employed in similar research studies and sufficiently met all the requirements for the statistical analysis employed. However, the developed and validated scales can be reviewed and utilised in future research studies by using larger sample sizes to review the robustness of the scale and accordingly, to profile the risk tolerance behaviour of individual investors more accurately.

In this research study, a non-probability purposive sampling method was used to filter the individual investors from the investment company, who met the inclusion criteria of 18 years and older, a current investor with some form of a formal investment product with the investment company and lives in Gauteng, to obtain the representative sample. However, it can be recommended to use an alternative sampling method and accordingly, adjust or extend the inclusion criteria of the research study as preferred by the researcher to draw a representative sample from the population. Furthermore, a quantitative research approach was followed in this research study. Hence, it can be recommended to follow a mixed-methods research approach, by also incorporating qualitative interviews to examine the rationales for the influence of endogenous and exogenous factors on individual investor risk tolerance behaviour.

Given that the risk profiling model is multifaceted and sophisticated, the review and further investigation of the multitude of pre-identified endogenous and exogenous factors incorporated into the model to profile investor risk tolerance behaviour will assist to further refine and simplify the model. In particular, the endogenous and exogenous factors that explain investor risk tolerance behaviour to a rather small degree should be reviewed and further investigated. Lastly, it can be recommended that the research study should be considered by individual investors, financial planners, investment companies and researchers, both nationally and internationally, to be acquainted with and to comprehend the endogenous and exogenous factors that influence the risk tolerance behaviour of individual investors. Moreover, the risk profiling model should be considered to facilitate the more practical, executable and accurate profiling of the risk tolerance behaviour of individual investors and accordingly, to ensure the successful implementation of investment strategies in practice.

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ANNEXURE A: INFORMED CONSENT

PO Box 1174, Vanderbijlpark
South Africa 1900

Tel: 016 910-3111
Fax: 016 910-3116
Web: http://www.nwu.ac.za

Risk Management Department
Tel: 016 910-3377
Email: Zandri.Dickason@nwu.ac.za

Participant information leaflet and consent form

Title of the research project: The influence of endogenous and exogenous factors on investor risk-tolerance behaviour

Principal Investigator: Anzel van den Bergh-Lindeque (082 457 2689)

Promoter(s): Dr Z Dickason; Dr SJ Ferreira; Prof PMS van Heerden

Reference numbers: NWU-00770-19-A4

You are being invited to take part in a research project that forms part of a PhD study. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied, that you clearly understand what this research is about and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say decline, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the **Economic and Management Sciences Research Ethics Committee of the North-West University** (NWU-00770-19-A4) and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki and the ethical guidelines of the National Health Research Ethics Council. It might be necessary for the research ethics committee members or relevant authorities to inspect the research records to make sure that we (the researchers) are conducting research in an ethical manner.

What is this research study about?

The purpose of this study is to profile investor risk tolerance behaviour based on the endogenous (internal) and exogenous (external) factors that influence individual investment decisions. Existing and conventional risk assessment forms used by practitioners in the financial industry consist of shortcomings as it is not comprehensive enough to take into account all the factors that could influence individual investors' risk tolerance behaviour when making investment decisions. This study will determine if the addition of endogenous

(internal) and exogenous (external) factors to conventional risk profiling methods will provide a more accurate and comprehensive model to profile investor risk tolerance behaviour. You have been invited to participate in this study.

Why have you been invited to participate?

You have been invited to participate because your company represents the sample population under investigation.

What will your responsibilities be?

The questionnaire should take approximately 15-20 minutes to complete.

Who will have access to the data?

Anonymity (that is, in no way will the results be linked to the company) will be ensured as the researchers do not have direct access to the company's client database. Confidentiality (that is, we assure you that we will protect the information we have about the company) will be ensured by the way the data will be captured, and no mention of the company will be included in the study or any research projects related to the study. Only the researchers will have access to the data. Data will be stored for 5 years before being confidentially destroyed.

What will happen to the data?

The data from this study will be reported on in the following ways: in an academic study and research articles. In all of this reporting, you will not be personally identified. This means that the reporting will not include the company name or details that will help others identify that the company participated (e.g. the company's name or physical description). Only researchers affiliated with the NWU will have access to the data.

Will you be paid/compensated to take part in this study and are there any costs involved?

No, you will not be paid/compensated to take part in the study.

