

Analysing the investor life cycle in a South African universal bank

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DECLARATION

I declare that:

“Analysing the investor life cycle in a South African universal bank”

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 dissertation has not previously been submitted by me for a degree at any other university.

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To whom it may concern

This is to confirm that I, the undersigned, have language edited the completed research of Dewald Kellerman for the dissertation submitted in fulfilment of the requirements for the degree Magister Commercii in Risk Management at the Vaal Triangle Campus North-West University entitled: Analysing the investor life cycle in a South African universal bank.

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 dissertation.

Yours truly

Handwritten signature of Jomone Müller.

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“You have to give yourself credit, not too much because that would be bragging.”

(Frank McCourt)

“If a man empties his purse into his head, no man can take it away from him. An investment in knowledge always pays the best interest.”

(Ben Franklin)

ABSTRACT

Keywords: Investor life cycle, individual investor decision, banking, behaviour finance, client retention, demographic factors, Big Data, South Africa

Individual investment decision-making theory revolves around the logical choices an investor is expected to make in order to achieve the maximum return on investments. The investor life cycle theory is often used as a guideline to determine how investors will invest based on their predicted life cycle phase. There are limitations to implementing investment theory in real world scenarios and determining in which phase of the investor life cycle an investor falls is no easy feat. Another challenge stemming from the theory of behavioural finance is that investors do not always invest as would be expected due to a lack of knowledge, incorrect information or even fear. This makes it difficult to group investors into set life cycle phases. In order to make more accurate predictions on the life cycle phase an investor is in, large volumes of behavioural data are required. Banks have the means and ability to gain valuable insight from the vast amounts of data they have access to on their clients. Due to this, banks play an increasingly important role when it comes to the financial well-being of their clients. For banks to remain competitive against the wave of new competitors, diversified investment product ranges need to be provided to their clients. The main purpose of the study was to analyse how South African banking clients invest their disposable income versus what the theoretical patterns of the investor life cycle proposes. Due to investors having different needs, goals, and levels of investment knowledge, banks need to identify distinguishing demographic factors that can be used to determine the phase in the investor life cycle.

The empirical research was conducted in order to add to the body of literature within the field of investment management. The study used a quantitative research approach with a positivist research paradigm. The target population included investors at a South African universal bank. The inclusion criteria required these investors to have a main transactional account at the specific universal bank with at least one additional investment product held. A sample of 19 911 investors was obtained using a stratified sampling technique. The sample was also subdivided into low-, medium- and high income and wealthy investors as the focus was placed on differing investment patterns based on individual income levels. The investment products that were selected for the study constituted products easily accessible to the average South

African investor at a universal bank and excluded investments specifically targeted at saving towards retirement.

The study highlighted the value of Big Data analysis for banks when it comes to promoting investments to existing clients. Investors in the lower income brackets do not necessarily have access or the financial means to obtain financial advice. Marketing campaigns educating investors about the different investment products available to them can have a profound impact on their saving and investment patterns. The study differs from previous studies, as it excluded investments structured towards retirement and investigated how investors invest their remaining funds. It also analysed investors at a single universal bank, where these investors have access to almost all their financial requirements at a single financial institution. The analysis found that the investment patterns of South African investors strongly contradict the foundational literature of the investor life cycle. South African investors are skewed more towards low risk investment options like cash, across all age ranges, only investing in higher risk instruments much later than what the investor life cycle theory suggests. Female investors are especially risk averse, however, the effect becomes less prominent as income level rises. There are also still inequalities between the different racial groups, with African investors of all income levels investing less than the other groups with similar income levels. The findings tie back to the history of Apartheid in South Africa, with African investors investing less than the other race groups. African investors make up the biggest portion of investors in South Africa and banks have an opportunity to improve their investment habits. This will not only make these clients wealthier, but also more profitable for the bank and the South African economy. The risk averse investment style seen in the findings for all South African investors can be explained by the slow economic growth experienced in South Africa, with investors having less disposable income to invest.

Banks can play a significant role in driving behavioural changes and promoting a culture of investing, rather than promoting more debt products, especially in a slow expanding economy like that of South Africa. Using these insights, banks can model investor behaviour and promote healthier investment habits, especially among young African investors. Banks can use the findings to construct new investment products that more closely meet the investment needs of their clients. By combining the theory of the investor life cycle, with the results found in this study, banks can also improve the expected returns for the clients as well as improve overall client retention due to a wider investment product range being offered.

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LIST OF ABBREVIATIONS

ABSA	: Amalgamated Bank of South Africa
AI	: Artificial Intelligence
ANC	: African National Congress
APT	: Arbitrage Pricing Theory
BCBS	: Basel Committee on Banking Supervision
CAPM	: Capital Asset Pricing Model
CV	: Coefficient of Variation
EFF	: Economic Freedom Fighters
ETF	: Exchange-Traded Funds
EY	: Ernst & Young
FNB	: First National Bank
FSB	: Financial Services Board
GARP	: Global Association of Risk Professionals
GDP	: Gross Domestic Product
IT	: Information Technology
JSE	: Johannesburg Stock Exchange
NCA	: National Credit Act
NPL	: Non-Performing Loan
OECD	: Organization for Economic Cooperation and Development
PD	: Probability of Default

POPIA	: Protection of Personal Information Act
PWC	: Price Waterhouse Coopers
REIT	: Real Estate Investment Trust
S&P	: Standard & Poor's
SARB	: South African Reserve Bank
SAS	: Statistical Analysis System
SDA	: Secondary Data Analysis
SML	: Securities Market Line
SMS	: Short Message Service
SQL	: Structured Query Language
WEF	: World Economic Forum

CHAPTER 1: INTRODUCTION AND BACKGROUND

“If you buy things you don’t need, soon you will have to sell things you need.”

(Warren Buffett)

1.1. Introduction

The key to success for banks in the South African investment industry is to fully understand the unique investment needs of their clients (Seetharaman *et al.*, 2017:153). Brown and Reilly (2012:41-43) suggest a popular theory known as the investor life cycle, which can be used to determine the most suitable investment products an investor should invest in to meet their specific needs. The current investor life cycle focuses mainly on the current age group of the investors and their risk tolerance levels based on limited demographics and assumptions. It is believed that investors in their twenties have different investment needs than that of investors in their forties, while several factors like affluence, family size, and more could affect what an investor’s actual needs are (Bodie, 2015:43).

An important factor to remember is that investor needs change over time. A product that was suitable for specific investment needs at a certain point in time may not be what is needed in a couple of years’ time (Jagongo & Mutswenje, 2014:92-93). Banks group investors into different risk profiles based on the investors’ willingness to tolerate risk. Risk tolerance can be defined as the amount of volatility an investor is willing to tolerate with the anticipation of greater returns, individual investment objectives and investment considerations (Harlow & Brown, 1990:50-52). Utilising Big Data, which is the process of using technology to analyse large volumes of data, can be a solution to gain insights as to the life cycle stages for non-advisory clients where administering risk profiling questionnaires are impractical (Lee, 2017:293).

By analysing the investment horizon and types of investment products of clients, banks can determine in which stage of the investor life cycle an investor is and which investors will benefit more from another product than the product they currently invest in. Banking clients will receive relevant advice with a collaboration between the different investment segments within a bank and data analytics focussing on all the different products available. Moreover,

these clients can be assured that they will invest in the best product to serve their individual investment needs (Seetharaman *et al.*, 2017:153-154).

Subramanyam (2004:588-589) found that modern banks are subdivided into different divisions or business units, each dealing with different banking aspects. This can limit knowledge sharing between the subdivisions and hamper growth as each segment is concerned with retaining their clients and making a profit (Chigada, 2014:212). However, some of these clients may benefit more from other investment products provided by a different division. With internal cooperation between these segments, banks can obtain an improved overall view of the type of investment products clients from different income levels would be interested in. This can improve the effectiveness of marketing campaigns (Lyons *et al.*, 2007:77).

In order to ensure that the existing clients of a company use in-house investment products instead of products provided by competing firms, will result in improved client retention. Improved client retention is of concern as it is costly to acquire new clients (Liu & Wu, 2007:132-133). Client retention has become the biggest struggle for the four big South African universal banks, with companies diversifying their product ranges. The four big banks of South Africa include Standard Bank, First National Bank (FNB), Amalgamated Bank of South Africa (ABSA) and Nedbank. One of the major competitors for these banks, ready to throw the banking sector into disarray, is the insurance company Discovery Limited, who recently received their banking license (Stoddard, 2017:1). Discovery Limited is well-poised to acquire a large portion of the overall market share, with a strong foothold in the insurance- and investment sectors (Ziady, 2017b:1).

Krishna *et al.* (1999:1194) suggested that banks can increase the stickiness of their current client base by providing more attractive investment opportunities. The four big South African banks have large client bases that utilise the normal day-to-day banking services, however, their clients' investment portfolios are often kept at other well-known investment firms. Liu and Wu (2007:141) found that by diversifying a bank's product ranges the cost of current product offerings will become less expensive due to economies of scope. This is achieved when product diversification leads to a decrease in the production cost of existing product offerings (Cooper *et al.*, 2007:381-382). A study conducted by Levesque and McDougall (1996:7) also suggest that clients with more investment products at the same banking institution compared

to liabilities such as loans have less negative critique with regard to the level of service received from the bank and are therefore more satisfied.

1.2. Problem statement

There are numerous limitations when attempting to apply investment theory to real world scenarios. The investor life cycle is no exception, as found by Bodie (2015:43), it is not always easy to gauge in which stage of the investor life cycle an investor is. The theory of behavioural finance suggests that investors do not always react rationally and often make mistakes due to lack of knowledge, incorrect information or fear. This makes it difficult to group investors into set groups as each investor will not necessarily make rational investment decisions and therefore matching investors with the best product for their unique needs becomes problematic (Chaudhary, 2013:85).

Banks can no longer only focus on traditional services in terms of transactions. Hence, a diversified product range is required to keep existing clients from moving their accounts to other institutions that can provide a wider range of services (Rose & Hudgins, 2010:5-6). Modern banks create divisions that operate as separate businesses, which can hamper knowledge sharing and limit opportunities to cross sell investment products. With collaboration between these segments the bank can capitalise on existing client base and ensure the best products are allocated as per investment needs (Lyons *et al.*, 2007:77).

Marketing campaigns in the form of emails or short message services (SMS) that are used to persuade clients to invest in different investment products, often do not reach the intended audience. If these campaigns are based on analytics that group investors based on the predicted stage of the investor life cycle, they are more likely to be successful. The campaigns can be personalised to appeal to the specific investor needs, which eliminates the risk of annoying clients with products that do not apply to them (Hofacker *et al.*, 2016:89). Hence, it is therefore important to see whether investors do invest in accordance with the investor life cycle. In doing so, banks have the opportunity to promote more investment products suitable for the client's current stage of the life cycle.

1.3. Objectives to the study

The objectives of the study consisted of primary-, theoretical-, and empirical objectives.

1.3.1. Primary objective

The study analysed the validity of the current client investment life cycle theory in a South African universal bank. This was done by analysing client data and investment requirements while drawing some conclusions on existing theories.

1.3.2. Theoretical objectives

In accordance with the primary objective of the study, the following theoretical objectives were formulated:

- Contextualising the validity of investor life cycle theory;
- Conduct an in-depth analysis on how investors are characterised in different risk-taking categories;
- Link investor life cycle with the appropriate level of risk;
- Analysis of the South African banking industry;
- Provide a theoretical background on the importance of Big Data in banking; and
- Link the importance of the banking industry to investor needs.

1.3.3. Empirical objectives

In accordance with the primary objective of the study, the following empirical objectives were formulated:

- Determine the demographic factors that influence investment product selection;
- Analyse the individual investors' product choices over different income levels;
- Determine individual investors' phase in the investor life cycle; and
- Identify if South African investors conform to the patterns laid out by the investor life cycle theory.

1.4. Research design and methodology

The results and success of the implementations were analysed from a quantitative point of view as secondary client data were analysed. The data were analysed to determine the willingness of investors to invest in risky investments and distribution of investment products of the selected population.

1.4.1. Literature review

Secondary sources were used to conduct this study and prior research on the investor life cycle was considered. Literature sources included international databases, such as journal articles, books, reputable online newspaper articles and websites.

1.4.2. Empirical study

The empirical portion of the study consists of the following methodological dimensions:

1.4.2.1. Target population and sampling frame

The target population chosen for this study was made up of South African investors. The sampling frame consisted of a sample of investors from a South African bank. The requirement was that these investors have a main bank account at the bank with at least one additional investment product held. The bank offers numerous banking services from day-to-day transactional services and retail banking needs to investment and insurance products, which ensures the sample is well-diversified.

1.4.2.2. Sample, sample method and sample size

The stratified sampling technique was used. The technique forms part of the probability sampling methods, which suggests that every element that forms part of the population has a non-zero chance of being selected (Maree, 2012:172). Stratified sampling can be defined as a method where the entire population used for the study is subdivided into categories or strata. From the sample, an equal allocation would be made to ensure each stratum has the same number of elements (Rossi *et al.*, 1983:37).

1.4.2.3. Data extraction and source

The data were received directly from the bank and were extracted from a relational database using a domain specific data extraction language i.e. Structured Query Language (SQL).

1.4.3. Statistical analysis

In order to quantify the data, descriptive- and inferential statistics were used. The statistical analysis System, (SAS) Enterprise Guide 7.1 in combination with Microsoft Excel 2016 was used to analyse the data by doing data modelling, correlation and regression analysis.

1.5. Ethical considerations

All requirements regarding ethical standards of academic research were adopted for the research study conducted (NWU, 2016:15). The data provided by the bank were signed off by the relevant data owner and all participants were kept anonymous. No reference was made directly to the bank and no information was disclosed that can be tied back to a specific investor. Data were also sampled and not used in its entirety. No data extracts or bank specific information were stored on any personal devices or transmitted through personal emails. Prior to any new data extracts, sign-off was obtained from the data owner.

1.6. Chapter classification

This comprised the following chapters:

Chapter 1: Introduction and background to study. The concept of the investor life cycle and the limitations in the current South African banking sector are introduced.

Chapter 2: Individual investor decision. The investor life cycle is discussed with the focus being placed on how investors from different demographics are grouped into the different investment periods. The methods banks use to group investors into different risk profiles that can be linked back to the investor life cycle are also discussed.

Chapter 3: South African banking industry. This chapter comprises an analysis of the current South African banking sector and the limitations and challenges faced in the investment sector. The importance of banks in the investment process and the rise of Big Data are also highlighted.

Chapter 4: Research methodologies. The research process is discussed, as well as the methodical process followed and the statistical process that was used to analyse the data.

Chapter 5: Results and findings. The findings of the study after the data were analysed are discussed in this chapter.

Chapter 6: Conclusions and recommendations. The chapter summarises the findings and concludes the study.

CHAPTER 2: INDIVIDUAL INVESTMENT DECISIONS

2.1. Introduction

The underlying concepts of individual investment decisions revolve around numerous overlapping areas of study. These decisions mainly include logical financial ideas and concepts, however, the psychology behind irrational investment decisions will also need to be thoroughly understood in order to construct an understanding of how to approach this issue. An investment represents any instrument that can be used to achieve capital growth by committing cash with the expectation of future income (Skully, 2007:35). There are numerous strategies that can be followed regarding how to effectively structure a portfolio with the most efficient asset mix. The investor life cycle, which was introduced in Chapter 1 will form the basis of this study. With advances in healthcare and general living standards across the world, money management, and effective investment strategies to ensure a comfortable retirement have become more important than ever before (Van Solinge & Henkens, 2010:47-48). Studies have shown that the majority of South Africans will not have enough savings by the time they need to retire (Nogantshi, 2015:1). By understanding the needs of investors, banks have the opportunity to provide more effective solutions and promote relevant investment strategies to their client. This chapter covers the theories behind the most effective strategies financial institutions can use to profile their clients and ultimately advise them on how to invest their wealth. The first three theoretical objectives are addressed in Chapter 2 which are to contextualise the validity of investor life cycle theory; conduct an in-depth analysis on how investors are characterised in different risk-taking categories; and link investor life cycle with appropriate level of risk.

The subsequent sections to follow begins by introducing the concept of risk profiling and how South African banks group investors into different risk categories based on their individual considerations, objectives, constraints, and risk tolerance. The main asset classes, which include cash and other marketable securities, bonds, real estate, equities, and alternative investments, are then introduced and discussed (Travers, 2004:7-8). It is important to have the best combination of assets for the specific investor needs in a portfolio, which is why the theory of asset allocation is focussed upon. In order to fully understand how the asset mix of a portfolio is decided on, the calculations to determine an asset's risk and return are discussed, as well as all the different asset pricing models. The focus then shifts back to the investor life cycle with

the four different phases of an individual investor's life explained in more detail. The life cycle is made up out of the accumulation, consolidation, spending, and gifting phases (Brown & Reilly, 2012:33). Consideration is given to the effects of behavioural finance and how this affects the investor life cycle. Lastly, prior research on the investor life cycle is discussed.

2.2. Investor risk profiling

There are several factors a bank needs to take into consideration when profiling investors into different risk categories. The main driving forces for individual investment needs stem from demographic- and socioeconomic influences (Sulaiman, 2012:109-115). Banks generally have enough client information obtained when clients open new accounts, to determine in which risk category a client would fall based on the manner demographics such as age, gender and race influence risk-taking behaviours (Sulaiman, 2012:109-115). However, this is not the only information a bank needs to accurately profile their investment clients, as every individual would have their own specific investment considerations and goals. Further to this, a number of factors constraining the asset types that can be included when choosing the perfect asset mix are considered. Each investor perceives risk differently and has differing risk tolerance levels of risk given the expected return (Barclays Plc, 2018:1).

In addition to different perceptions of risk, there are also differing levels of sophistication under investors. Investors with more financial knowledge monitor the market and use complicated technical- or fundamental analysis techniques in order to identify and exploit profit making opportunities (Al-Tamini & Kalli, 2009:500-501). The average individual with moderate to no financial knowledge will, however, choose investments based on limited information and the performance of the investment will be subjective to market forces. Investors hope to make future profits, however, they will need to accept losses if markets fall. Understanding what type of investor a bank is dealing with is of utmost importance as it will assist to select the correct investment products (Barclays Plc, 2018:1). There are three broad categories banks measure and score, in order to determine what kind of investments are most suited for an investor. These categories will be discussed in Section 2.2.1.

2.2.1. Investor considerations

In order to provide investors with the best investment products, banks need to understand exactly what the saving goal is for individual investors. Here the investor's age is a big

consideration as the investment horizon for an investor in their twenties is far longer than an investor in their sixties when considering retirement savings. Investors who agree to advisory services with a bank are generally required to complete questionnaires known as a Financial Needs Analysis that aim to provide insight into the investor's considerations, objectives, risk tolerance and ultimately what the investor is trying to achieve with the specific investment choice (Budhram, 2017:1).

2.2.2. Investor objectives

The investment objectives for individuals differ considerably, however, they can be grouped into four main types, i.e. capital preservation, capital appreciation, current income and total return (Elmiger & Kim, 2002:101).

2.2.2.1. Capital preservation

Hallman and Rosenbloom (2009:214) elaborate on the theory that investors seek to protect the invested funds and therefore keep the possible loss amount to a minimum. In an attempt to keep the real value of the investment as high as possible, the investment needs to generate more returns than the amount by which inflation increases general price levels. This strategy is best suited for short-term investment goals, including saving for a down payment on a mortgage bond, or university tuition due in a year's time (Curtis, 2004:20).

2.2.2.2. Capital appreciation

This objective is normally accompanied with longer investment time-lines and is considered a more aggressive investment approach. The investor is saving towards future obligations, like retirement funding or a university fund for their children (Brown & Reilly, 2003:45). Higher levels of risk will be tolerated to achieve larger gains (Kess & Mendlowitz, 2016:68).

2.2.2.3. Current income

Investors seek to earn some form of income from the investment with this approach. The goal is therefore not to save for a future expense, but to support a current lifestyle. Individuals who are no longer earning a salary after retirement may use this strategy, as they can live of the income generated by the investment, without using up their retirement savings (Witz & Zemon, 2017:27).

2.2.2.4. Total return

The objective is similar to that of capital appreciation, however, apart from saving for a future need by means of capital appreciation, the investor will also reinvest the income generated by the investment (Kess & Mendlowitz, 2016:68).

2.2.3. Investor constraints

Baker and Filbeck (2013:129) list five constraints that will need to be taken into account when determining an investor's investment needs. These constraints include liquidity needs, investment time horizon, tax considerations, legal and regulatory requirements, and the individual's unique circumstances.

2.2.3.1. Liquidity needs

Liquidity of an asset can be defined as the ease of converting the asset into cash, which can be used immediately (JSE, 2018b:1). An example of highly liquid assets is Treasury bills, while real estate and art are seen as illiquid assets due to the long process involved with finding a buyer (Rose & Hudgins, 2010:315-316). Individuals require a portion of their investment in these liquid assets in order to have disposable funds for monthly expenses, like travel, accommodation, entertainment and medical expenses. Investors should also prioritise a safety fund in liquid assets to fund unexpected expenses, like storm damage to their homes, car accidents and so forth (Dammon *et al.*, 2004:1025-1026).

2.2.3.2. Time horizon

The amount of time for which an investment can be invested is strongly correlated with the need for liquidity and the amount of risk an investor is willing to take (Brown & Reilly, 2003:46). Younger investors have longer investment horizons, and it is assumed that they will not need funds invested for long-term goals until a much later stage in their lives (Bovenberg *et al.*, 2007:348). These investors are also willing to take higher amounts of risk with the potential of reaping higher returns in the future, as any potential losses can be recovered from over the long investment period (Hallman & Rosenbloom, 2009:213).

2.2.3.3. Tax considerations

Proper tax planning is important when constructing a portfolio, as governments around the world use different strategies to tax investments. Taxes on income, capital gains, gifts and other wealth taxes can greatly reduce the amount of capital growth received from the different asset classes (Dammon *et al.*, 2004:999-1000).

Previous research conducted by.... Chance *et al.* (2003:74), Wasik (2016:1) and Keswell (2017:1) found that there are some strategies an investor can consider to reduce the amount of tax individuals are liable to pay:

- Tax avoidance – This strategy involves choosing investments that are non-taxable or saving in specialised tax-free accounts.
- Tax reduction – A popular method to limit an investor's exposure to tax expenses is to invest in growth stocks instead of income stocks as the capital gains on these investments will be lower. Another strategy is to sell securities at a loss, although this may seem counterintuitive to what the investor would like to achieve. This strategy is referred to as loss harvesting.
- Deferring taxes – By holding investments for longer periods, investors can take advantage of capital gains tax breaks granted when investments are held for longer than a specified threshold period.
- Wealth transfer taxes – By transferring wealth in the form of gifts investors can reduce the amount of tax to be paid, depending on specific juristic conditions and thresholds specified by the country where the investment is to be taxed.

2.2.3.4. Legal and regulatory requirements

Oversight over financial markets has stringent requirements and need to comply with copious amounts of legislation and regulation (Brown & Reilly, 2003:50). This is to include penalties for early termination of an investment. Investments specifically geared towards retirement often have large penalties if removed before the age of sixty (Arde, 2016:1). Investors often shy away from these types of investments due to the need for liquidity and to hedge the risk of possibly paying a penalty on their own money (Nedbank Ltd., 2018:1). Insider trading is also of concern and it happens when any employee of a company with knowledge of a big decision, like buying another company or merging with another company, is legally not allowed to act

on such information (Van Osselaer, 2017:399-400). Summerton and Rossouw (2010:1) emphasise that investors can avoid legal issues by seeking legal help before investing. This can limit the choices of assets to be included in their portfolio.

2.2.3.5. Unique circumstances

Additional provisions need to be made for unique circumstances. These unique circumstances can include every constraint that is not covered by the other constraint categories. This can include not investing in a company due to personal objections against the type of business or how a company is being operated (Hevner, 2009:21-22). Macey (2013:1-3) finds that by showing interest in the kinds of investments an investor is morally comfortable with, client retention is improved and the bank's reputation is bolstered.

2.2.4. Risk tolerance

Risk tolerance suggests that every individual has a set amount of risk they are willing to take or is tolerable towards a certain amount of risk, in order to receive the highest returns on an investment (Harlow & Brown, 1990:50-52). Regardless of numerous studies already conducted on risk tolerance, debates are still raging around the most effective manner of measuring risk tolerance. This is due to the subjective nature of investors to act in unpredictable manners (Grable, 2000:625). Furthermore, Cordell (2001:36) suggests that risk tolerance comprises four unique features, which need to be measured to accurately gage an investor's tolerance to risk. The features are propensity, capacity, attitude and knowledge.

2.2.4.1. Risk propensity

The concept of risk propensity refers to the investor's past and present risk-taking actions (Meertens & Lion, 2008:1506). Financial advisors would generally recommend more risky assets to an investor that invested in high risk investments in the past. This could be a useful indicator as to which assets to consider as part of the asset mix, however, it should only be considered in conjunction with the other three features of risk tolerance discussed in subsequent paragraphs. Investors often hold risky assets without the knowledge of the possibility of loss, or simply stay invested in a risky asset due to uncertainty as to where to invest instead (Cordell, 2002:30).

2.2.4.1. Risk capacity

In order to assess how much risk an investor can handle, an advisor needs to have a firm idea of their risk appetite. The monthly disposable income available to be invested and the time horizon in which the funds can be invested for affects the type of investments to be considered (Barclays Plc, 2018:1). The investor may also require invested funds to grow by a specific amount to reach their financial goals. Taking into consideration an investor's age, profession, experience, goals, and theoretical position on the investor life cycle, an advisor can make an informed decision on what kind of investments the investor should consider (Schuchardt *et al.*, 2009:90).

2.2.4.2. Risk attitude

By assessing an investor's attitude towards risk, an advisor can get an idea of how much risk an investor would be willing to take (Cordell, 2001:37). This is where scientifically formulated questionnaires are of utmost importance, as measuring attitude is subjective of nature, and reliance is placed on how honestly investors answer these questions. Rather than evaluating past decisions of an investor, this feature measures the risk an investor would be willing to take, currently and in the future (Dohmen *et al.*, 2011:523-524).

2.2.4.3. Risk knowledge

Masson and Stark (2004:232) elaborate that a thorough understanding of how investments and risk work generally makes an investor more willing to take a calculated risk. These investors understand that if they have a longer investment horizon, it may be worthwhile to accept higher risk as any losses can be cancelled out over the longer period. They will also be less prone to panic during times where the market is bearish (Cordell, 2002:32).

2.3. Main asset classes

In order to construct the most efficient portfolio, it is essential to know exactly which assets can be invested in, as well as the advantages and disadvantages associated with each. For the purpose of this study, four main asset types will be discussed namely cash and other marketable securities, bonds, equities, and alternative investments (Hevner, 2009:25-26).

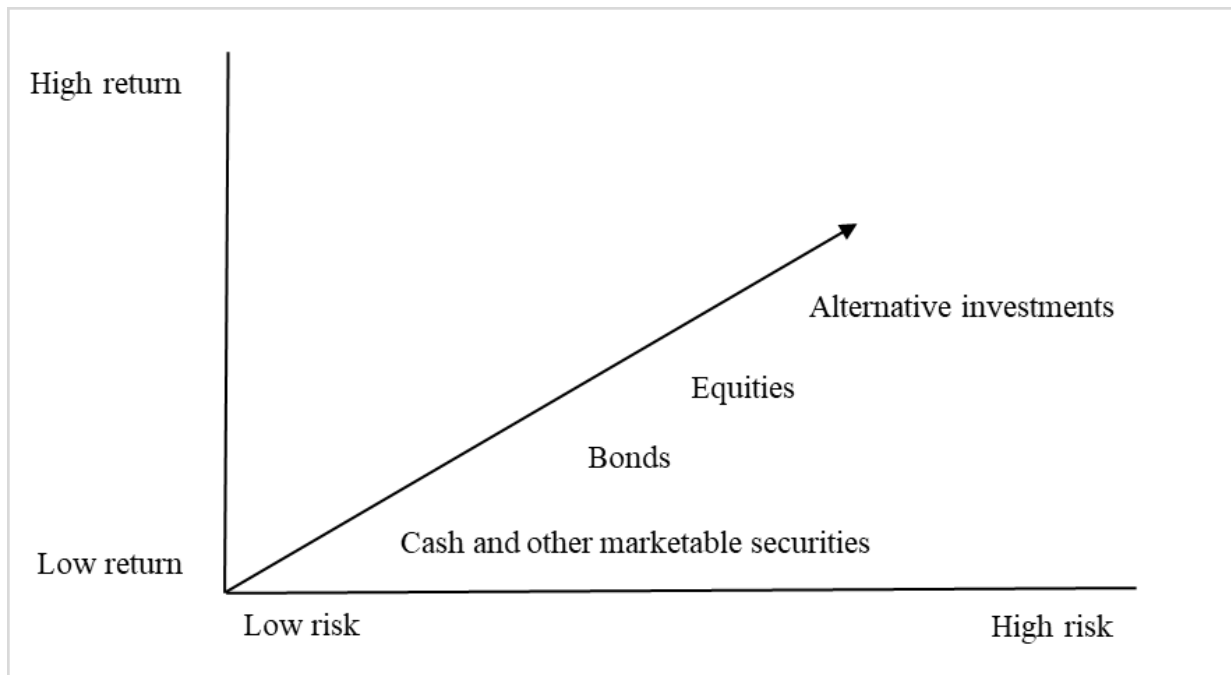


Figure 2.1: Risk vs. Return per Asset Class

Source: Travers (2004:8).

Figure 2.1 indicates the risk and return relationships for the four main asset classes to be discussed.

2.3.1. Cash and other marketable securities

According to Marais (2016:1), cash and other investments that form part of the money market are short-term investments usually associated with financial instruments with less than one year to maturity. These investments can easily be exchanged in the market due to high liquidity. They are often seen as the safest investment class with the disadvantage of lower returns when compared to other riskier asset classes (Rose & Hudgins, 2010:314-315). Table 2.1 presents the advantages and disadvantages of cash and other marketable securities.

Table 2.1: Advantages and disadvantages of cash and other marketable securities

Advantages		
Safety	Due to the low amount of risk investors are exposed to, the value of cash and other marketable securities is guaranteed not to lose nominal value. Banks also have strict capital requirements provided by the Basel Accord, which insures the investment to a certain extent.	Gibson (2008:24)

Liquidity	Due to the ease of converting these securities into cash, an investor will always be able to readily use these funds in case of emergencies.	Segar (2012:1)
Investment opportunities	As these securities are very liquid, it is easy to take advantage of investment opportunities that present itself. This could be in the form of new business ventures, identifying undervalued equities expected to grow in the future, or buying new property in an up and coming neighbourhood.	Segar (2012:1)
Disadvantages		
Low return	Due to the low amount of risk and ease of conversion, these instruments generally provide lower growth rates when compared to the other asset classes.	Gibson (2008:24)
Inflation	Due to the natural increase in goods prices, cash investments face the risk of losing real value, as the interest earned can often be lower than the percentage inflation increases by.	Loungani & Sheets (1995:381-382)
Interest rate risk	Returns are dependent on interest rates. If the economy is going through recession, interest rates can decline and lower returns could be earned. This ties in with the disadvantage of inflation.	Eisenschmidt & Tapking (2009:6)

Source: Author compilation

2.3.2. Bonds

Bonds are medium risk investments that promise low to medium returns. Bonds are also known as debt financing instruments, which means the issuer of the bond owes the holder a debt (Brigham & Ehrhardt, 2011:174-175). The holder is therefore entitled to a certain amount of interest known as coupon payments as specified by the bond contract, with the principle investment amount to be paid on the maturity date of the investment (Bodie *et al.*, 2001:35). Table 2.2 presents the advantages and disadvantages of bonds.

Table 2.2: Advantages and disadvantages of bonds

Advantages		
Low risk	These investments generally tend to have lower risk than equities and alternative investments due to the contractual obligation between the issuer and the bond holder.	Fitzsimons (2017:1)
Source of income	Bonds pay coupon payments at regular intervals and thus investors have a steady stream of income. This is especially useful after retirement as the income could be an alternative to a monthly salary.	Brigham & Ehrhardt (2011:138); Ibbotson (2018:1)

Portfolio diversification	Bonds form a crucial part when constructing a portfolio as they tend to be highly uncorrelated with the equities market. When the equities market is not performing well, bonds can help to keep returns stable.	Ibbotson (2018:1)
Disadvantages		
Low returns	Investors have the opportunity to earn higher returns with equities and more risky investments over the long-term.	Ibbotson (2018:1)
Default risk	If the company that issued the bonds goes into bankruptcy, the investor could lose the invested funds.	Fons (1994:25)
Interest rate risk	If interest rates increase, bond prices are negatively affected.	Lazaroff (2016:1)

Source: Author compilation

2.3.3. Equities

Equities are instruments traded via an exchange, which typically includes ordinary shares, preference shares, Real Estate Investment Trusts (REIT's), and Exchange-Traded Funds (ETF's) (Brown & Reilly, 2012:70-75). The Johannesburg Stock Exchange (JSE) defines ordinary shares as a direct investment into a specific company (JSE, 2013:1). With equities, investors own a portion of a company and have the right to vote on decisions that can impact the value of the shares. Investors can decide on the individuals that will form part of the board of directors, who in turn employ the executives responsible for managing the company (Brigham & Ehrhardt, 2011:269). Investors do not earn any interest, however, they can earn a dividend payment depending on the amount of profit the company they are invested in earned (Brigham & Ehrhardt, 2011:269; JSE, 2013:1). The value of the shares can also increase as the value of the vested company increases (JSE, 2013:1).

Preference shares are similar to ordinary shares, with the difference that investors have limited voting rights and as the risk is lower, the returns are generally lower than that of ordinary shares (Hallman & Rosenbloom, 2009:178). REIT's are good investment instruments if an investor is considering to enter the property market, without the requirement of a large initial cash investment. These instruments behave similarly to ordinary shares with REIT payments functioning similarly to ordinary share dividends. The instrument also has the added benefit of being more liquid than investing directly in real estate as they are traded via an exchange, which makes buying and selling more convenient (Blau *et al.*, 2015:233-234). Another instrument

that has gained popularity in recent years are ETF's. An ETF tracks a bucket of underlying assets that includes indexes, commodities, bonds and shares (ABSA, 2018b:1). An example would be an ETF tracking the Top 40 listed companies in South Africa. They usually have quarterly dividends paying out at the same ratio as the underlying assets paid out during the same period (Hallman & Rosenbloom, 2009:199-200). Table 2.1 presents the advantages and disadvantages of equity investments.

Table 2.3: Advantages and disadvantages of equities

Advantages		
Higher long-term returns	Historically, equities have resulted in higher returns over the long-term. Events like the financial crisis in 2008 showed how volatile the market can be, however, the effects of these events are ironed out over a long investment period.	Gibson (2008:45); Brigham & Ehrhardt (2011:144)
Investing offshore	Equities provide the option of investing in international companies, hedging against negative events felt in the investor's country of residence.	JSE (2018a:1)
Source of income	Equities have regular payments in the form of dividends that can provide income, however, unlike bonds companies are not contractually obligated to make these payments.	Brigham & Ehrhardt (2011:148); JSE (2018a:1)
Disadvantages		
Market volatility	In the short-term, equities can potentially lose massive amounts of their original value due to poor performance by the company, and economic factors that influence equity prices.	Gibson (2008:45)
Complex instrument	Investing in equities requires some investment knowledge, as prior research into the equity the investor is considering to buy should be conducted before investing.	JSE (2018a:1)
Less liquid	Depending on the specific instrument, these instruments are generally less liquid as they trade on the principle of supply and demand. If there is no demand for a specific equity, an investor will struggle to sell. There is also a three-day waiting period for these trades to settle after selling.	JSE (2018a:1)

Source: Author compilation

2.3.4. Real estate

Real Estate constitutes investments in property. These investments can generate great returns, however, the biggest drawback is that the process of buying and selling property is lengthy and complex, involving numerous legal requirements (Kyle, 2000:1-3). The buy and sell are also dependent on finding a willing buyer and seller. Real estate can be purchased for a personal home, to be rented out, or for commercial use (Gibson, 2008:166).

Table 2.4: Advantages and disadvantages of real estate

Advantages		
High return on investment	Investing in an up and coming neighbourhood where prices are low, can result in a big return on investments once prices start increasing.	Rose (2018:1)
Source of income	Buying property with the idea of renting it out can generate a stable monthly income.	Rose (2018:1)
Disadvantages		
Illiquidity	The biggest drawback of investing in property is the long period involved with finding willing buyers and the lengthy legal process that follows.	Heystek (2015:1)
Interest rate risk	Most investors would require a mortgage bond to buy property. If the interest rate increases, the monthly bond repayments also increase and an investor could default on the payments.	Heystek (2015:1)

Source: Author compilation

2.3.5. Alternative investments

An alternative investment is a broad category including any investment that does not form part of the previously discussed more conventional investment categories. These investments are high risk illiquid instruments, which is generally more specialised, requiring more investment knowledge and skills (Skully, 2007:35-36). Alternative investments include instruments such as hedge funds, derivative instruments, art, private equities, venture capital, and commodities (Liang, 2004:76).