How will you know about the findings?

The general findings of the research will be shared with you electronically in article form, after completion of the study.

Is there anything else that you should know or do?

Should you have any queries please contact Anzel van den Bergh-Lindeque at 082 457 2689 or anzel@evdb.co.za. Alternatively, you can contact Dr. Zandri Dickason at (016) 910-3377 or Zandri.Dickason@nwu.ac.za; Dr. Suné Ferreira at (016) 910-3365 or 23261048@nwu.ac.za.

If you have any concerns or complaints that have not been adequately addressed by the researcher you can contact the chair of Economic and Management Sciences Research Ethics Committee (Prof Bennie Linde) at (018) 299-1427 or Bennie.Linde@nwu.ac.za.

You will receive a copy of this information and consent form for your own records.

Declaration by participant

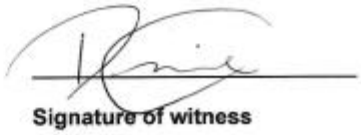
By signing below, I, Jean Dommisse agree to take part in the research study.

I declare that:

- I have read and understood this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions to both the person obtaining consent, as well as the researcher (if this is a different person), and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I understand that what I contribute (what I report/say/write/draw/produce visually) could be reported publically and/or quoted, but without reference to my personal identity.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interest, or if I do not follow the study plan, as agreed to.

Signed at *(place)* Kuilsriver on *(date)* 15/05/2020

Signature of participant



Signature of witness

Declaration by researcher

I, Anzel van den Bergh-Lindegue declare that:

- I explained the information in this document to Jean Dommisse.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.
- I did/did not use an interpreter.

Signed at *(place)* Vanderbijlpark on *(date)* 15/05/2020.

Signature of researcher **Signature of witness**

ANNEXURE B: ETHICAL CLEARANCE

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

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Economic and Management Sciences Research
Ethics Committee (EMS-REC)
Tel: 018 299-1427
Email: Bennie.Linde@nwu.ac.za

24 June 2019

Dr Z Dickason, Dr S Ferreira and Prof P M S van Heerden

Dear Dr Dickason, Dr Ferreira and Prof van Heerden,

FEEDBACK – ETHICS APPLICATION 21062019 – A van den Bergh (22983120)(NWU-00770-19-S4) PhD in Risk Management – Dr Z Dickason, Dr S Ferreira and Prof P M S van Heerden

Your ethics application on, *The influence of endogenous and exogenous factors on investor risk tolerance behaviour,* that served on the EMS-REC meeting of 21 June 2019 refers.

Outcome:

Approved as a minimal risk study. A number NWU-00770-19-A4 is given for three years of ethics clearance.

Kind regards,

Prof Bennie Linde
Deputy Chairperson: Economic and Management Sciences Research Ethics Committee (EMS-REC) Potchefstroom Campus

ANNEXURE C: QUESTIONNAIRE

THE INFLUENCE OF ENDOGENOUS AND EXOGENOUS FACTORS ON INVESTOR RISK-TOLERANCE BEHAVIOUR

Please do not put your name, surname, or any identifying marks on your questionnaire.

You are being invited to take part in a research project that forms part of a PhD study. The purpose of this study is to profile investor risk tolerance behaviour based on the endogenous (internal) and exogenous (external) factors that influence individual investment decisions. Existing and conventional risk assessment forms used by practitioners in the financial industry consist of shortcomings as it is not comprehensive enough to take into account all the factors that could influence individual investors' risk tolerance behaviour when making investment decisions. This study will determine if the addition of endogenous (internal) and exogenous (external) factors to conventional risk profiling methods will provide a more accurate and comprehensive model to profile investor risk tolerance behaviour.

Please complete the questionnaire if you meet the following criteria:

- Older than 18 years;
- A current investor; and
- Lives in Gauteng.

Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied, that you clearly understand what this research is about and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say decline, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part. You are kindly requested not to withdraw without careful consideration, since it may have a detrimental effect on, inter alia, the statistical reliability of the project.

By agreeing to take part in the project, you are also giving consent for the data that will be generated to be used by the researchers for scientific purposes as they see fit. The data will be **confidential** and your results will be reported in aggregate (as part of the whole sample) and not individually. The questionnaire should take, on average, 15-20 minutes to complete.