Table 2.5: Advantages and disadvantages of alternative investments

Advantages		
Massive returns	Due to the high risk and potential loss an investor could face with these instruments, they have the potential of generating much higher returns than any other asset class.	Skully (2007:35-36); Simpson (2016:24-25)
Disadvantages		
Highly complex	No investor should invest in these instruments without a proper understanding of the underlying mechanics that drives these instruments.	Skully (2007:35-36); Simpson (2016:24-25)

Source: Author compilation

2.4. Asset allocation

Asset allocation can be defined as the amount of assets an investor has in different categories of assets (Sharpe, 1992:7). Due to the differences in volatility levels and potential returns from different asset types, the variability on the returns for an individual's portfolio can largely be explained by the different asset types the portfolio is made up of (Patton, 2004:130-131).

2.4.1. Diversification

The concept of diversification was first introduced by Markowitz (1952) who developed the modern portfolio theory. Diversification is important when constructing a portfolio as the idea is that by combining assets that move in different directions as a result of changes in the market, the unsystematic risk is reduced (Ilmanen & Kizer, 2012:15-16). Diversification however fails to reduce systematic risk as all market factors are susceptible to systematic risk. One asset may be negatively affected by a change in the market, while another is positively affected, cancelling out some of the negative movements. The more assets in the mix that are uncorrelated with each other, the less risk will be inherent in the portfolio (Fabozzi *et al.*, 2002:7-8).

2.4.2. Constructing the most efficient asset mix

Brown and Reilly (2012:534-535) list two broad strategies that can be used when deciding on the perfect asset mix, being strategic asset allocation and tactical asset allocation. Strategic asset allocation aims to structure the mix of assets based on the individual investor's needs and unique characteristic. This is generally a long-term strategy, as once the desired mix of assets

has been determined, a passive strategy is adopted and the investments will move together with market forces. Portfolio managers need to be patient and should not continuously adjust the portfolio to include assets that might be outperforming assets currently in the mix (Campbell & Viceira, 2002:3-4).

Tactical asset allocation aims to take advantage of undervalued markets. The mix is adjusted away from properly or overvalued instruments and more undervalued instruments are added to the mix. This constitutes a short-term allocation method and the portfolio is actively managed to ensure the mix of assets always includes the most relevant undervalued assets. The strategy requires a disciplined approach as the risk and return of each asset needs to be carefully considered before changing the mix (Lee, 2000:14-15).

2.4.3. Measuring the risk of an asset or portfolio

Understanding how much risk each asset being considered for a portfolio holds is important in order to limit the overall portfolio risk to what an investor's individual risk profile allows. Loth (2007:1) lists four formulas used to measure risk by calculating variance, standard deviation, coefficient of variation and beta.

2.4.3.1. Variance

The calculations for variance and standard deviation are the simplest measures for risk, however, they are useful when analysing financial assets (Glosten *et al.*, 1993:1779). Both variance and standard deviation measure the spread between the mean of the data and the actual data points. If the data are further apart, a larger variance and standard deviation would result, which suggest greater uncertainty and risk (Salvatore & Reagle, 2002:13). The formula for a sample's variance is:

$$\sigma^2 = \sum \frac{(R_p - \bar{R})^2}{n - 1} \quad (2.1)$$

Where n is the number of data points for the selected sample. R_p represents each value in the portfolio with $\bar{R}$ being the mean of R_p . Variance needs to be considered as it places more weight on outliers (Salvatore & Reagle, 2002:13). This also eliminates the possibility of data below the mean value from being cancelled out by values above the mean, which can result in a zero variance. However, the data are no longer in the original unit of measure (Gibson, 2008:64).

2.4.3.2. Standard deviation

Salvatore and Reagle (2002:13) indicate that by taking the square root of variance, the formula for standard deviation is obtained:

$$\sigma = \sqrt{\frac{\sum(R_p - \bar{R})^2}{n - 1}} \quad (2.2)$$

Where n is the number of data points for the selected sample. R_p represents each value in the portfolio with $\bar{R}$ being the mean of R_p . By taking the square root, the data are restored to its original form. If the standard deviation is zero, all the data points are equal to the mean and as a result, there is no risk (Salvatore & Reagle, 2002:13).

2.4.3.3. Coefficient of variation

The coefficient of variation (CV) is a measure used to determine the dispersion of a probability distribution (Brown, 1998:155). The CV is a good measure of risk where the expected returns of two assets differ. The formula is represented as follows:

$$CV = \frac{\sigma}{\bar{k}_i} \quad (2.3)$$

Where σ is the standard deviation of the portfolio and $\bar{k}_i$ represents the expected return of the portfolio. A higher CV points to more risk in the portfolio (Brown, 1998:155).

2.4.3.4. Beta

Beta is a form of regression analysis and it compares the overall market to a portfolio in order to determine the systematic risk, more commonly known as the volatility of the portfolio. The idea is to determine how the portfolio reacts to changes in the market (Elmiger & Kim, 2002:41).

$$\beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)} \quad (2.4)$$

Where R_i is the rate of return of the stock and R_m represents the rate of return for the market portfolio (Elmiger & Kim, 2002:41).

2.4.4. Measuring the expected return of an asset or portfolio

The expected return of a portfolio is determined by calculating the weighted average profit of each individual asset and adding them together (Gibson, 2008:64).

$$E(R) = \sum_{i=1}^s P_i R_i \quad (2.5)$$

Where $E(R)$ is the expected return of the portfolio. P_i represents the probability of the i^{th} state occurring and R_i is the return if the i^{th} state occurs while s is the number of possible states (Luenberger, 1998:140).

2.4.5. Interpreting risk and return

After the risk and return of all the assets that will form part of a portfolio has been determined, it is important to understand how correlated these assets are with each other, and how to interpret the result (Elmiger & Kim, 117-118).

2.4.5.1. Correlation

As discussed previously, diversification of a portfolio greatly reduces the risk of a portfolio. Understanding how correlated assets are with each other will assist in choosing the most diverse assets (Elmiger & Kim, 2002:234). The formula to calculate correlation is shown as:

$$r_{xy} = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}} \quad (2.6)$$

Where x & y is the individual assets and n is the number of pairs of scores (Baker & Filbeck, 2015:108). Correlation will always have an answer between -1 and 1 (Lind *et al.*, 2006:377-378). The table below illustrates how to interpret the results.

Table 2.6: Interpretation of correlation results

Correlation Results	Interpretation
-1	The movements of the securities are perfectly inverse. If the one security increases, the other would decrease in exactly the same amount but in the opposite direction.
Between -1 and 0	The movements of the securities are inverse. If the one security increases, the other would decrease in the opposite direction.

0	No relationship between the securities.
Between 0 and 1	The movements of the securities are correlated. If the one security increases, the other would increase in the same direction.
1	The movements of the securities are perfectly correlated. If the one security increases, the other would increase in exactly the same amount and in the same direction.

Source: Lind *et al.* (2006:377-378)

2.4.5.2. Securities Market Line (SML)

The SML can be used to visually represent the most efficient mix of risk and return of different investments by constructing a portfolio with risky assets and a risk-free asset (Mpofu *et al.* 2010:35). In Figure 2.2, the relationship between assets will create a straight line as there is a linear relationship between expected return and standard deviation (Luenberger, 1998:182; Brown & Reilly, 2012:21).

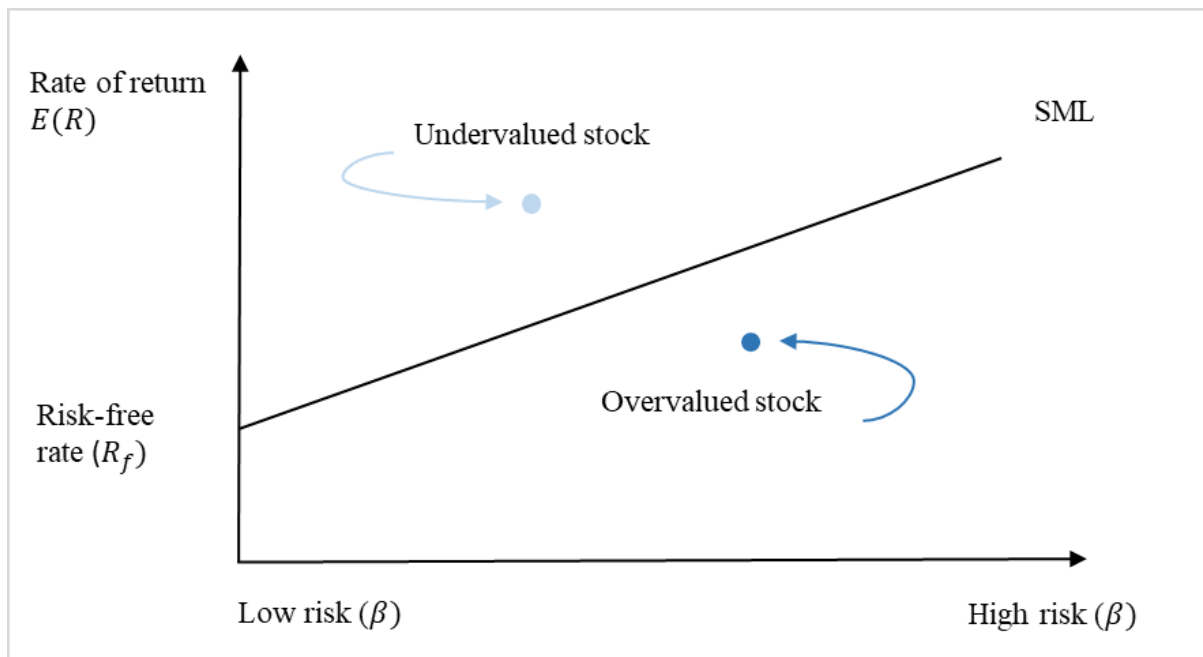


Figure 2.2 Securities Market Line

Source: Luenberger (1998:182); Mpofu *et al.* (2010:35); Brown & Reilly (2012:21).

2.4.6. Measuring the performance of an asset or portfolio with asset pricing models

The majority of investors make investment decisions based on the return an asset has generated or is expected to generate. As per the previous topics discussed, it is clear that the amount of

risk an investment has should also be considered (Warren, 2009:52). Two investments could have identical returns, however, based on the risk level, one may actually be underperforming. This issue resulted in three alternative measures being developed namely Treynor's performance index, Sharpe's ratio and Jensen's alpha (Bello, 2005:47-49).

2.4.6.1. Treynor's performance index

Treynor (1965) developed a measure that indicates the amount of return per unit of risk a portfolio is expected to generate. The Treynor performance index can be represented mathematically as (Ming Chen, 2017:4-5):

$$T = \frac{\bar{R}_p - R_f}{\beta_p} \quad (2.7)$$

$\bar{R}_p$ is the expected return of the portfolio with $\bar{R}_f$ representing the risk-free rate. β_p is the beta or systematic risk of the portfolio's returns (Ming Chen, 2017:4-5)

2.4.6.2. Sharpe ratio

The Sharpe ratio was developed by William Sharpe (1966) and measures the expected portfolio return given the standard deviation (Bodnar & Zabolotsky, 2016:2). The formula can be written as per the below:

$$S = \frac{\bar{R}_p - R_f}{\sigma_p} \quad (2.8)$$

$\bar{R}_p$ is the expected return of the portfolio with $\bar{R}_f$ representing the risk-free rate. σ_p is the standard deviation or total risk of the portfolio's returns (Bodnar & Zabolotsky, 2016:4).

2.4.6.3. Jensen's alpha

Jensen's alpha was first introduced by Michael C Jensen (1968) in an attempt to improve how the performance of mutual funds is measured (Bello, 2005:47).

$$\alpha_p = \bar{R}_p - [\bar{R}_f + \beta_p(\bar{R}_M - \bar{R}_f)] \quad (2.9)$$

Where $\bar{R}_p$ is the expected return of the portfolio with $\bar{R}_f$ as the risk-free rate. β_p is the beta or systematic risk of the portfolio. $\bar{R}_M$ is the expected return of the market (Bello, 2005:47).

2.4.7. Asset allocation across risky and risk-free portfolios

Assets are ranked by how risky they are as demonstrated in Figure 2.1, with cash and other marketable securities seen as low risk investments and equities carrying higher risk. There is a correlated relationship between the amount of risk and the expected return an investor should receive for the amount of perceived risk. A risk-free asset can be defined as an instrument that guarantees a future return that is uncorrelated with other assets. The asset that comes closest to being risk-free is Treasury bills, as these instruments are backed up by the government where they have been issued (Bodie *et al.*, 2003:150).

There are two main models that can be used to price a portfolio. The first method to be discussed is the Capital Asset Pricing Model (CAPM), followed by the Arbitrage Pricing Theory (APT) (Gibson, 2008:155).

2.4.7.1. Capital Asset Pricing Model (CAPM)

The CAPM analyses an investor's required rate of return that should be accepted, given the systemic risk to which an investment is exposed to. In order to benchmark the performance of a risky asset being measured using CAPM, the SML line can be used. The SML indicates how much return can be expected using the market portfolio and risk-free asset (Khudoykulov *et al.*, 2016:108).

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f) \quad (2.10)$$

Where $E(R_i)$ is the required return on financial asset, i and R_f represents the risk-free rate of return. β_i is the beta or systematic risk of the portfolio with $E(R_m)$ being the average return on capital market. The $E(R_m) - R_f$ portion of the formula is the market risk premium (Khudoykulov *et al.*, 2016:108).

The SML does not take lending and borrowing into consideration (Mpofu *et al.*, 2010:40). Luenberger (1998:183) elaborates that by allowing an investor to borrow at the risk-free rate, the return would increase in a linear fashion with an increase in the amount of risk giving rise to the capital market line (Brown & Reilly, 2012:200).

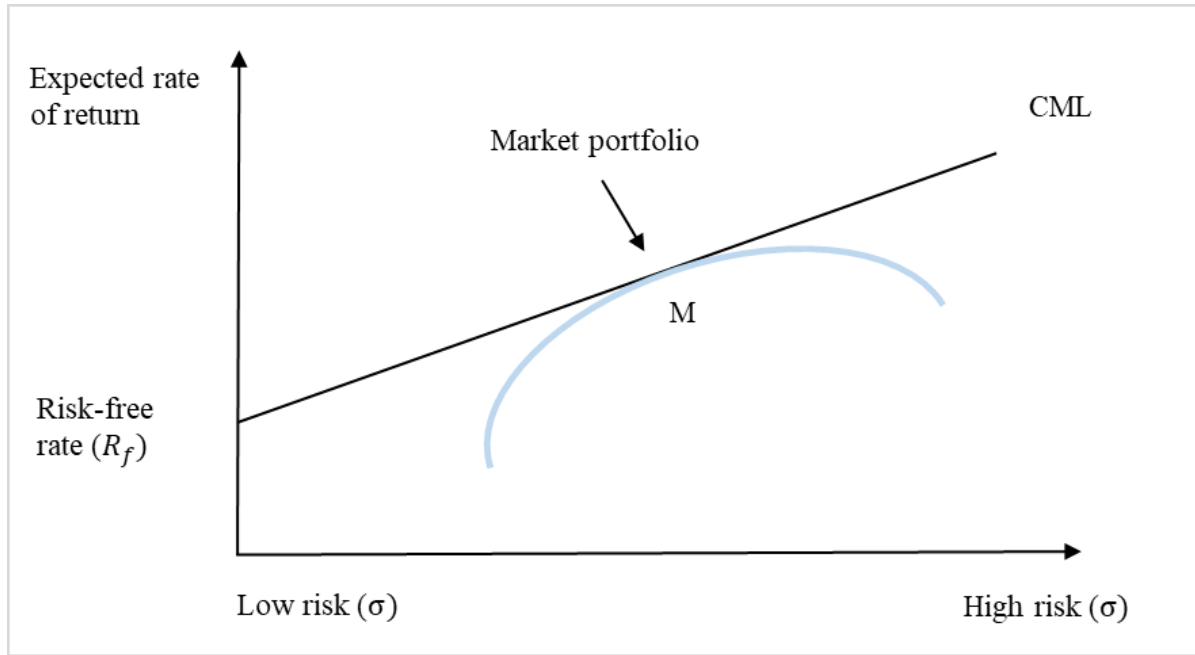


Figure 2.3 Capital Market Line

Source: Luenberger (1998:183); Mpofu *et al.* (2010:40); Brown & Reilly (2012:200).

2.4.7.2. Arbitrage Pricing Theory (APT)

Arbitrage can be defined as the process where an investor seeks out opportunities where assets are under- or overvalued in order to benefit from future price changes, as these assets adjust to their actual values (Kolb, 2002:7-8). APT was first developed by Ross (1976) and is rooted in the theory that there is a linear relationship between factors of risk and the amount of a return an asset will generate. The model comprises out of less complex assumptions than the CAPM model and seeks to highlight mispriced assets and exploit arbitrage opportunities. The theory is built on the assumptions that markets are frictionless, implying that there are no transaction costs, no limitations on trades and that markets are competitive (Cetin *et al.*, 2003:311-312). APT can be formulated as follows:

$$E_i = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} + \dots + \lambda_k b_{ik} \quad (2.11)$$

Where λ_0 is the return on an asset with zero systematic risk and λ_i represents the risk premium for the related factor, b_i is the pricing relationship between the risk premium and asset i (Khan & Sun, 2001:226-227).

2.4.8. Factor models

A factor model can be used to achieve the most diversified portfolio possible given the expected return based on the amount of risk the assets hold, while also considering the liquidity of the investments. A variety of different asset classes are used in the model in order to increase the amount by which a portfolio can be diversified (Becker, 2010:119).

In order to achieve this, each individual asset class needs to be identified and the risk and expected return calculated. If the asset mix is not the most efficient combination of risk vs. return, alterations can be made to the mix. Fabozzi *et al.* (2002:18) list three factor models that can be used namely statistical factor models, macroeconomic factor models, and fundamental factor models. The ability to measure the changes in return from the different asset classes due to changes in statistical, macro- or fundamental factors enable fund managers to measure their performances of actively managing portfolios. The results are compared to benchmarked asset class mixes and the fund manager can get a clear indication of how the fund is performing (Sharpe, 1992:7). A generic representation of a factor model can be represented as:

$$\tilde{R}_i = [b_{i1}\tilde{F}_1 + b_{i2}\tilde{F}_2 + \dots + b_{in}\tilde{F}_n] + \tilde{e}_i \quad (2.11)$$

Where $\tilde{R}_i$ is the return on an asset i and n is the number of factors. $\tilde{F}_n$ is the value of factor n with b_{in} representing the sensitivities of factors to the return while $\tilde{e}_i$ is the non-factor component or error term of $\tilde{R}_i$ (Sharpe, 1992:7-8).

2.5. Investor life cycle theory

A broadly acceptable definition of the investor life cycle theory is the behaviour of investors given their investment horizon. The theory's main assumption is that investors will behave differently in different stages of their lives and that the amount of time an investment is expected to be kept influences the amount of risk an investor takes (Coco *et al.*, 2005:526-527). According to Brown and Reilly (2012:33), the theory comprises four different life stages, being accumulation, consolidation, spending, and gifting. Bodie and Treussard (2007:47) found that target-date funds, also known as life cycle funds have the potential of earning greater returns when compared to some of the investment choices made by uninformed fund participants that lack investment knowledge. This highlights the importance of the life cycle as this simplifies the concept of investing to the average person.

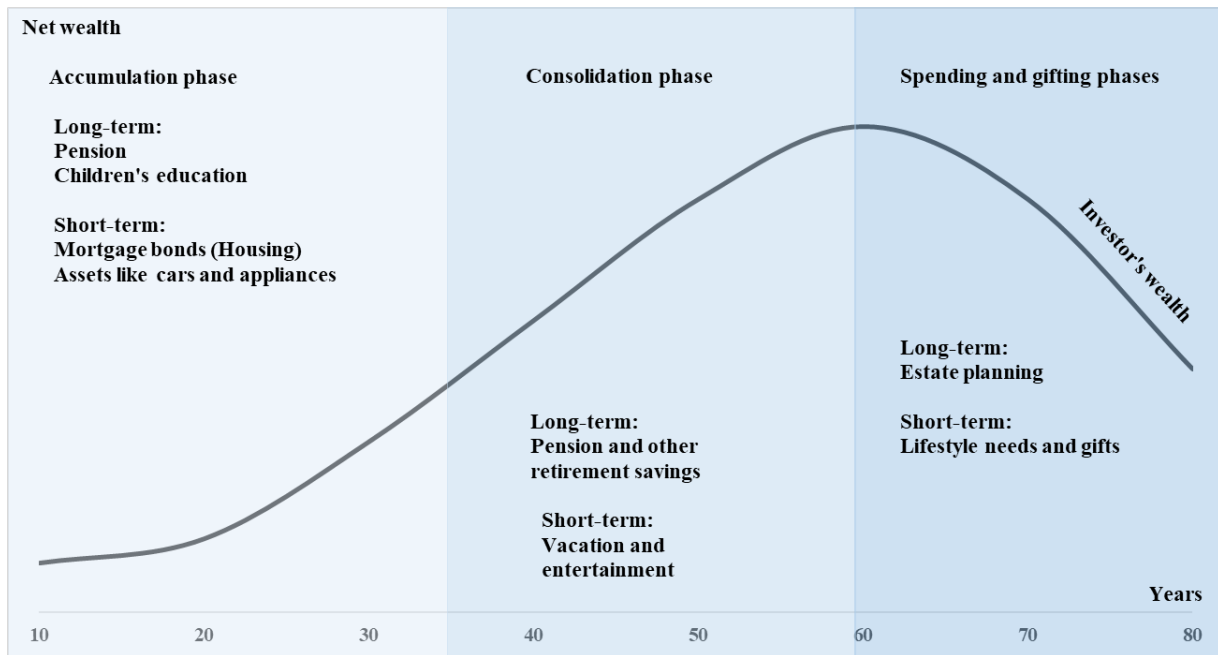


Figure 2.4: Investor life cycle

Source: Brown & Reilly (2012:33)

2.5.1. Accumulation phase

In this phase, the investor has just entered the workforce with lower expected income, which will increase as experience is gained (Brown & Reilly, 2003:37). Shorter term goals take precedence as generally a very small portion of the income can be invested as the bulk will go towards repayment of student loans, mortgage bonds and the accumulation of non-financial assets like cars and appliances (Bodie *et al.*, 2003:601). Investors will also start families in this stage that will further reduce the amount of disposable income that can be invested (Brown & Reilly, 2012:33).

The accumulation phase is one of the most important stages as investors can make use of a longer investment horizon as it can be expected that they still have time to recover investment amounts lost in risky investments (Brown & Reilly, 2012:33). The potential earnings on the smallest investment amounts in risky high return assets over the long investment period have the potential of generating massive returns when considering the effects of compounding interest (Mpofu *et al.*, 2010:266-267).

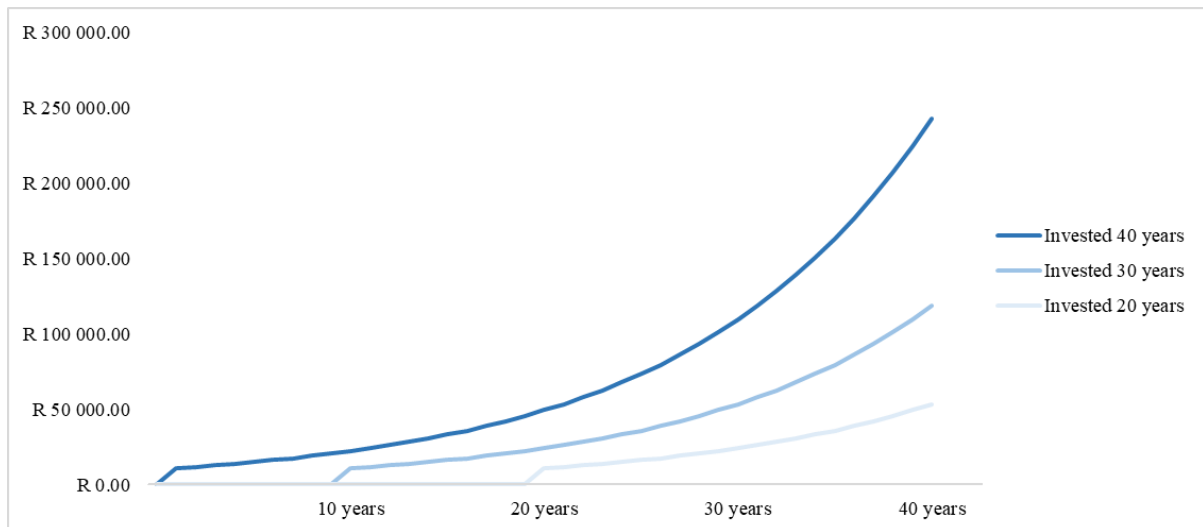


Figure 2.5: Compounding interest of R10 000.00 invested at 8% compounding monthly

Source: Author compilation

As per Figure 2.5, an investor with an initial investment amount of R10 000.00 invested monthly at a rate of 8% compounding monthly (compounding monthly), can expect the below future values:

- 20 years R49 268.03
- 30 years R109 357.30 (R60 089.27 more compared to 20 year investment)
- 40 years R242 733.86 (R133 376.56 more compared to 30 year investment)

2.5.2. Consolidation phase

The individuals' expenses are less than their income as they will now receive greater salaries and previous debt like mortgage bonds and student loans will now be paid off. They would also have accumulated more financial assets and due to a reduced investment time frame, they will be more balanced between high return risky investments and more stable income generating assets (Bodie *et al.*, 2003:601).

2.5.3. Spending phase

The investor is retired in this stage of the cycle and the main source of income will come from investments and pension funds. The income amount is generally reduced and the lifestyle becomes more modest. The investment horizon has now decreased by ten to twenty years and the remaining wealth will generally be kept in low risk assets like cash and bonds. A small

portion may still be kept in riskier assets like equities, in order to hedge against inflation (Mpofu *et al.*, 2010:267).

2.5.4. Gifting phase

In the final stage, the amount of wealth accumulated is more than the needs of the individual and is now distributed among friends and family, or charitable causes. The spending and gifting phases are sometimes grouped together (Brown & Reilly, 2012:33).

2.6. Effects of behavioural finance on the investor life cycle

Chaudhary (2013:85) defines behavioural finance as the financial decisions individuals make, which contradicts what a rational person would be expected to do in order to maximise wealth. It combines the study of psychology with economics and finance to provide answers as to why individuals make a certain decision (Chaudhary, 2013:85). Lucey and Dowling (2005:212-213) found that emotions can play a big role on decisions individuals make and due to this, an investor may be expected to be in the consolidation phase of the investor life cycle, however, in reality, they are investing only in high risk instruments. This would normally be associated with the accumulation phase and the investor should be holding more stable guaranteed return investments based on the theory (Lucey & Dowling, 2005:212-213).

2.6.1. Prior research on the investor life cycle

A study conducted by Bodie *et al.* (2007:18) advises that the purpose of the investor life cycle theory should not be to make the investment decision for an individual, but rather to assist with a structure to be followed by an investor or advisor. Bodie and Treussard (2007:47) further conclude that life cycle funds, structured around the concepts of the life cycle theory, provide investors with limited investment knowledge with a simpler alternative to conventional investing. The portfolio will be diversified based on the theoretical life cycle phase the investor is in (Bodie & Treussard, 2007:47).

Coco *et al.* (2005:526-527) found supporting evidence for the investor life cycle that shows that investors tend to move away from riskier investments like equities as they age. The researchers developed a quantitative model to determine how an investor with uncertain labour income would react. The investor has the choice to invest in either a risky, or a riskless asset, and from the results, labour income that represents an implicit risk-free asset becomes less

important as the investor aged. The investor adjusts by investing more in the risk-free asset (Coco *et al.*, 2005:527). Another study supporting the notions of the investor life cycle was conducted by Schooling and Worden (1999:41-42) who confirmed that investors base their investment decisions on individual time-horizons and the amount of risk they are willing to tolerate.

Findings from a study conducted by Gomes and Michaelides (2005:897-898) investigated the low numbers of young investors, participating in the stock market. The findings suggest that contrary to the theory, not all younger investors had the majority of their portfolios invested in equities. Households that are risk averse and the elasticity of intertemporal substitution is low, do not accumulate enough wealth to enter the equities market during the accumulation phase and only young investors that can overcome the entry barrier would invest in equities (Gomes & Michaelides, 2005:897-898).

2.7. Synopsis

The individual investment decision is one of the complex attributes, as numerous factors, ranging from demographic- and socioeconomic influence to personal preferences, which will ultimately shape the perfect portfolio of investments for every investor. Banks use a number of strategies to determine the risk categories of their clients, in order to provide the most effective investment products to suit individual needs. In order to determine the risk profile of an investor, banks will need to determine the investor consideration by analysing available demographic information and administering questionnaires where the investor can provide more insight into what they are trying to achieve with the investment. Banks can also use the information to identify constraints that can impact investments to be considered for individual investors. Further to this, an investor's risk tolerance levels also need to be taken into account. As no two investors are the same, the best way to measure risk tolerance is from the investor's own opinions on risk. This highlights the importance of using properly researched questionnaires when building investor portfolios.

To find the best combination of risky assets, banks and financial advisors need to analyse the main asset classes available and their unique characteristics. The main asset classes that were discussed are cash and other marketable securities, bonds, equities, real estate and alternative investments. These instruments each have unique risks and return characteristics that can be linked to the needs of the investor. Cash and other marketable securities are low risk

investments with low returns. Bonds are slightly riskier, however, they can generate higher returns while still considered relatively safe investments. Equities are risky investments that require market research and a keen understanding of how they need to be traded. Real estate is seen as a good investment with promising returns, however, its biggest drawback is the difficulty in buying and selling of the asset. Alternative investments are specialised instruments that do not fall into any of the previous categories. These instruments are generally very complex and carry the highest risk, however, they also have the potential of generating the biggest returns.

Allocating assets efficiently into a portfolio is the most important part of the portfolio's construction. Diversification reduces the amount of risk in a portfolio without reducing the expected return. By measuring the risk and return of these assets followed by the measurement of how correlated they are with each other, it is possible to determine what percentages of each asset would provide the most suitable combination of assets for the individual investor's unique needs. A number of models have been developed that can be used to measure the performance of a portfolio and to find the required mix of risky and riskless assets.

Investors approach investing in the same way. The investor life cycle theory proposes that an investor will go through four distinct phases in their lifetime. The initial accumulation phase is where the investor starts to accumulate wealth. At this stage there is a long expected investment horizon, the investor can invest in riskier assets as they have time to recoup any possible losses. Following the accumulation stage, the investor will enter the consolidation phase where they have a shorter investment horizon and would rather seek to preserve the value of their investments for retirement. When retirement approaches an investor will enter the spending phase, where they will likely seek out the safest investments as they are no longer accumulating new wealth rather surviving off existing investments. The final stage is the gifting phase, where investors no longer require the large amount of wealth they accumulated and they start sharing the wealth with family or donating to charity.

The life cycle attempts to justify why investors behave as they do. Investor behaviour can be unpredictable, however, as there are a large number of factors that can influence investment returns. In addition to this, individuals do not always make rational decisions, which makes modelling investor decisions even more unpredictable. This contradicts the theories laid out by the investor life cycle, as these irrational investors may not behave in the way they should,

given their theoretical life cycle stage. Irrespectively, there has been an abundance of research conducted with regard to the validity of the life cycle theory, with the majority supporting the theory. The theory should be used as a guideline for financial advisors to provide investors with a suitable investment taking into consideration their individual needs.

3.1. Introduction

As banks provide individuals and businesses with essential services required to perform daily financial functions, it may be deduced that banks are vital to the effective functioning of the economy (SARB, 2018:2). Furthermore, with the distinction between different categories of banking institutions becoming more distorted, banks have a moral obligation to promote a culture of investment and to provide clients with relevant investment products (Matthews & Thompson, 2005:59-60). If banks provide investment products, client retention can be improved and a critical service is delivered to its clients (Lee, 2017:300). The rapid changes in banking may be attributed to advances in technology, which drive banks to offer more digital solutions. Visiting a branch with a physical address is quickly becoming a thing of the past as banking clients are opting more on doing their banking via online services (Ziady, 2017a:1). In addition, banks are in a position to provide their clients with the most relevant investment products as they have access to almost every demographic factor that influences the type of investments best suited to a client's interests. The last three theoretical objectives are addressed in Chapter 3 which are to conduct an analysis of the South African banking industry; provide a theoretical background on the importance of Big Data in banking; and link the importance of the banking industry to investor needs.

In order to understand how the banking industry evolved, the chapter begins by with the analysis of the term “bank” and the services they provide. A distinction is drawn between the three main banking types, commercial-, investment-, and universal banking (Goddard & Wilson, 2016:18-20). The risks inherent in the banking industry is then highlighted as they affect every service the bank provides. The focus moves towards the banking industry in South Africa with the unique characteristics being highlighted. The banking industry is well-known for having to adhere to strict regulations and supervisory requirements due to the sensitive nature of handling individual- and corporate wealth (Sarstedta *et al.*, 2019:2). The main regulations and acts that these institutions adhere to include the Basel Accords, the National Credit Act (NCA), and the Protection of Personal Information Act (POPIA). The main challenges impacting the South African banking institutions are analysed. These include, but are not limited to, technology, competitors, political climate, economic climate, knowledge sharing, and strict regulatory requirements. The role banks play in promoting investments is subsequently introduced with the focus on the manner in which data are used by banks to better

understand the needs of their client base. The chapter ends with a discussion on the importance of investment products for banks to retain their existing clients.

3.2. Defining the term “bank”

Due to the complexity of the different functions banks can perform, confusion still exists as to what the definition of a bank is. According to Goddard and Wilson (2016:1) the basic definition is any institution that safe keeps cash deposits and extends financial loans to individuals, businesses, and governments. Banks, however, also provide a wide series of other financial services that do not form part of this basic definition. The definition of a bank stems from the functions performed in the economy, as well as the products offered (Rose & Hudgins, 2013:2). Banks play a major role in the economy, as they accept deposits from individuals and businesses and use the funds to extend credit. This process allows economic growth to increase as borrowers now have funds to participate in the economy, which they would not otherwise have been able to do (Mohr & Fourie, 2008:338).

Figure 3.1 illustrates how banking changed from simple structures used to store wealth, to the complex industry found today. Goddard and Wilson (2016:18-20) divided banking into three distinct banking types namely commercial-, investment-, and universal banking, which is subsequently be discussed.

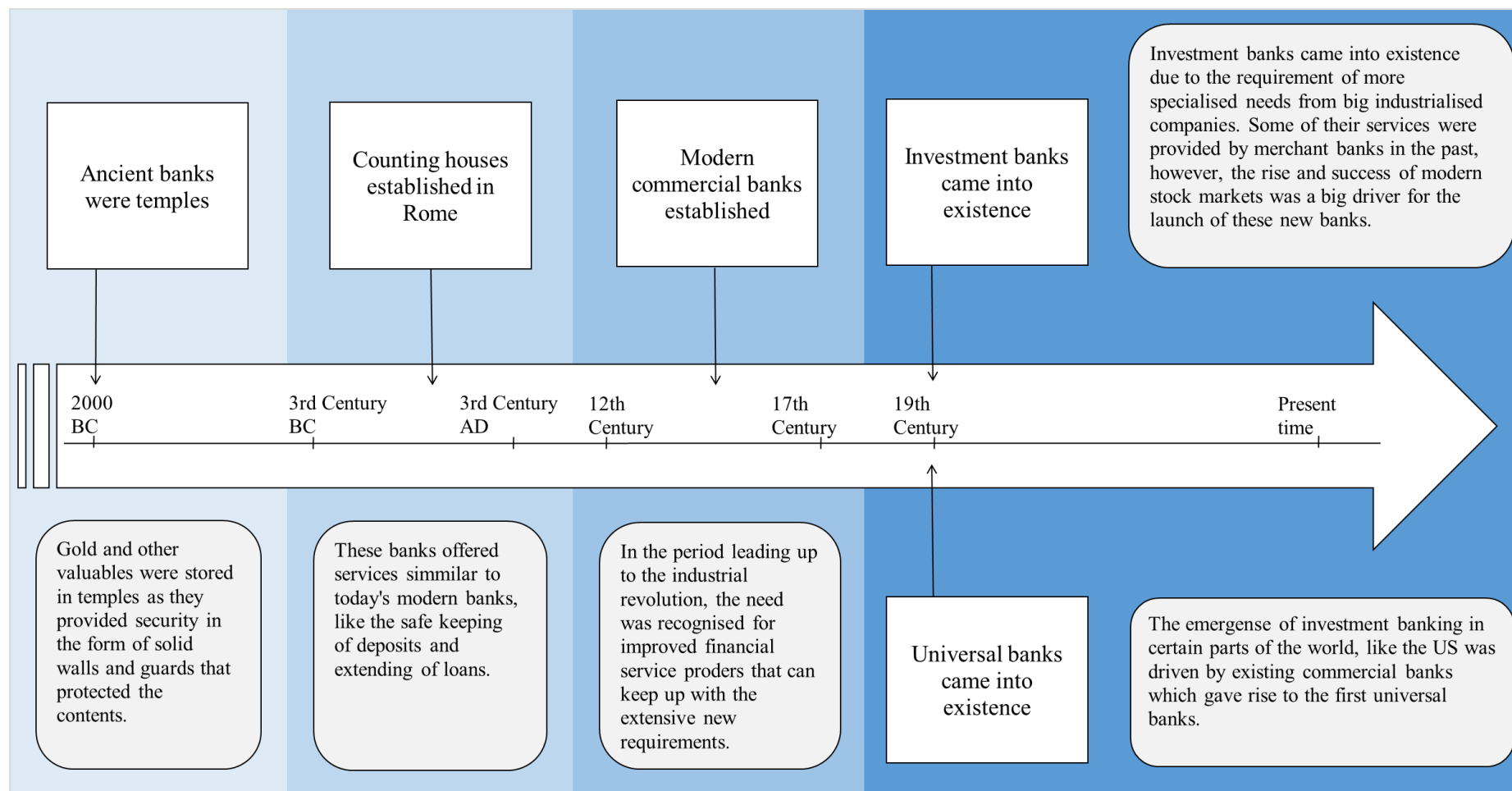


Figure 3.1: Evolution of the banking industry

Source: Iannotta (2010:3-4); Rose & Hudgins (2013:4); Labate (2016:1); Brandl (2017:486-487)

3.2.1. Commercial banking

A commercial bank is one that most closely meets the defining criteria of the basic definition of a bank. The main focus of a commercial bank is to be a financial intermediary by means of the safekeeping cash deposits and granting loans. Commercial banks can be further subdivided into retail- and corporate banking (Iannotta, 2010:2).