This study has received ethical clearance from the Economic and Management Sciences Research Ethics Committee of the North-West University and received the following ethical clearance number: NWU-00770-19-A4. The study will be conducted according to the ethical guidelines and principles as prescribed to by the North-West University (www.nwu.ac.za). It might be necessary for the research ethics committee members or relevant authorities to inspect the research records to make sure that we (the researchers) are conducting research in an ethical manner.

Should you have any queries please contact Anzel van den Bergh-Lindeque at 082 457 2689 or anzel@evdb.co.za. Alternatively, you can contact Dr. Zandri Dickason at (016) 910-3377 or Zandri.Dickason@nwu.ac.za; Dr. Suné Ferreira at (016) 910-3365 or 23261048@nwu.ac.za. If you have any concerns or complaints that have not been adequately addressed by the researcher you can contact the chair of Economic and Management Sciences Research Ethics Committee (Prof. Bennie Linde) at (018) 299-1427 or Bennie.Linde@nwu.ac.za.

SECTION A: DEMOGRAPHICAL & SOCIO-CULTURAL INFORMATION

A1.

Age	18–24	1
	25–34	2
	35–49	3
	50 +	4

A2.

Gender	Male	1
	Female	2

A3.

Ethnicity	African	1
	Asian	2
	Coloured	3
	White	4
	Other	5

A4.

Marital status	Single	1
	Common-law spouse	2
	Married	3
	Divorced	4
	Widowed	5

A5.

Highest level of education	No matric	1
	Matric	2
	Further training	3
	3-year diploma	4
	3+year diploma	5
	Bachelor's degree	6
	Honours degree	7
	Master's degree	8
	Doctoral degree	9
	Other	10

A6.

Employment status	Salaried employed	1
	Self-employed	2
	Unemployed-not looking for work	3
	Unemployed-looking for work	4
	Retired	5
	Other	6

A7.

What is your annual income?	Below R 100 000	1
	R 100 001-200 000	2
	R 200 001-300 000	3
	R 300 001-400 000	4
	R 400 001-500 000	5
	R 500 001-600 000	6
	R 600 001-700 000	7
	R 700 001-800 000	8
	R 800 001-900 000	9
	R 900 001-R 1 million	10
	More than R 1 million	11

A8.

Income variability	My income is very stable & predictable	1
	My income is somewhat stable & predictable	2
	My income is fluctuating & unpredictable	3

A9.

Net worth	Less than R1 million	1
	Between R1 million and R3.5 million	2
	Between R3.5 million and R7 million	3
	Between R7 million and R12 million	4
	Between R12 million and R30 million	5
	R30 million and more	6

A10.

Homeownership	Living with relatives	1
	Renting	2
	Home ownership with mortgage	3
	Home ownership without mortgage	4

A11.

Household size	1–2 individuals	1
	3–5 individuals	2
	6+ individuals	3

A12.

Number of dependants you care for	0 dependants	1
	1–2 dependants	2
	3–5 dependants	3
	6+ dependants	4

A13.

Religion	None	1
	Christianity	2
	Judaism	3
	Hinduism	4
	Islam	5
	Other	6

A14.

Level of financial and investment knowledge	Little	1
	Average	2
	Above-average	3
	Superior	4

A15.

Health status	Poor	1
	Fair	2
	Good	3
	Very good	4
	Excellent	5

SECTION B: SELF-REPORT ON INVESTOR LIFECYCLE

Indicate the degree to which you agree or disagree with this statement.							
Statement		**Strongly disagree**	**Disagree**	**Somewhat disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
B1	I am in the early to middle years of my working career and have a great future earning ability.	1	2	3	4	5	6
B2	I am accumulating assets to satisfy my short-term goals (e.g. studies, cars, house, and furniture) and longer-term goals (e.g. children's college needs and retirement).	1	2	3	4	5	6
B3	I have a small net worth and a large amount of debt from car loans, house down payments or past college loans.	1	2	3	4	5	6
B4	I want to accumulate more capital as I have a very long time horizon before I reach retirement (30+ years).	1	2	3	4	5	6
B5	I am past the midpoint of my working career.	1	2	3	4	5	6
B6	I am concerned with long term goals such as retirement and estate planning.	1	2	3	4	5	6
B7	Most or all of my outstanding debt has been paid off and my income earned is greater than my expenses.	1	2	3	4	5	6
B8	I still have a relatively long time horizon (20 to 30 years) until I reach retirement; however I want to start to preserve capital for retirement.	1	2	3	4	5	6
B9	I have reached retirement age.	1	2	3	4	5	6
B10	I want to protect and preserve my capital at this stage in my life.	1	2	3	4	5	6
B11	I am financially independent and my living expenses are covered by fixed income received from investments and retirement plans.	1	2	3	4	5	6
B12	I have adequate income and assets to cover my expenses and I am able to provide financial support to families, friends, or charities. I focus on estate planning and tax minimisation.	1	2	3	4	5	6