Retail banks offer services to individuals or small businesses. Their main product ranges include current- and savings accounts, credit cards, overdraft facilities, and personal- and mortgage loans (Brandl, 2017:144-145). Current accounts provide banking clients with immediate access to their deposit at the bank. These accounts offer convenience, however, they offer very little to no interest (Butterworth, 2010:1). Savings accounts provide low interest, with the drawback of the client having to give notice of withdrawal and then being subjected to a specified waiting period (depending on the specific product) before the funds are accessible (Ahmed, 2011:64-65). Credit cards provide access to additional funds from the bank up to a specified limit. Overdraft facilities are similar to credit cards as they provide access to funds limited to an agreed upon amount, effectively pushing the account overdrawn. Interest is charged on the credit extended on both these products. Personal loans are agreements where the borrower receives a specified cash amount from the bank, and is obligated to pay back set amounts monthly until the loan amount is paid off (Old Mutual, 2018:49). Mortgage loans on the other hand are credit extended to clients to purchase a new property (Brandl, 2017:359). These loans use the property as collateral, and can be seized by the bank if the borrower defaults on the loan. Interest is charged on either a fixed or floating rate, for both personal and mortgage loans (Rose & Hudgins, 2010:8-10).

Corporate banking provides financial services to large corporations and firms (ABSA, 2018a:1). The product ranges are similar as the retail banking products discussed in aforementioned sections, however, they also provide additional services tailored towards large business. These services include large loans with flexible repayment schedules known as revolving credit facilities and syndicated lending, where the bank is unable to provide the large amount required (Blomberg *et al.*, 2012:108). Agreements are made with other banks and financial services providers to contribute to the loan, and as a result extend the funds in a joint effort. In addition, these banks provide services such as issuing guarantees, risk management services, and facilitating international trade agreements (Rose & Hudgins, 2010:12-15).

3.2.2. Investment banking

An investment bank provides more specialised services, directed towards wealthy individuals and large businesses, looking to invest their funds for the highest possible returns (Morrison & Wilhelm, 2008:100). These banks offer services such as, financial advisory, brokerage and other share trading facilities, asset management, and underwriting of equities and bonds (Iannotta, 2010:3-4). Advisory services provide advice to businesses on complex matters like mergers and acquisitions. These banks also provide a platform where investors can trade in shares and bonds, either via a broker or simplified trading platforms (Blomberg *et al.*, 2012:5). Asset managers advise investors on the most efficient method to structure their investment portfolios, estate planning, insurance, and general advice regarding preservation and growth of wealth (Mullainathan *et al.*, 2012:1-2). Another function of investment banks is to assist in underwriting the issuance of new securities including bonds and equities in the form of primary offerings, initial public offerings, seasoned offerings, and private placements (Brandl, 2017:486-487).

3.2.3. Universal banking

Mathews and Thompson (2005:59-60) found that the line between commercial banking and investment banking has become unclear, as numerous commercial banks offer investment banking solutions and some investment banks have extended loans and other forms of credit. Commercial banks that merge with investment banks have caused the differences between the banking types to become less prevalent. This gave rise to universal banking (Rose & Hudgins, 2010:83). These banks have the added advantage of improved client retention as they offer a wide range of services and the client would not need to go to numerous financial institutions for their different needs. However, there is a drawback as the bank is no longer specialising in a specific service and would be less equipped to deal with changes in the market for all the different services provided (Pastor & Serrano, 2006:125-126).

3.3. Risks inherent in the banking industry

Risk is a broad concept, with different definitions, which depend on the context. Even though there are debates to the definition, there is agreement that there is uncertainty about a future outcome. If there is a higher probability of a negative outcome, the risk is higher and vice versa (Marx *et al.*, 2010:106). In financial terms, risk refers to the possibility of losing a portion of, or the full investment amount. In more technical terms, an investment is risky if there is a

possibility that the actual return may be less than the expected return (Grable, 2000:625). It should be noted, however, that the outcome of a risky investment is not always negative and greater returns may be realised with riskier investments (Tucci, 2015:25). The subsequent sections elaborate on the different risks and their importance.

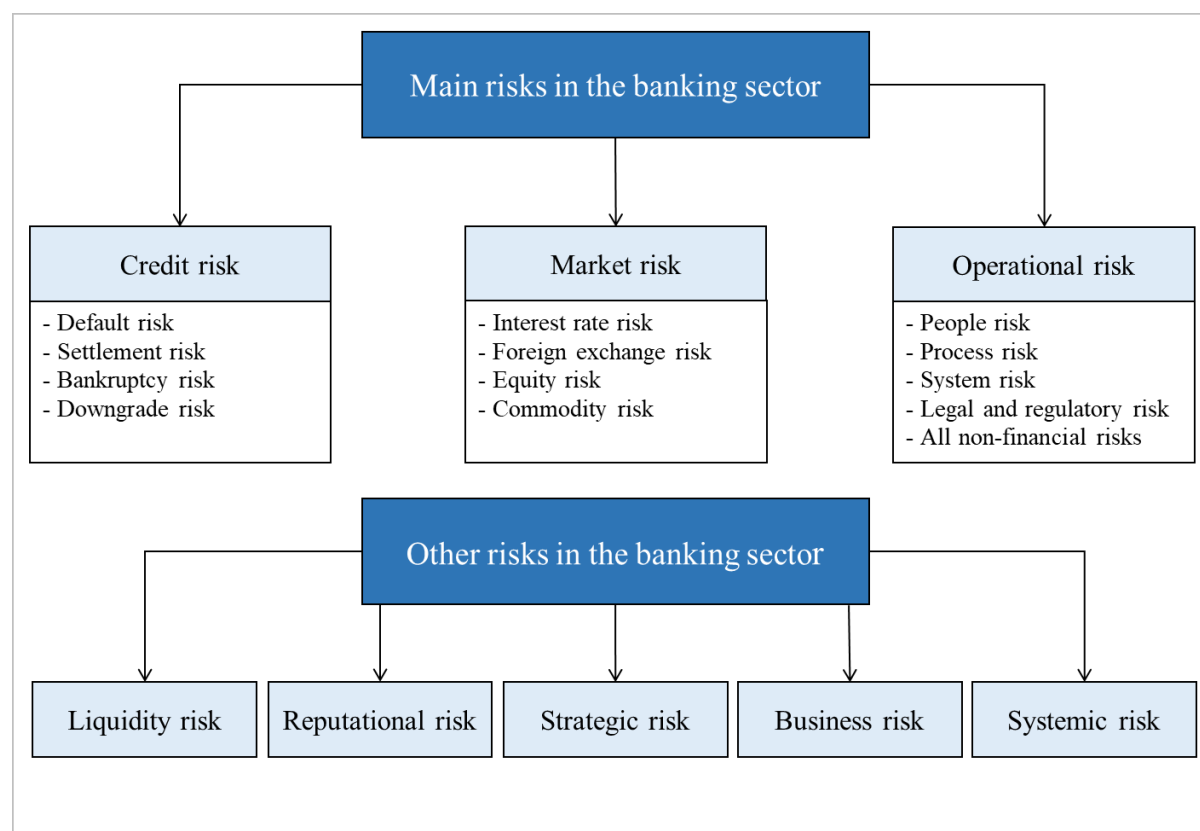


Figure 3.2: Types of risks in the banking industry

Source: Van Gestel and Baesens (2009:24-38); Crouhy *et al.* (2014:24)

From Figure 3.1, there are eight categories of risk to consider in the banking industry. These risks include credit risk, market risk, operational risk, liquidity risk, reputational risk, strategic risk, business risk and systemic risk.

3.3.1. Credit risk

Granting credit to clients where interest is charged at a percentage of the outstanding amount is one of the main methods banks use to earn money. The interest charged on credit agreements are usually much higher than the interest amounts investors can earn from cash investments at these institutions (Van Gestel & Baesens, 2009:24). Due to credit being the main source of income for a bank and clients making use of credit facilities as a source of funding, the risk of

clients defaulting is the most prominent and most regulated in the banking sector (Li *et al.*, 2013:165). Credit risk occurs when a borrower of funds is unable to repay the full amount outstanding, or can only afford a partial repayment (GARP, 2015:3). Credit risk can be further grouped into four sub-risk types. These include default risk, settlement risk, bankruptcy risk, and downgrade risk.

Firstly, default risk is the uncertainty associated with the probability that a borrower may not be able to meet his or her payment obligations. This can also be referred to as the probability of default (PD). There are numerous factors to consider when assessing the PD of a client like a low or unstable income stream and the number of other debt products held (Fiordelisi & Marqués-Ibañez, 2013:8). These clients would have a high PD as they could be faced with sudden unexpected expenses, retrenchment or bankruptcy in which case they will not be able to meet all their obligations. Banks will generally attempt to collect funds from the first 30 days that the payment was missed, up until 90 days after. When a loan is behind for more than 90 days it is reclassified as a non-performing loan (NPL) and handed over to the legal team for further collections (Stijepović, 2014:102-103).

Secondly, there is settlement risk with some financial transactions. The most notable example being foreign exchange transactions, the payment and exchange of the securities do not happen at the same time. This can result in one of the participants not being able to deliver or pay on the settlement date (Kahn *et al.*, 2003:591-592). Settlement risk is most prevalent in foreign exchange markets, as the exchange rate of each country is constantly fluctuating based on numerous economic factors that are difficult to keep track of (GARP, 2015:5).

Thirdly, bankruptcy risk is the probability that a bank will not be able to service all their debt obligations. Alternatively, it could be defined as the risk that a financial institution can become insolvent and incapable of funding its debt obligations (Dichev, 1998:1131). Bankruptcy risk is brought on and exacerbated if a bank manages its assets poorly and no contingency planning is done to ensure funds will be available to service all their debt obligations (Crouhy *et al.*, 2000:60).

Lastly, downgrade risk is characterised by the possibility that one of the major credit rating agencies can downgrade the credit rating of a financial institution. This generally has a negative effect on the reputation of the institution and investor confidence (Crouhy *et al.*, 2000:60). There are three prominent credit agencies namely, Moody's, Standard & Poor's (S&P) and

Fitch. If any of these companies decide to adjust the credit outlook of a bank to negative, this can greatly affect the reputation of the institution (Mattarocci, 2011:9).

3.3.2. Market risk

Financial institutions are faced with the possibility of losses on the value of financial assets brought forth from the specific markets a financial instrument is traded in. Market risk is the probability of loss due to negative movements in the underlying market that drives the value of investments (Hendricks & Hirtle, 1997:1-2). Banks are more actively taking part in the trade of riskier alternative investment types like derivatives and special credit vehicles, which exposes the institutions up to higher market risks. These instruments are used to hedge against adverse price movements and if the market moves against the position the bank took, the bank stands to lose large invested amounts (Matthews & Thompson, 2005:183). Van Gestel and Baesens (2009:24-38) and Crouhy *et al.* (2014:24) list four sub-risk categories that form part of market risk as interest rate risk, foreign exchange risk, equity risk and commodity risk.

For the first category, interest rate risk is discussed. Interest rate risk is the probability that the value of an investment can change due to fluctuations in the interest rate pose a big risk to banks as these institution serve as the middleman for all cash transactions being processed.. Inflation is also closely linked to this risk. If prices rise more than interest, banking clients will invest less of their funds in cash and more funds in riskier assets with higher expected returns. This could result in liquidity issues for banks (GARP, 2015:3).

The second category is exchange rate risk. Banks are faced with the risk of loss when the price of other currencies from different countries rise and fall in comparison to the currency the bank uses (GARP, 2015:5). Banks purchase foreign currencies in their own capacity and on behalf of their clients, which opens them up to the possibility that these currencies will lose value in comparison to their base currencies. Due to the possibility of the bank's currency losing value, a competitive disadvantage could result (Kyung-Chun & Morgan, 2003:278).

The third category is equity risk. The risk that equity investments can lose monetary value due to price fluctuations brought forth by changes in the stock markets is known as equity risk (Van Gestel & Baesens, 2009:29). Banks are exposed to this risk when they purchase stocks to diversify their own portfolios (Crouhy *et al.*, 2014:26). They also provide their investment clients with trading platforms, where there are slight delays between when the trade is placed and when it gets executed in the market. Due to this delay, there is a chance of large price

fluctuations causing the price at which the trade is executed to be higher, resulting in the investor paying more for securities purchased than they were intending to (Sommer, 2018:1). This is a risk as trades execute in the market regardless if the investor had sufficient funds and the investor is entitled to the purchased shares (not the bank). The bank thus sits with overdrawn accounts where the investor needs to fund, however as the trade accounts are not credit facilities the bank has limited authority to collect the funds. The only alternative is selling the shares if the investor does not fund which has a number of other legal implications as the price of the shares being sold will be different to what it was originally bought for (Sommer, 2018:1).

The final category is commodity risk. Commodity risk is the possibility that commodity prices could fluctuate due to underlying factors like supply and demand for those commodities is a risk faced by all banking institutions (Van Gestel & Baesens, 2009:30). South Africa exports large amounts of commodities in the form of agriculture, ores and minerals, metal products and energy exports (Stats SA, 2018b:7-8). These exports could lose value, which affects the country's balance of payments. This can have an effect on the entire economy and filter down to the banks.

3.3.3. Operational risk

Operational risk is a broad category that includes all risks that arise from non-financial sources. The official definition from the Basel Committee on Banking Supervision (BCBS: 2001:2) is “the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events”. This implies that any losses that occur from the normal operations of the bank, or any event that prevents these operations from occurring forms part of operational risk (Brandl, 2017:279). The banking industry has become more intricate and globalised, the amount of operational risk is increased dramatically. Banks need to understand what these risks are and keep liquidity based on the probability of the occurrence of these events (De Jong *et al.*, 2013:364-365). The sub-risk categories that form part of operational risk include, people risk, process risk, system risk, legal and regulatory risk and other non-financial risks.

The first category to be discussed is people risk. Banks are some of the biggest companies in the world and employ and estimated 200,000 people in South Africa (BusinessTech: 2017:1). These employees are responsible for numerous operational activities that largely involves financial transactions. The possibility that any of these employees make a mistake that may

result in losses for the bank makes this one of the biggest operational risks to consider (Sweetings, 2011:105). This prompted banks to spend large sums of money to implement processes, checks, and early detection software to identify potential loss events due to human error before the loss is realised (Young, 2006:13).

The second category is process risk. Processes do not always run smoothly and there is always a possibility of process failure. Process risk is closely related to people risk as bank employees are responsible for the development and implementation of new processes. If an event occurs that was not included in the process, or important factors are overlooked, the process could fail and result in losses (Chernobai *et al.*, 2007:17).

The third category to consider is system risk. The possibility that the information technology (IT) teams implement systems incorrectly or neglect to test for all possible scenarios is known as system risk (Young, 2006:14). One of the challenges addressed in subsequent sections is that South African banks are using old legacy systems on which their banking operations are processed. The risk that these systems can fail is a real possibility with South African banks facing system downtime on numerous occasions over the past couple of years (PWC, 2017:1). These downtime events are linked to large revenue losses as banking clients are unable to use the services during this time. Banks are also faced with external threats where criminals attempt to hack these systems, which is why security measures need to be put in place and maintained (Young, 2006:17).

The forth sub-category is legal and regulatory risk. South African banks have strict laws and regulations to adhere to, from both local and international authorities. The possibility of banks being fined due to non-compliance to all the laws and regulation, either purposefully or unknowingly, can result in losses from being sued or fined. Banks are faced with new legal requirements on a daily basis and legal teams always need to be aware of the changes being made (Chernobai *et al.*, 2007:28).

Lastly, the full range of other non-financial risks should be considered. There are a number of other risks faced by banks, which due to the nature and scope of their occurrences are difficult to quantify and plan for. These events include anything that can prevent the bank from performing their daily operational tasks, like natural disastrous or terror attacks (Sweetings, 2011:102).

3.3.4. Liquidity risk

Liquidity risk is the probability that a banking institution would not have enough liquid assets to cover all their financial expenses. The concept of liquidity refers to the marketability, or ease of sale, linked to an asset (Drehmann & Nikolaou, 2010:2). Regulations set out by the Basel Committee introduced in subsequent sections require banks to retain set percentages of marketable securities for all the different risks faced. This is to ensure that if any of the potential loss events occur, the bank will be able to cover the costs, as well as its normal day-to-day overhead costs for a thirty calendar day liquidity stress test (BCBS, 2013:1).

3.3.5. Strategic risk

According to Crouhy *et al.*, (2014:37) strategic risk refers to the high uncertainty related to changing a bank's overall strategy. This change in strategy is usually associated with the risk of a competitor outperforming the bank's current operating strategy. If the strategy does not prove to be profitable or causes the bank and its clients to lose money, the bank's reputation may be damaged.

3.3.6. Business risk

The term business risk is the uncertainties faced in the specific business industry. These uncertainties include, but are not limited to, the price charged for products and services, and demand and supply prospects (Marx *et al.*, 2010:107). Business risk is excluded from the BCBS definition of operational risk that suggests that banks need to ensure they keep adequate capital reserves to hedge against any loss uncertainties that stem from business risks (Crouhy *et al.*, 2014:36).

3.3.7. Reputational risk

The definition of reputational risk overlaps significantly with other risk areas. If banking clients incur losses due to inefficiencies within the bank or the company's share value decreased significantly, clients may lose trust in the institution's abilities to safeguard their funds (Lange *et al.*, 2011:153-154). Apart from dealing with only the repercussions of the original loss event, banks will also need to deal with the loss of clients and revenue brought forth by the loss of their good reputation (BCBS, 2009:19). Crouhy *et al.* (2014:36) elaborate further that banking

clients entrust the institution with their financial assets. If the bank fails to ensure the safety of their funds, the loss of confidence will prompt clients to invest elsewhere.

3.3.8. Systemic risk

Systemic risk is the probability of the entire industry or economy failing due to a single company or event triggering failures across the interrelated companies. This failure could lead to recessions as was experienced during the 2007–2009 financial crisis, where systemic risk played a significant role in numerous financial institutions going bankrupted. The financial crisis highlighted the interrelatedness of all the previously discussed risk types and how this can lead to a systemic risk event (Katarzyna, 2016:305-306).

3.4. State of the banking industry in South Africa

The South African banking industry has been recognised as being one of the soundest in the world, despite the country being a developing nation. Esterhuysen (2010:86) highlighted the soundness of the South African banking industry as banks had adequate liquidity during the financial crisis of 2008 and did not require a sovereign bailout. This was due to strict adherence to regulatory and supervisory requirements (Akinsola, 2016:30). The Global Bank Quality benchmark test conducted by Lafferty and the Global Competitiveness Report compiled by the World Economic Forum (WEF) in 2016-2017 placed South Africa's banking systems 2nd out of 137 countries that participated in the study (Gernetzky, 2017:1; WEF, 2017:325). South Africa's credit rating does not mirror a stable banking system, however, with two major rating agencies, S&P Global and Fitch downgrading the status to junk, with another rating agency, Moody's, placing the country under review for downgrade to junk. These downgrades subsequently led to a downgrade of the banks to reflect the sovereign credit rating (Donnelley, 2017:1). The same report compiled by WEF in 2017-2018 was less positive, with the soundness of South African banking institutions declining to 37th place (WEF, 2018:269).

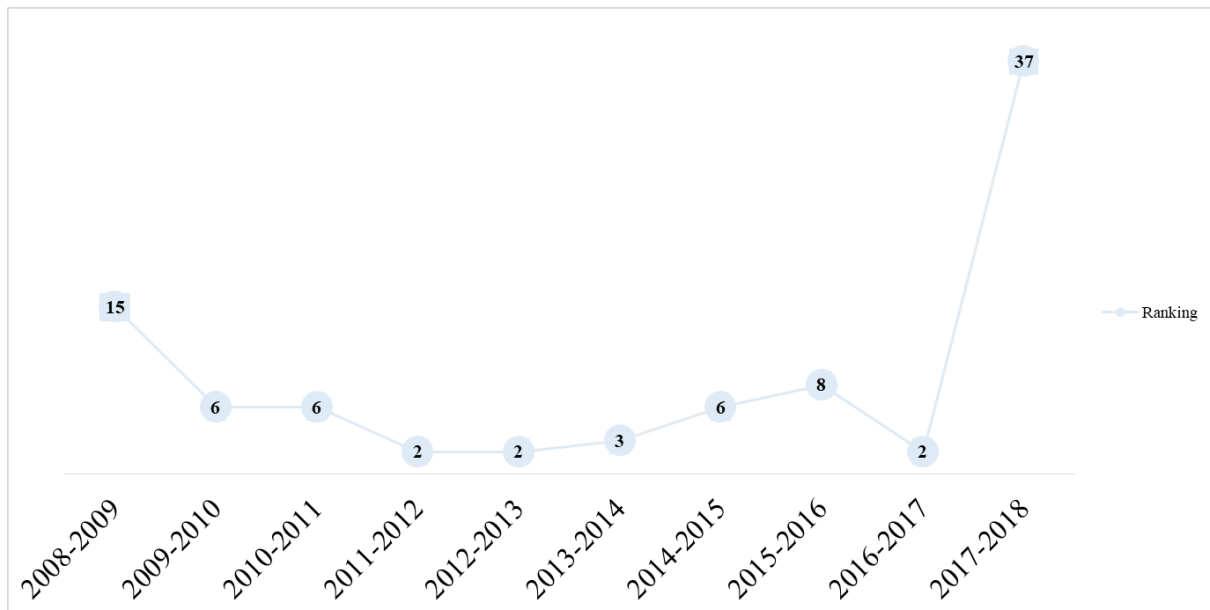


Figure 3.3: Ranking of South Africa's banking industry soundness

Source: WEF (2018)

Figure 3.2 indicates the rankings of the soundness of the South African banking industry over a period of ten years. The banking system had an alarming spike at the end of 2017. The rankings are obtained by how confident the international community is when dealing with the industry, as well as trustworthiness. The large shift reflects how much confidence was lost in the sector after the credit downgrades in 2017, as well as effects of the government instabilities within the country (Laing, 2017:1). In order to gain a deeper understanding of why the South African banking industry is considered so sound, the regulatory requirements in the sector are discussed.

3.5. Regulation in the South African banking sector

South Africa's banking industry is regulated and supervised by the South African Reserve Bank (SARB), the central bank of the country. The industry has numerous legislations and regulations that need to be adhered to. Adherence ensures the SA banking industry will remain one of the most sophisticated in the world. In addition, adherence will assure risk is kept to a minimum and banks are more equipped to deal with the risks that cannot be avoided (Itzikowitz & Meiring, 2018:1). The South African banks used to be regulated by the Registrar of banks, which was a body of the SARB, while other financial institutions were supervised by the Financial Services Board (FSB). The FSB was established as a statutory body under the Financial Services Board Act of 1990 (SARB, 2018:1-2). This however changed with the

introduction of the Twin Peaks model which came into effect in April 2018. The model creates two peak regulatory authorities, where the first peak is responsible for system stability, with the second monitoring for misconduct and protecting consumers of financial products and services (Schmulow, 2018:1).

There are numerous acts the banking industry needs to adhere to which includes the Banks Act, the National Payment Systems Act, the Currency and Exchanges Act, the Financial Intelligence Centre Act, the Financial Advisory and Intermediary Services Act, The Consumer protection Act, and the Financial Markets Act, Protection of Personal Information Act and the National Credit Act to name a few. According to Marx and Mynhardt (2011:435-436), South African banks have also agreed to adhere to rules and regulations around capital adequacy levels set by the BCBS. These regulations are known as the Basel Accords and are made up of a series of three Accords that are discussed in the following sections. Other relevant acts to be discussed that affect regulation in South Africa include the NCA of 2005 and the POPIA, which is set to become law by late 2019.

3.5.1. The Basel Committee and Accords

The Basel Committee was first established in 1974 by the G10 countries (Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States) in an attempt to unify the supervisory requirements for all banks across the globe (BCBS, 2017:1). This came shortly after the collapse of the Bretton Woods system, in 1973 where the German bank, Bankhaus Herstatt, lost their banking license due to reckless foreign exchange exposure. International banks that had ties with Bankhaus Herstatt also suffered considerable losses. This highlighted the interrelatedness of the banking systems on an international front, which prompted world leaders to seek international standardisation (Helleiner, 2010:625).

The original function of the committee was to promote financial stability by means of the introduction of standards and guidelines, as well as improve supervision of the banking industry on a global scale. Focus has, however, shifted towards ensuring banks have adequate capital to weather any risk events. This gave rise to the three Basel Accords (BCBS, 2017:1).

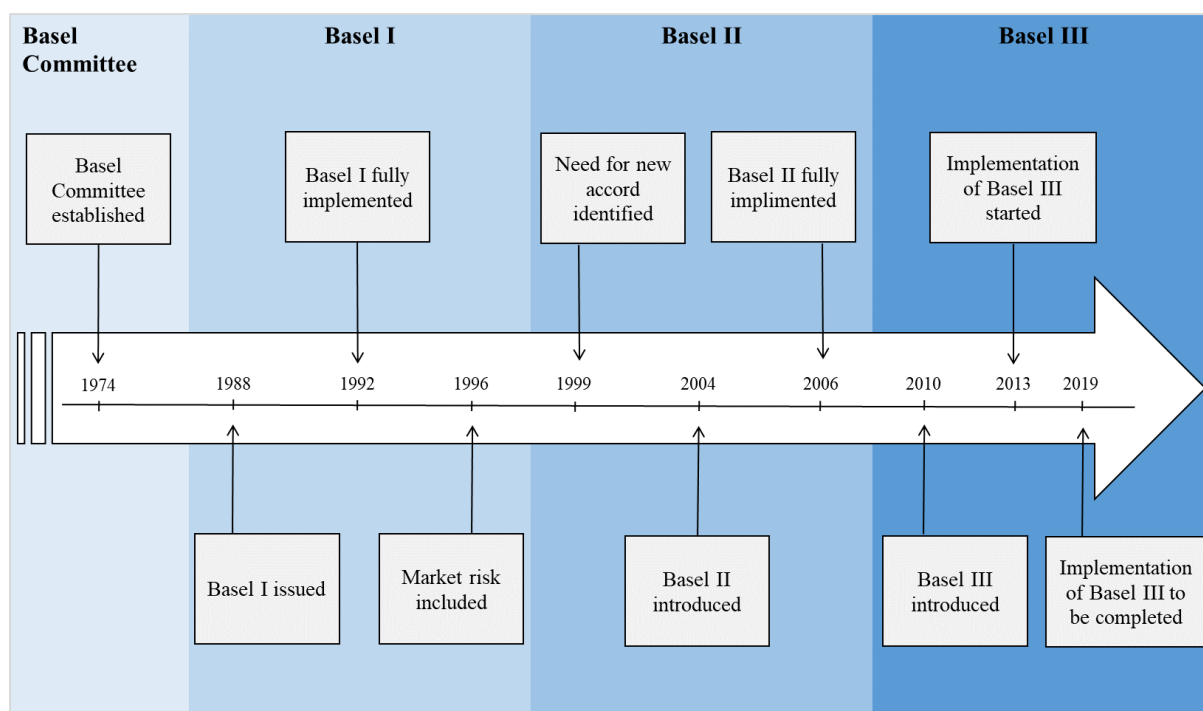


Figure 3.4: Evolution of Basel Committee since inception

Source: Crouhy *et al.* (2014) and BCBS (2017)

Figure 3.4 graphically depicts the time-line from the establishment of the Basel Committee to the implementation of the Basel III Accord. The subsequent sections to follow provide more details regarding the importance of each Basel Accord.

3.5.1.1. Basel I

The original Accord was introduced in 1988 with its main focus on adequate capital requirements. International banks were faced with more risks from emerging markets, with the Latin American debt crisis in the 1980s that placed these institutions' capital ratios under pressure (Rose & Hudgins, 2010:694). The Basel Committee proposed the use of a risk-weighted approach to accurately measure risk. The proposal included an eight percent minimum capital to risk-weighted assets on both on and off-balance sheet assets. The Accord allowed for changes to be made, with amendments added in 1991, 1995, and 1996 (Crouhy *et al.*, 2014:71-72). The most marketable amendment was the introduction of other risk types that do not form part of credit risk, being market risk in 1996. This also introduced internal measurements the bank could use known as Value at Risk (VAR) models, as long as they adhered to strict quantitative and qualitative standards (BCBS, 2017:1).

3.5.1.2. Basel II

By 1999 the requirement for a completely new capital adequacy structure was recognised as the original Accord excluded some key risks faced in the banking industry. This led to the release of Basel II in 2004. The new framework included three main pillars that can be used to ensure adequate capital is kept (BCBS, 2017:1). Pillar 1 set out the minimum capital requirements for the three main risks in the banking sector being credit risk, market risk and operational risk. Pillar 2 introduces supervisory review procedures, to ensure that the regulations set out by pillar 1 is adhered to and maintained. Pillar 3 ensures adequate disclosure of the bank's operations to the public domain (Crouhy *et al.*, 2014:77-81).

3.5.1.3. Basel III

The third Basel Accord was introduced in 2010, after the financial crisis of 2007-09. The need for even stricter regulation and supervision was identified, as during this period, the mispricing of credit, and immense growth in credit being extended were prevalent. This eventually led to banks being over leveraged with severe liquidity issues (BCBS, 2017:1). This triggered a systemic risk event with the US investment bank, Lehman Brothers, filing for bankruptcy in and a score of international banks requiring sovereign bailouts (Mathiason, 2008:1). The changes from Basel II to Basel III included higher Tier I capital requirements, the introduction of a Liquidity Coverage Ratio to ensure liquidity, and a additional three percent Non-risk Based Leverage Ratio that serves as a backstop to the Tier I Capital measures (Foster, 2018:1).

3.5.2. The National Credit Act

The NCA regulates credit being extended by financial institutions. The Act aims to create a fair market place to obtain consumer credit while regulating the institutions that provide credit facilities. Financial institutions need to adhere to strict standards set out by the NCA when providing credit information to consumers (Booyens *et al.*, 2015:83).

The South African government enacted the following objectives as part of the NCA (South Africa, 2006:2):

- The promotion of a fair and non-discriminatory marketplace for access to consumer credit and for that purpose to provide for the general regulation of consumer credit and improved standards of consumer information;

- The promotion of black economic empowerment and ownership within the consumer credit industry;
- To prohibit certain unfair credit and credit-marketing practices;
- To promote responsible credit granting and use and for that purpose to prohibit reckless credit granting;
- To provide for debt re-organisation in cases of over-indebtedness;
- To regulate credit information;
- To provide for registration of credit bureaux, credit providers and debt counselling services;
- To establish national norms and standards relating to consumer credit;
- To promote a consistent enforcement framework relating to consumer credit;
- To establish the National Credit Regulator and the National Consumer Tribunal;
- To repeal the Usury Act, 1968, and the Credit Agreements Act, 1980; and
- To provide for related incidental matters.

Bimha (2014:171) found that the NCA was successful in its quest to reduce the amount of reckless credit being extended in South Africa, which was widespread in the pre-act period tested. However, findings did indicate a new issue that emerged in the form of unsecured lending. South African banks have more unsecured loans on their books than ever before, as they are attempting to bypass the stringent requirements set out by the NCA. In order to protect consumers from unsolicited marketing, which often includes credit products, the government enacted the POPIA, which will be discussed in Section 3.5.3 (Pelteret & Ophoff, 2017:56-57).

3.5.3. The Protection of Personal Information Act

The POPIA will aim to protect personal information being shared and used by all institutions in South Africa. Unsolicited marketing from telemarketers is common practice in South Africa due to personal information being shared freely between companies (Pelteret & Ophoff, 2017:56-57). The act will ensure that South African companies will need to properly disseminate what client details they have that is considered personal information by the act. The companies would then need to ensure that the data are secure and stored in such a manner to not violate the regulations (Alfreds, 2014:1).

The South African government enacted the below objectives as part of the POPIA (South Africa, 2013:2):

- To promote the protection of personal information processed by public and private bodies;
- To introduce certain conditions so as to establish minimum requirements for the processing of personal information;
- To provide for the establishment of an Information Regulator to exercise certain powers and to perform certain duties and functions in terms of this Act and the Promotion of Access to Information Act, 2000;
- To provide for the issuing of codes of conduct; to provide for the rights of persons regarding unsolicited electronic communications and automated decision-making;
- To regulate the flow of personal information across the borders of the Republic; and
- To provide for matters connected therewith.

De Bruyn (2014:1333) elaborates that personal information has a monetary value as this data can be used to market products to individuals that meet the specific criteria. Due to this, banks need to ensure employees with access to this data are not tempted or able to store the data on personal devices to be sold. All data needs to be encrypted and rendered useless if it falls into the wrong hands. Sensitive paper documents need to be destroyed after the minimum retention period (Alfreds, 2014:1). Implementation of POPIA will require banks to develop and maintain new security measures. The challenges that surround these implementations are subsequently discussed (Pelteret & Ophoff, 2017:57).

3.6. Challenges in the South African banking industry

The South African banking industry is dominated by its main four universal banks, Standard Bank, First National Bank (FNB), Amalgamated Bank of South Africa (ABSA) and Nedbank (PWC, 2017:1). For these banks to stay relevant, there are certain challenges that have the potential to change the landscape of the banking industry that will need to be addressed and overcome (Berger, 2003:141; Ziady, 2017a:1). The main challenges to be discussed in the subsequent sections include technological advances, competitors, political instability, economic climate, and knowledge sharing.

3.6.1. Technological advances

Mostert and Lotz (2010:42) emphasise that the changing technological environment had a profound impact on the operating method of every institution. Banks have access to large volumes of client- and financial data. In order to retain a competitive advantage, it is essential

to have the best technology to process and derive value from the data (Berger, 2003:141). Banking clients have grown accustomed to convenient solutions with the prominence of online banking and other digital solutions that have increased exponentially. As a result, banks are relying more heavily on automated systems that allow clients to transact in real time (Ziady, 2017a:1). As clients have more control over when and how they transact, they tend to gravitate towards the bank that offers the most efficient and convenient solutions (Achmed, 2011:80). An example of this is the “selfie” feature FNB launched in 2018, where potential new clients can open an account by simply taking a selfie on their banking app (Mavundza, 2018:1).

Further to this, the emergence of online banking has exposed banking institutions to a new risk of data breaches and the possibility of client funds being stolen through accounts being hacked. The big four South African banks have not been able to keep up with all the technological advances with system downtimes hitting the biggest two, Standard Bank and FNB the hardest. These banks have been well-established for years and their systems need to be upgraded and changed to keep up with technological advancements. Maintenance and the transfer of data from old legacy systems to new versions can be a large costly exercise (PWC, 2017:1).

Another development in the banking environment where South African banks need to increase their focus is within the realm of artificial intelligence (AI) and machine learning. AI is already present in everyday banking, with complex algorithms predicting which products to market to specific clients, early fraud detection analytics and chatbots that can free up client services teams to respond to more complex queries, already being widely utilised (Daks, 2018:10). Nedbank introduced a humanoid robot in one of its branches to greet clients and assist with general queries as an attempt to explore the possibility of using robotics in everyday banking (Alfreds, 2018:1). From an investment side, banks are also investigating the possibility of using digital advisory services, where the investor completes a questionnaire online. An algorithm will then process the data and provide the investor with a full range of portfolio constructs, based on their unique needs and risk profile (Rodionov, 2017:1).