SECTION C: SELF-REPORT ON RISK TOLERANCE BEHAVIOUR

Indicate the degree to which you agree or disagree with the following statements with regard to the amount of financial risk you are willing to take when making an investment or applicable to you in the specified situation?

Statement		Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
C1	I am willing to take substantial financial risks expecting to earn substantial returns.	1	2	3	4	5	6
C2	A large portion of my investment portfolio consists of growth assets such as international and domestic equities.	1	2	3	4	5	6
C3	I am willing to bet a day's income at a high-stake poker game.	1	2	3	4	5	6
C4	I will remain with a consistent long-term investment plan even if poor market conditions lead to significant losses in my investment performance over the short-term.	1	2	3	4	5	6
C5	I am willing to take above-average financial risks expecting to earn above-average returns.	1	2	3	4	5	6
C6	My investment portfolio consists of a mix of asset classes, but mainly consists of a higher preference towards equities.	1	2	3	4	5	6
C7	I am willing to bet a day's income at the horse races.	1	2	3	4	5	6
C8	I will wait and monitor the performance of my investment for at least one year before making any changes.	1	2	3	4	5	6
C9	I am willing to take average financial risks expecting to earn average returns.	1	2	3	4	5	6
C10	My investment portfolio consists of a combination of equities, property and some fixed interest investments.	1	2	3	4	5	6
C11	I am willing to invest 5% of my annual income in a very speculative stock.	1	2	3	4	5	6
C12	If my investment losses 5% over a quarter, I will sell and invest somewhere else.	1	2	3	4	5	6
C13	I am not willing to take any financial risks.	1	2	3	4	5	6
C14	My investment portfolio consists of less risky assets such as cash, bonds, fixed interest investments and unlisted property.	1	2	3	4	5	6
C15	I am willing to invest 10% of my annual income in a moderate	1	2	3	4	5	6

	growth diversified fund.						
C16	If my investment loses ANY value, I am very concerned and am likely to sell immediately and invest somewhere else.	1	2	3	4	5	6
C17	I am willing to bet a day's income on the outcome of a sporting event.	1	2	3	4	5	6
C18	I am willing to invest 10% of my annual income in a new business venture.	1	2	3	4	5	6
C19	When hearing the concept financial risk, I think about loss, danger and uncertainty.	1	2	3	4	5	6
C20	When hearing the concept financial risk, I think about opportunity, thrill and adventure.	1	2	3	4	5	6

SECTION D: BEHAVIOURAL FINANCE

Indicate to what extent the following statements drive your investment decisions:

Statement		Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
D1	My investment decisions are based on the past performance of investments.	1	2	3	4	5	6
D2	My superior investment knowledge drives my decisions.	1	2	3	4	5	6
D3	I rely only on a single piece of information (past or current information) to make investment decisions.	1	2	3	4	5	6
D4	My investment decisions are based on future market predictions.	1	2	3	4	5	6
D5	My investment decisions are based on the most recent information.	1	2	3	4	5	6
D6	I would rather hold onto current investments with negative returns instead of selling and taking a loss.	1	2	3	4	5	6
D7	My previously incorrect investment decisions which led to a financial loss drive my investment decisions.	1	2	3	4	5	6
D8	I receive a good return on my investment and will rather keep money in my current investment as to earn higher future returns elsewhere.	1	2	3	4	5	6
D9	I exercise self-control when making investment decisions.	1	2	3	4	5	6

SECTION E: THE EXTERNAL ENVIRONMENT

POLITICAL-LEGAL

Political stability and a sound legal system in a country are imperative for a stable economy and stock market growth.
For each of the following statements, please indicate the likelihood that international and domestic political risk, unless specified otherwise, would influence your investment decisions if you were to find yourself in certain political circumstances.