3.6.2. Competitors

Competition is necessary in any healthy industry as it promotes innovation and insures efficiency and fair pricing. The banking industry in South Africa is known for having monopolistic competition, as there are four large universal banks dominating the landscape. The aforementioned banks make up over 80 percent of the total assets held by banks in South

Africa (Mlambo & Ncube, 2011:6-7). A number of smaller banks entered the market after the fall of the Apartheid regime in 1994, however, the majority of these banks started experiencing liquidity issues from 1999. This sparked a banking crisis that led to Saambou Bank and Regal Treasury Bank's closures due to a loss of confidence in these banks (Cronje, 2007:11-12). The remaining smaller banks either liquidated, was not allowed to renew their banking licenses, or merged with the larger banks (Simatele, 2015:828).

The biggest challenger to the large four banks thus far is Capitec Bank. Although the bank is ranked sixth based on total assets, it was reported in 2018 that the bank had the most South African banking clients (Pitjeng, 2018:1). Capitec bank's strategy to enter the market was to target unbanked clients, where the fees of the traditional banks were too high. By taking advantage of a previously undiscovered client base and providing low cost banking options, the bank has managed to successfully enter the market and shows no signs of slowing down (Nhundu & Makhaya, 2016:111-112). Other notable new entrants to the market include Discovery Bank, ThymeDigital and Bank Zero. What makes these new entrants unique, is the fact that their banking systems can be built from scratch with the latest technology, and they will be digital only, without the cost and effort of physical branches having to be built (Dube, 2018:1). Without the drawback of having to upgrade old systems and migrate large volumes of data onto new platforms, the exercise will be less costly and banking clients will receive more efficient digital solutions than what the existing banks can deliver. A factor that makes Discovery Bank the biggest threat to the current industry leaders, is the fact that they already offer investment, insurance, credit and other banking related services. As the company's focus in the past was to provide clients with medical aid, the company has access to a considerable amount of client data, unheard of in the traditional banks (Cranston, 2018:1). This gives the company the added advantage of more specific marketing campaigns and the ability to predict which banking products a client may soon require based on their medical claims history and other health related data (Mchunu, 2018:1).

3.6.3. Political climate

The biggest challenge for South African banks, is the political situation in the country. Sweeping statements made by the ANC government have hampered international investment into South Africa and the new threat of distribution of land without compensation can be devastating to banks (Matthews, 2018:1; Mkhabela, 2018:1). If the government allows this policy to become law, banks stand to lose large amounts of assets in the form of loans to

farmers. This could trigger a systemic risk event in the country with banks requiring sovereign bailouts to stay liquid (Matthews, 2018:1). Political experts have criticised the move as an attempt by the African National Congress (ANC) to win back voters from the Economic Freedom Fighters (EFF) and that this is not in the best interest for South African citizens (Mkhabela, 2018:1). The Global Competitiveness Report compiled by the WEF identified seventeen of the biggest challenges when conducting business in South Africa with six of the biggest issues relates to the political climate.

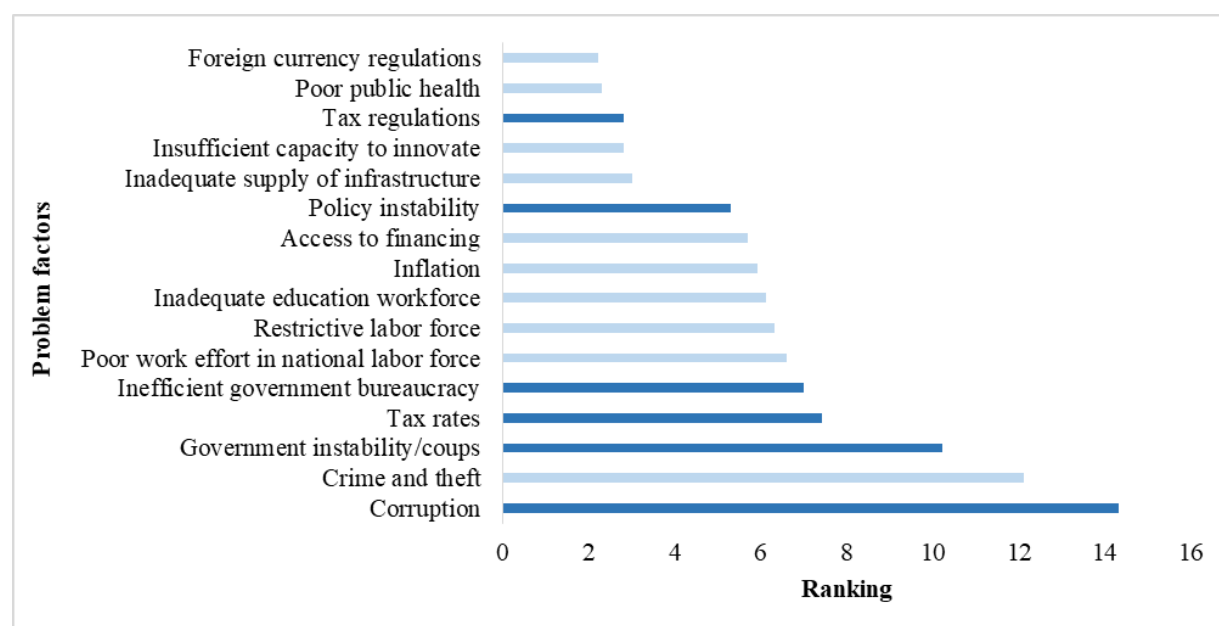


Figure 3.5: Problematic factors for doing business in South Africa

Source: WEF (2018:268).

The overall international sentiment has, however, improved since the removal of former president Jacob Zuma and the appointment of President Cyril Ramaphosa (Hanusch, 2018:1). Corruption has been mulled by the removal of some of the key ministers involved with state capture and ties with the controversial Gupta family was dismissed soon after Ramaphosa took office (Mahlaka, 2018:1).

3.6.4. Economic climate

South African banks are faced with a daunting economic outlook, especially due to low forecasted growth rates. The Organization for Economic Cooperation and Development (OECD) predicts that economic growth will improve for 2018/2019 due to renewed industry and consumer confidence (OECD, 2018:1). Although the economy saw an improvement in the

fourth quarter of 2017 of 3.1 percent for Gross Domestic Product (GDP) growth, this was largely due to the improved market sentiment, brought on by the removal of president Zuma and the election of president Ramaphosa in his place (Van der Merwe, 2018:1). The first quarter of 2018 was less positive as the South Africa's GDP shrank by 2.2 percent (Stats SA, 2018a:1). The second quarter resulted in the country entering a recession, with only a 0.7 percent quarter on quarter growth (Stats SA, 2018c:1). A reduction in profits from agriculture, manufacturing and mining also contributed to the reduction in GDP early 2018 (Stats SA, 2018a:1).

3.6.5. Knowledge sharing

Haryanto (2017:84) found that banking institutions have placed more focus on knowledge management strategies to improve competitiveness. If knowledge management strategies are implemented effectively, the bank will have more opportunities for innovation and effect change. South African banking institutions are segmented into different business units based on the banking functions performed (Subramanyam, 2004:588-589). These business units become the data owners for all the data relating to their individual function or products. If banks improve the method business units share knowledge with the rest of the bank, employees of the bank will be aware of all data available to them. Knowledge sharing will improve the analytics that can be performed and provide more client insights. Knowledge sharing poses a challenge as a study conducted by Chigada (2014:212) that included participants from both Nedbank and FNB, found that a lack of policy guidelines as to how to preserve information resulted in inadequate knowledge retention. Other contributing factors were employee deaths, resignations and retirements, which leads to inefficiencies within the banks. Inadequate knowledge retention strategies ties back to the challenge of legacy systems previously discussed, as the skill and coding languages required to develop on these systems are no longer taught at universities and knowledge transfer is solely the banking institutions' responsibility (Bobeldijk, 2017:1).

3.6.6. Strict regulatory and supervisory requirements

The soundness of the South African banking industry was previously highlighted, however, this has come at a cost. Banks were required to fund large scale projects to develop the infrastructure needed to accommodate new laws and regulations (Marx & Mynhardt, 2011:435). The implementation of the POPIA has been a recent challenge for banks. Failure to

comply with these legislations will result in large fines and clients taking the bank to the ombudsman resulting in legal fees (Alfreds, 2014:1). If the ombudsman finds that the bank leaked personal information covered by the act, settlement amounts will be paid to the client for damages caused (South Africa, 2013:36). Another effect of this act, is the sharing of personal information, both internally and externally, will need to comply with stricter requirements, which can hamper the data and analytics capabilities within the bank, as well as marketing campaigns (Dicey, 2018:1). Analytics that require personal information like race, gender and age, to gain insights into a bank's clients and which products to market to different groups of individuals will be more difficult to obtain. This will also have an effect on the operations teams within the bank as only relevant information required for the processing of requests may be sent and stored (Dicey, 2018:1).

3.7. Importance of banks to promote investment in South Africa

The traditional banking industry focussed on safekeeping funds and extending credit (Goddard & Wilson, 2016:1). This has been a very lucrative endeavour with interest rates on credit products being higher than interest on the funds kept on behalf of their clients. With the changing technology and modern clients becoming accustomed to quick and easy solutions, more clients would like to see all their financial assets and obligations on one single platform (Saleem & Rashid, 2011:537). This is causing a shift towards banks launching their own unique investment products and solutions. Banks also have a moral obligation to provide clients with products they need instead of only pushing the most profitable option like extending credit (Mostert & Lotz, 2010:8). South Africans are over indebted and studies have estimated that a large portion of the population will not have enough savings at retirement age (Nogantshi, 2015:1). South African over-indebtedness highlights the importance for banks to understand the needs of their clients and promote relevant investment opportunities.

3.7.1. Big Data and investment marketing

According to Lee (2017:293), Big Data is the availability and interpretation of large quantities of data by using technological advances. The concept has had profound implications on the ability of firms to analyse their clients' behaviour and utilise the data to improve everyday operations and marketing. Research conducted by Hofacker (2016:89) found that Big Data has the ability to provide insight into each different stage of the investor decision-making process.

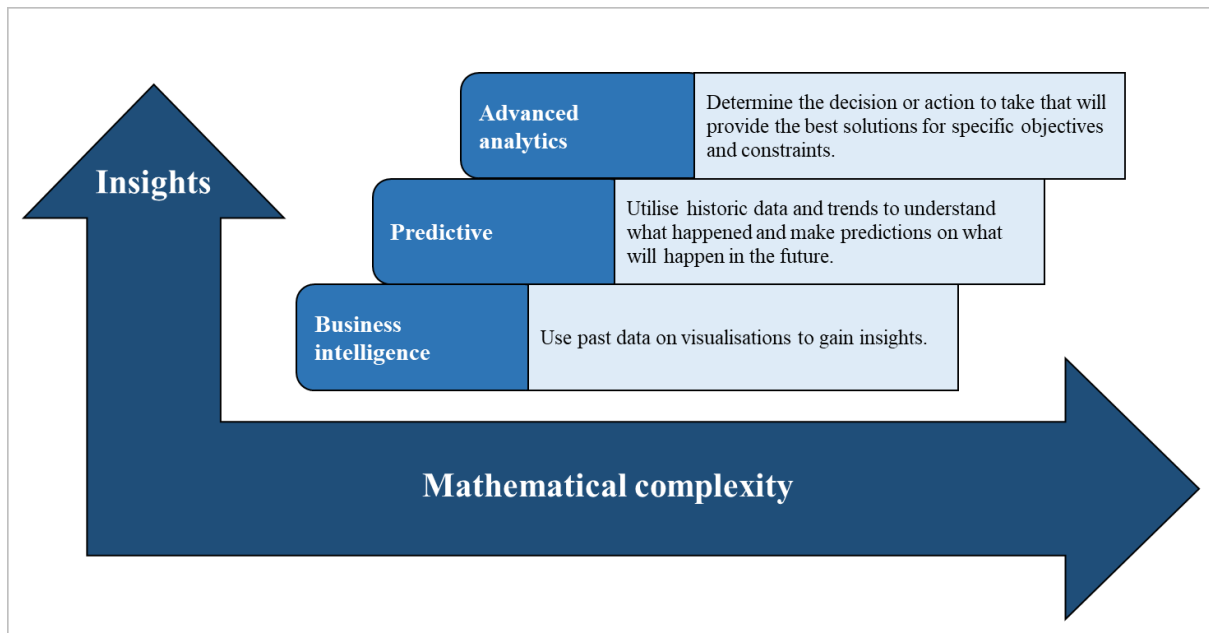


Figure 3.6: Stages of Big Data analysis

Source: Ernst & Young (2013:6).

Banks have large volumes of client data that can be used to gain client insights. The data can be used to model client investment portfolios to gain a view of the overall bank's investor behaviours and the differences between clients of different demographics and income levels (Kitchens *et al.*, 2018:550). This allows the bank to promote investment products suitable for their investments based on their predicted stage in the investor life cycle. Data and analytics have become so sophisticated that banks can see when their clients have funds flowing to competing firms. With this information, banks can determine which products the competing firms have that could be attracting their clients and lure them back by providing similar products, with the added benefit that all their products would be available on a single platform (Hao, 2000:53). The use of historic data to visualise trends and make assumptions on how clients will react is a vital part to determine how clients will react in the future. The use of Big Data and sophisticated statistical analysis tools allow for more accurate predictions (EY, 2014:2).

Hofacker (2016:89) also found that due to the ease of transacting online, banks can record every action a client takes. If a client starts the process to open a new investment account for instance and then stops before accepting the terms and conditions, banks can analyse the data and make deductions as to what prompted the client to cancel the application. Utilising Big Data provides banks with a competitive advantage over their competitors (EY, 2014:1). By

understanding the data and needs of the clients, banks can effectively provide relevant products and boost client retention rates (Lee, 2017:300). Due to this fewer clients would move their funds to competing firms that provide a wider range of investment opportunities (Kitchens *et al.*, 2018:541).

3.7.2. The role of investments in client retention strategies

Acquiring new clients should always be an enormous drive for banks, however, more focus should be placed on retaining existing clients. Since the introduction of mass marketing strategies, based on readily available client information, banks have managed to sell massive amounts of products. Clients that previously would have been unaware of products available suddenly had an abundance of choices. This led to increasing client numbers, with the drawback that banks started losing the personal touch (Achmed, 2011:63-64). Linking back to the importance of Big Data, banks can get a better understanding of the types of clients they are dealing with and personalise communications sent to these clients (Kitchens *et al.*, 2018:541).

Research conducted by Ernst & Young (EY, 2010:5) found that clients look at the best product for their needs and not necessarily using one individual banking institution. This trend seems to be less prevalent with clients with more than one product at one bank, which suggests that loyalty towards a bank increases with the number of products held at the institution. With more products at one bank, it is also more difficult to move all of them to a competing bank, which increases client retention. This highlights the importance of offering investment products, even if they are less profitable than the traditional credit products (Chen & Popovich, 2003:672).

3.8. Synopsis

Banking institutions can be subdivided into three broad categories. Commercial banks are the banks that most closely meet the basic definition of a bank that is to accept cash deposits and provide loans to individuals and businesses. Investment banks provide more specialised services to the most affluent individuals and corporates, while universal banks provide both commercial and investment banking services. Due to the financial nature of the business, numerous risks are prevalent in the banking industry. The main risks include credit risk, market risk, and operational risk. Credit risk is the probability that borrowers will be unable to pay back the funds they loaned. Market risk is the risk that the investment price could change due to factor influencing the underlying market. Operational risk is the possibility of loss due to

failures in the normal operations of the business. Other important risks include liquidity risk, reputational risk, strategic risk, business risk and systemic risk.

The South African banking sector has been ranked one of the soundest in the world. Due to recent political events and the country's credit rating being downgraded by two of the big three credit rating agencies, this perception is waning. The said industry does, however, still adhere to the strict regulatory rules prescribed by the Basel Accords. These Accords provide guidelines relating to the amount of capital a bank needs to prevent large risk events from forcing them into bankruptcy. Other acts discussed was the NCA, which regulates the amount of credit banks may provide, and the POPIA, which ensures the ethical and responsible use of personal information by all institutions. The role of the banking industry has become more complex, as due to advances in technology, competing firms, a daunting economic outlook, political unrest, inadequate knowledge sharing, and strict regulatory requirements, the traditional bank has a range of new challenges to overcome. Studies conducted by the WEF found that the biggest challenges for the South African banking industry is political in nature. The effects of this is evident when analysing how the perceived stability of the banking industry is deteriorating.

The banking industry is essential for the promotion of a healthy economy. Without banking institutions, obtaining funding for projects that grow businesses and the economy as a whole would not be possible. Banks also have the means and abilities to gain insights from the vast amounts of data available on their clients. Using these insights, banks can model investor behaviour and promote a culture of investment. By using the theory of the investor life cycle, combined with the data available, banks can improve the returns their clients are expecting. With banks providing more investment products, there is also the added benefit of client retention, as less clients would seek these investment opportunities elsewhere.

4.1. Introduction

Marczyk *et al.* (2005:1) argue that research is essential for scientific progress and that advances in all fields of science rely on contributions made to these fields by the researchers testing and hypothesising new ideas. Research can be defined as the process where knowledge is gained by means of observing natural phenomena or measuring and interpreting information to make meaningful conclusions (Leedy & Ormrod, 2005:2). Secondary data provided by a South African universal bank was used to model investors on the investor life cycle, based on their current investment products and unique characteristics. By analysing the current positions of investors of different age ranges, race, gender and income level, the validity of using data readily available to banks to make investment recommendations were tested.

In order to understand the methodological approach used in the empirical portion of this study, the chapter starts by investigating the concept of a research design and the different views of reality, which include axiology, ontology, epistemology and methodology (Killam, 2013:6-9). The section that follows evaluates the different research paradigms of positivism, post-positivism, interpretivism and pragmatism followed by the different research approaches, which include the qualitative and quantitative approaches as well as mixed methodologies (Creswell, 2013:7-11). The chosen approach and reasons for choosing the approach is then discussed.

The focus moves to the research method used in the study. As the researcher used secondary data provided directly by the bank, the secondary data analysis techniques are discussed, as well as ethical considerations, management of information, and the limitations to the study. This is followed by the sampling procedures, a discussion on the population selected, the sample frame, and the sampling methods available. Sampling can be done by using probability sampling techniques, which include simple random-, stratified-, systematic-, and cluster sampling. There are also a range of non-probability sampling techniques namely convenience-, snowball-, purposive- and quota sampling (Lind *et al.*, 2006:213-217; Maree, 2012:172-178).

The chapter ends with a discussion around the data analysis process, which revolves around data preparation, modelling, graphing and statistical analysis. The main statistical techniques used in the study included the t-test, correlation-, linear regression- and multiple regression analysis.