	Statement	Very unlikely	Unlikely	Somewhat unlikely	Somewhat likely	Likely	Very likely
E1	I take political circumstances into consideration when making investment decisions.	1	2	3	4	5	6
E2	Uncertain political circumstances are likely to influence my investment decisions.	1	2	3	4	5	6
E3	I will switch to more conservative investment options during uncertain political circumstances.	1	2	3	4	5	6
E4	I will wait and oversee how my investment performs over a time period before I make any changes during uncertain political circumstances.	1	2	3	4	5	6
E5	I will remain with my initial long-term investment strategy, regardless of uncertain political circumstances.	1	2	3	4	5	6
E6	Uncertain political circumstances cause me to doubt advice given by my financial planner.	1	2	3	4	5	6
E7	The current political uncertainty in South Africa negatively influences my confidence and likeliness to invest in the South African markets.	1	2	3	4	5	6
E8	I believe that the current political circumstances in South Africa are negatively influencing market performance.	1	2	3	4	5	6
E9	I believe that the current political circumstances in South Africa are negatively influencing my investment growth.	1	2	3	4	5	6
E10	I am concerned about the influence of the current property right regulations and land reform in South Africa.	1	2	3	4	5	6
E11	I am aware of prescribed regulations regarding investment portfolio choices.	1	2	3	4	5	6
E12	I take prescribed regulations regarding investment portfolio choices into consideration when making investment decisions.	1	2	3	4	5	6

TECHNOLOGICAL

The rise and enhancement of technology will have a major impact on investors, financial advisers and investment companies when it comes to financial and investment planning in the future.
For each of the following statements, please indicate the likelihood that technological developments would influence your investment decisions.

Statement		Very unlikely	Unlikely	Somewhat unlikely	Somewhat likely	Likely	Very likely
E13	Advances in technology affect the manner in which I invest.	1	2	3	4	5	6
E14	I rely on and make use of technological tools which provide me with more knowledge to make investment decisions.	1	2	3	4	5	6
E15	Technological advances provide me with more control over my investment decisions.	1	2	3	4	5	6
E16	With the development of robo-advisers (automated online advisers) that focus on low cost and some offering free services, I am more likely to make use of robo-advisers to assist in doing my own investment planning.	1	2	3	4	5	6
E17	Despite technological advances, I will still be very reliant on my financial adviser, that I trust and have a well-established relationship with, for financial and investment advice.	1	2	3	4	5	6

TAX IMPLICATIONS

Tax applicable to investments can have a negative influence on the gross return rates of investments. For each of the following statements, please indicate the likelihood that the following tax implication scenarios would influence your investment decisions.

Statement		Very unlikely	Unlikely	Somewhat unlikely	Somewhat likely	Likely	Very likely
E18	I take tax implications into consideration when making investment decisions.	1	2	3	4	5	6
E19	I understand the implications of tax relating to my investments.	1	2	3	4	5	6
E20	I exercise investment options that minimise tax implications.	1	2	3	4	5	6

MACROECONOMIC FACTORS

For each of the following statements, please indicate the likelihood that the following macroeconomic factors and scenarios would influence your investment decisions.

INTEREST RATES

Individuals tend to invest in interest-bearing investments when interest rates are high. When interest rates are low, a lower rate of return is likely to be earned.

Statement		Very unlikely	Unlikely	Somewhat unlikely	Somewhat likely	Likely	Very likely
E21	I take interest rates prevailing in the economy into consideration when making investment decisions.	1	2	3	4	5	6
E22	An increase in interest rates in the economy is likely to influence my investment decisions.	1	2	3	4	5	6
E23	A decrease in interest rates in the economy is likely to influence my investment decisions.	1	2	3	4	5	6

EXCHANGE RATE VOLATILITY							
Exchange rate volatility can influence and complicate investment decisions and constrain a country's economic growth. The percentage exposure allocated to an investment portfolio by the fund manager in international funds may have a direct influence on the return of the investment.							
Statement		**Very unlikely**	**Unlikely**	**Somewhat unlikely**	**Somewhat likely**	**Likely**	**Very likely**
E24	I take exchange rates into consideration when making investment decisions.	1	2	3	4	5	6
E25	How likely will the fluctuation of the South African Rand against major international currencies influence your investment decisions?	1	2	3	4	5	6
E26	Exchange rate volatility is a concern for me when making investment decisions.	1	2	3	4	5	6
INFLATION							
Inflation, the rise in prices over time, can erode investment returns. Investment portfolios with long-term returns that significantly exceed inflation are associated with a higher degree of risk. How likely are you to invest in the following portfolios?							
Statement		**Very unlikely**	**Unlikely**	**Somewhat unlikely**	**Somewhat likely**	**Likely**	**Very likely**
E27	Portfolio A will most likely exceed long-term inflation by a significant margin and has a high degree of risk.	1	2	3	4	5	6
E28	Portfolio B will most likely exceed long-term inflation by a moderate margin and has a moderate to high degree of risk.	1	2	3	4	5	6
E29	Portfolio C will most likely exceed long-term inflation by a small margin and has a moderate degree of risk.	1	2	3	4	5	6
E30	Portfolio D will most likely match long-term inflation and has a low degree of risk.	1	2	3	4	5	6
GROSS DOMESTIC PRODUCT							
The GDP reflects the overall performance of the economy. A healthy growth rate in the GDP results in better performance of the stock market.							
Statement		**Very unlikely**	**Unlikely**	**Somewhat unlikely**	**Somewhat likely**	**Likely**	**Very likely**
E31	I take the GDP growth rate of a country into consideration when making investment decisions.	1	2	3	4	5	6
E32	The poor economic performance of South Africa is negatively influencing my investment decisions.	1	2	3	4	5	6
E33	The poor economic performance of South Africa is making me want to avoid risk.	1	2	3	4	5	6
E34	I will remain with my initial long-term investment strategy, regardless of the poor economic performance of South Africa.	1	2	3	4	5	6

INTERNATIONAL EVENTS							
It is reported that individuals' investment decisions are influenced by recent news about international stock market returns and events for example the GFC. For each of the following statements, please indicate the likelihood that news about international market growth and/or events would/were to influence your investment decisions.							
Statement		**Very unlikely**	**Unlikely**	**Somewhat unlikely**	**Somewhat likely**	**Likely**	**Very likely**
E35	I do keep myself informed regarding news about international market returns and events.	1	2	3	4	5	6
E36	I do take news regarding international market returns and events into consideration when making investment decisions.	1	2	3	4	5	6
E37	Negative international market growth and events negatively influence my investment decisions.	1	2	3	4	5	6
E38	As a result of previous international events, I take more calculated risks when making investment decisions.	1	2	3	4	5	6

REACTION TO MARKET FLUCTUATIONS AND VOLATILITY							
Market fluctuations and volatility is an omnipresent risk. For each of the following statements, please indicate the likelihood that market fluctuations and volatility would influence your investment decisions.							
Statement		**Very unlikely**	**Unlikely**	**Somewhat unlikely**	**Somewhat likely**	**Likely**	**Very likely**
E39	I take market fluctuations and volatility into consideration when making investment decisions.	1	2	3	4	5	6
E40	My investment decisions changes during periods of high market fluctuations and volatility.	1	2	3	4	5	6
E41	I will switch to more conservative investment options during periods of high market fluctuations and volatility.	1	2	3	4	5	6
E42	Periods of high fluctuations and volatility in the markets, make me take more calculated risks when making investment decisions.	1	2	3	4	5	6
E43	I will wait and oversee how my investment performs over a time period before I make any changes during periods of high market fluctuations and volatility.	1	2	3	4	5	6
E44	I will remain with my initial long-term investment strategy, regardless of high market fluctuations and volatility.	1	2	3	4	5	6
E45	Periods of high market fluctuations and volatility cause me to doubt the advice given by my financial planner.	1	2	3	4	5	6

THANK YOU!

ANNEXURE D: STATISTICAL CLEARANCE

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Statistical Consultation Services
Tel: +27 18 285 2016
Fax: +27 0 87 231 5294
Email: suria.ellis@nwu.ac.za

15 September 2020

Re: Thesis, Ms A van den Bergh-Lindeque, student number 22983120

We hereby confirm that the Statistical Consultation Services of the North-West University analysed the data of the above-mentioned student and assisted with the interpretation of the results. However, any opinion, findings or recommendations contained in this document are those of the author, and the Statistical Consultation Services of the NWU (Potchefstroom Campus) do not accept responsibility for the statistical correctness of the data reported.

Kind regards

Prof SM Ellis (Pr. Sci. Nat.)
Associate Professor: Statistical Consultation Services