4.2. Research design

The researcher evaluated the most suitable research design for the study and found that there are different research stages to consider. The research design is applied during the planning stage in order to map out and plan how the research will be conducted. The research design ensures the results are accurate and credible (Kothari, 2004:3-32).

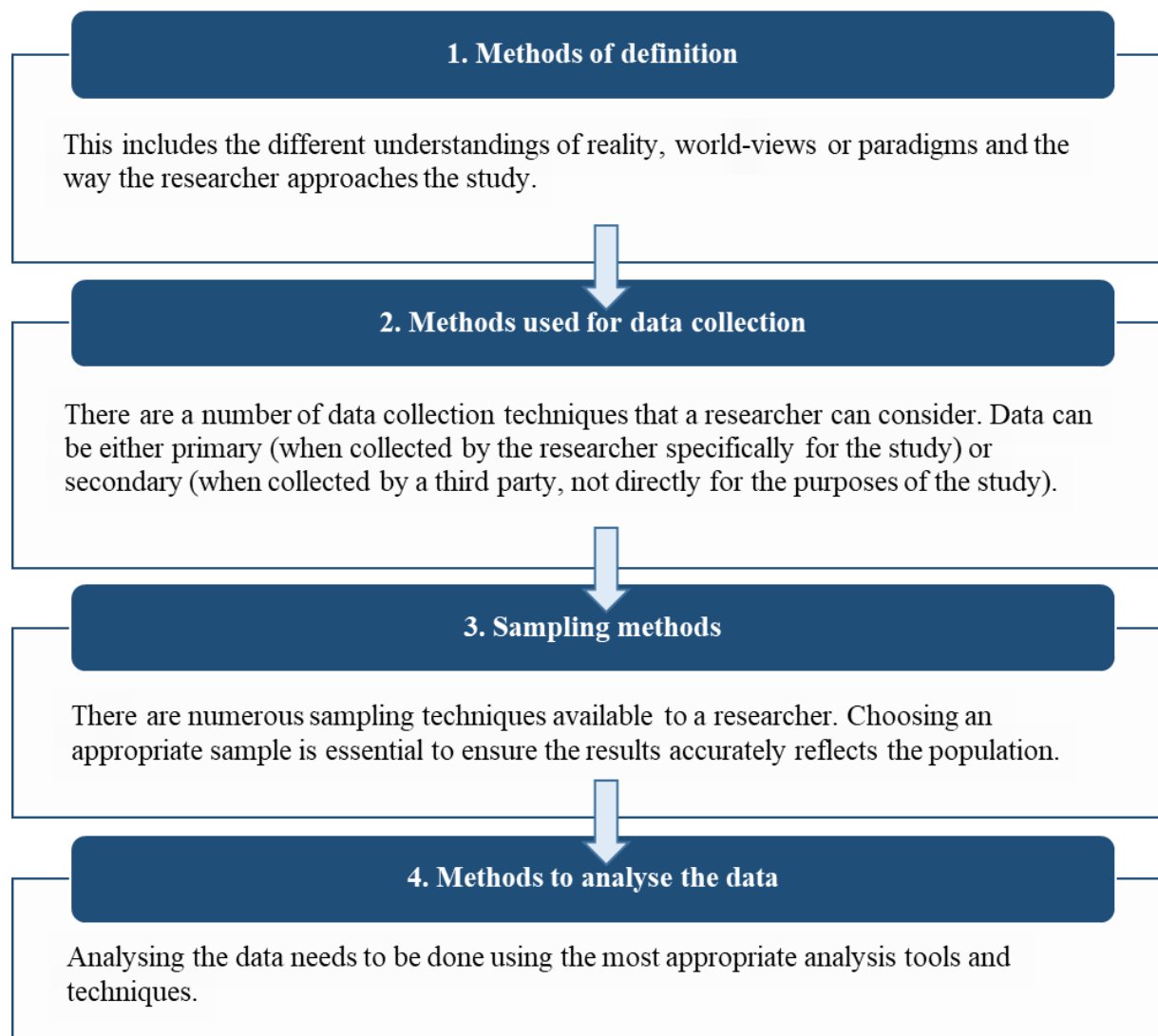


Figure 4.1: Research design

Source: Mouton, (1996:36); Myatt, (2007:2-6); Killam, (2013:6-9); Ngulube, (2015:130).

Research can take two distinct forms. It can either be applied, in which case the goal is to find answers to problems in the real world, or basic, in which case it attempts to fill in knowledge humanity currently does not have (Gall *et al.*, 2005:6). For this study the research is applied as

the researcher seeks to evaluate existing problems and attempts to better understand these issues and find solutions.

Before the researcher can choose a paradigm and research approach, there are four key concepts regarding what reality is that needs to be addressed namely, axiology, ontology, epistemology, and methodology (Killam, 2013:6-9).

Table 4.1: Views on reality

Concept	Definition	Source
Axiology	Refers to the study of ethics and values, and how the researcher views them.	Killam, (2013:6)
Ontology	Refers to the way the researcher perceives reality.	Maree <i>et al.</i> , (2012:52-53); Killam, 2013:7
Epistemology	Refers to the acquisition of knowledge and how the researcher acquired knowledge he already has. This is considered to be more philosophical in nature when compared to methodology.	Maree <i>et al.</i> , (2012:52-53); Killam, (2013:8)
Methodology	Refers to how the researcher discovers knowledge in a systematic way. It requires both the ontological and epistemological views of the researcher.	Killam, (2013:9)

Source: Author compilation

Table 4.1 lists and explains the different views a researcher needs to consider around the concept of reality. Once the researcher has a thorough grasp of these philosophical concepts, the research paradigm, approaches and techniques can be mapped out.

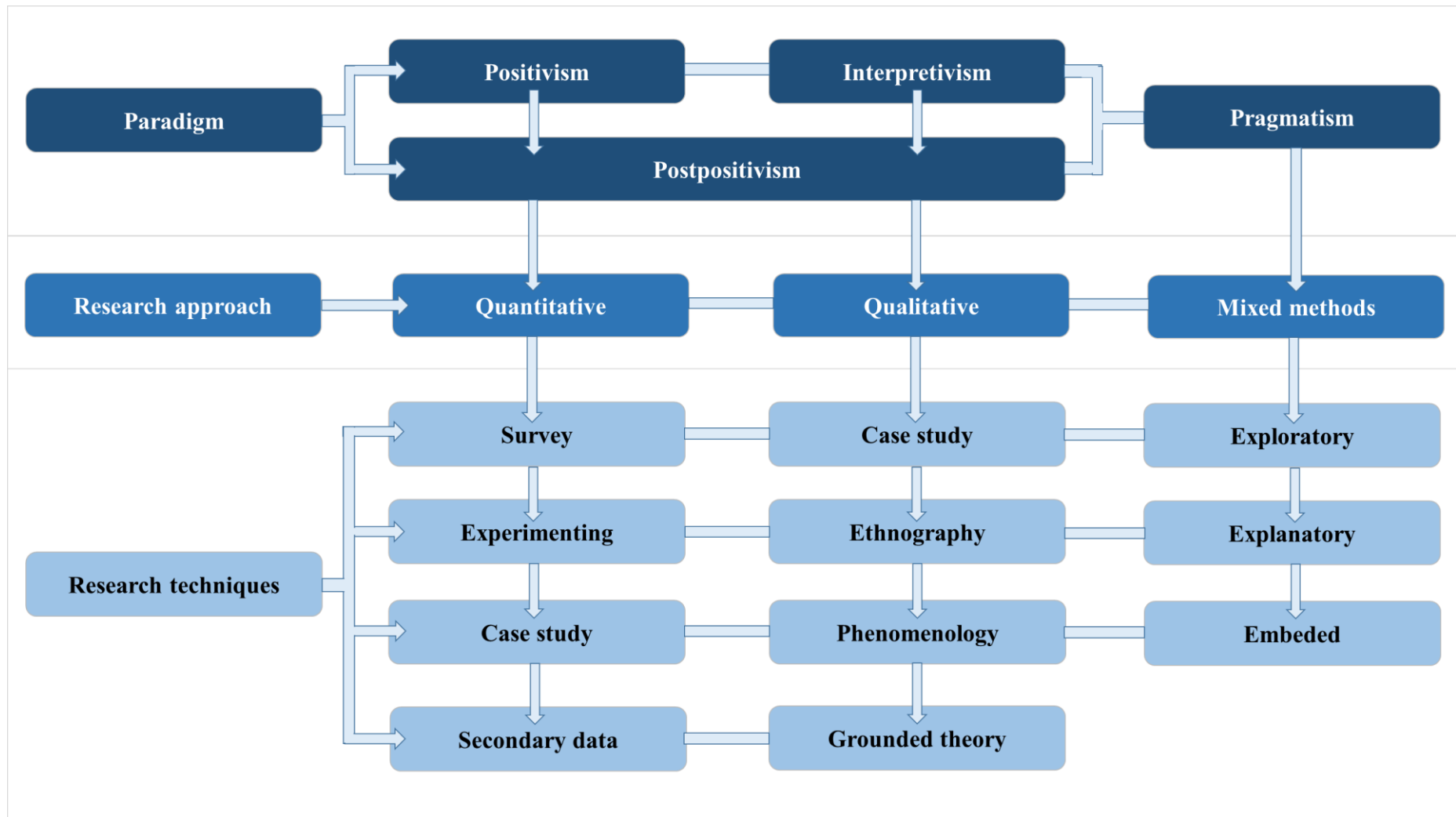


Figure 4.2: Research paradigms, approaches and techniques

Source: Ngulube, 2015:130.

From Figure 4.1 the different paradigms, research approaches and most common techniques were clearly mapped out. The different paradigms are discussed in the following section.

4.2.1. Research paradigm or world-views

The research paradigm, also known as the worldview, represents the methods used by researchers to acquire knowledge around how the examined phenomenon works, as well as making sense of reality (Tracy, 2013:38). Ritchie *et al.* (2013:5) found that there are different individual beliefs influencing how researchers approach research, especially with the social sciences. The research paradigms to be discussed are positivism, pluralism, post-positivism, interpretivism and pragmatism (Ngulube 2015:130).

4.2.1.1. Positivism

The positivist paradigm holds that knowledge stems from natural phenomena and the unique properties and relationships between characteristics. Phenomena are interpreted and converted into knowledge by using reason and logic (Jonker & Pennik, 2010:29). The research approach most closely related to positivism is the quantitative approach as the researcher uses empirical testing methods and scientific measures to gain insights and knowledge (Morgan, 2007:56).

4.2.1.2. Post-positivism

The paradigm is often also referred to as the scientific method or empirical science. It can be used by either quantitative or qualitative researchers, however, it is most common in quantitative studies (Creswell, 2013:7). It challenges the notion set forth by positivism that there is absolute truth when it comes to knowledge (Hamati-Ataya, 2012:291). The theory holds that even though positivism's focus is on empirical results and that the researcher's own experiences and values should not form part of the study, there could still be bias in the study, not realised by the researcher (Ryan, 2006:12-13). With post-positivism, the researcher attempts to identify possible biases in the positivist study.

4.2.1.3. Interpretivism

Interpretivism also referred to as constructivism, is the philosophical view that there is no absolute answer as proposed by positivism (Jonker & Pennik, 2010:29). The view is found in studies using a qualitative approach, as the focus is placed on details of individual experiences, rather than grouping answers together and making generalisations (Creswell, 2013:8). The

theory is most commonly used in social studies where the researcher's aim is to understand human behaviour and decision-making (Jonker & Pennik, 2010:29).

4.2.1.4. Pragmatism

The theory of pragmatism is built on the belief that problems should be dealt with in a practical manner, rather than focussing on existing theories or principles. The researcher focusses on the problem and all possible methods available to understand the problem (Morgan, 2007:60). The research approach associated with pragmatism is mixed methods, as the methods used to understand a problem combines qualitative and quantitative methods (Creswell, 2013:10-11).

4.3. Research approach

There are three different approaches a researcher needs to consider before a study is conducted. These approaches include qualitative, quantitative and mixed methods (Creswell, 2002:3). It is important to note that there is not a single correct approach and that all these approaches carry merit based on what is being studied (McMillan & Schumacher, 2001:463-464).

4.3.1. Qualitative research approach

Qualitative research is based on emerging methods with a limited number of participants. The approach is a sociological model that places emphasis on the fact that scientific enquiry is social in nature and focuses on experiences of individuals and their choices and decisions (Hox & Boeije, 2005:595). Novikov and Novikov (2013:75) define the qualitative approach as one where the researcher explores the totality of attributes, properties and specific features of an observed phenomenon or process. The approach uses interviews and questionnaires with open-ended questions to gain more complete and detailed insights (Marczyk *et al.*, 2005:17). These insights cannot be explained using statistics and instead the researcher focuses on patterns that emerge and use their own world-views to analyse and interpret the results. The approach accepts the fact that there are multiple realities, which explains why there are different human behaviours and interpretations based on social context (Leedy & Ormrad, 2005:94).

4.3.2. Quantitative research approach

Quantitative research uses predetermined questions and historic data to answer newly formulated hypotheses. The approach is based on numeric data that can be accurately measured and analysed using statistical analysis and other data modelling techniques (Dawson,

2009:127). This approach aims to ensure objectivity, generalisability and reliability (Keele, 2011:38). With the quantitative approach, it is possible to measure relationships between variables and it usually involves the unique characteristics of a population (Marczyk *et al.*, 2005:17). A sample is randomly obtained and unbiased, with the aim being that it resembles the actual population as closely as possible (Jonker & Pennik, 2010:38).

4.3.3. Mixed methods research approach

Tashakkori *et al.*, (2003:273-275) found that some studies require both qualitative and quantitative approaches. Creswell and Plano Clark (2007:5) determined that a mixed methodologies study usually comprises a portion where numeric data are measured using statistical tools (quantitative approach) and a second portion where open-ended questions are evaluated to determine trends and establish a more detailed understanding of the human aspect of the study (qualitative approach). Mixed methods are used when the other two approaches will not cover all the aspects the study sets out to prove (Morgan, 2007:48).

4.3.4. Research approach and paradigm selected for this study

The quantitative research approach and positivism paradigm was selected as the analysis comprised actual numeric and demographic data obtained from the bank. The data were analysed by grouping and modelling the data and using statistical tools to proof the empirical objectives formulated in Chapter 1.

4.4. Research method

Hox and Boeije (2005:593) found that data can either be obtained directly by a researcher specifically for a study, or existing data that has already been collected can be used to obtain new insights. The first is known as primary data, while the latter is known as secondary data. Primary data have the advantage of the researcher structuring the data to exactly suite the requirements to answer the formulated research questions (Kothari, 2004:95). Every time a researcher collects data, this data can be added to a body of knowledge that future researchers can access and use as secondary data (Brakewood & Poldrack, 2013:671-672).

Secondary data have already been collected and used in another study, or simply collected and stored for record-keeping and reporting purposes by governments, companies and other interested parties. The data are usually quantitative in nature and consists of observed

characteristics that have been coded in variables with a range of possible values (Hox & Boeijs, 2005:594). The researcher used secondary data in the study which are discussed in the following section.

4.4.1. Secondary data analysis (SDA)

The study made use of secondary data provided by a bank that agreed to participate in the study. The bank's investor data are stored on a relational database and were extracted using a domain specific data extraction language i.e. Structured Query Language (SQL). Demographic data like age, race and gender are directly supplied to the bank on account opening by the investors. The bank also keeps record of the value and types of investment each investor holds and funds flowing through the accounts that the researcher used to determine income levels.

The researcher used secondary data as the data reflect actual investment types and values held by the investors of the bank. This eliminates the risk of investors misrepresenting the investments they hold and demographic information when conducting surveys and other primary data collection methods (Kothari, 2004:111). The sample data were a snapshot of the investors' profiles as from the 31st of July 2018.

Myatt (2007:2) and Vartanian (2011:13-15) list five requirements that researchers need to adhere to when using secondary data to ensure the data are adequate to conduct the study:

- The population of the secondary data needs to be sufficient to address all the empirical objectives formulated by the researcher;
- The dependent variables being tested need to be available in the data. If not, the researcher can use the data if the variables are comparable and this is disclosed in the limitations of the study;
- All the independent variables the researcher will use to test their effects on the dependent variables should be available in the study. Specific groups also need to be easily identified from the data, for example, the income level of each investor;
- If special authorisation is required for the data to be shared, the permissions need to be granted before the researcher undertakes the study. The researcher also needs to take this into consideration when planning how long the study will take; and
- Secondary data often needs to be cleaned up and transformed into a useable format. In order to ensure the data are useable, the researcher either needs advanced programming skills in

statistical analysis tools or employ an individual who can assist to ensure the accuracy of the data.

For this study, the researcher confirmed that the data are sufficient to answer the empirical objectives formulated in Chapter 1. The dependent and independent variables were available and permission to use the data was obtained via the relevant sources. The researcher also has five years of experience working with large data sets and used the appropriate statistical tools to ensure the validity of the data. The ethical considerations relating to the study are discussed in the following section.

4.4.2. Ethical considerations

The use of personal information brings about ethical issues that need to be considered. Sarantakos (2005:22) argues that the accuracy of the methodological procedure followed should be viewed from an ethical point of view and not just as a technical requirement. Obtaining data in an unethical manner can result in the findings being irrelevant and mislead future researchers who base their studies on these incorrect results (Dane, 1990:52). No personal information that can be tied back to a specific individual or business can be disclosed in a study unless consent is received from the party involved allowing the researcher to make the data public (Marczyk *et al.*, 2005:240-241). All requirements regarding ethical standards of academic research were adopted for the research study conducted (NWU, 2016:15). The ethics clearance number for the study is ECONIT-2018-07 that can be viewed in Annexure A.

Ethical considerations for the study included the following:

- The anonymity of participants ensured (Leedy & Ormrod, 2005:102). The bank confirmed that there was no way to link back the data provided to the investors involved in the study. Random numbers were assigned to each investor, with no information that could expose the investor's identity.
- Permission to use the data was obtained directly from the participating bank and the researcher agreed not to disclose the name of the bank involved.
- The findings will be made available in the form of a scientific research report for the public to view. The results will also be published in a dissertation, as well as an academic journal.

- Research was only conducted once the Research Committee of the Faculty of Economic Sciences and Information Technology at the North-West University (NWU) provided ethical clearance (Annexure A).
- The data will be archived for at least five years.

4.4.3. Management of information

Management of information in the context of a research study refers to the process of storing and maintaining information used in the study. The onus falls on the researcher to ensure the data used are stored safely, protected adequately, the anonymity of the participants is ensured, and disposed of after a set amount of time (Brakewood, & Poldrack, 2013:671). The researcher took the below information management steps:

- Participants can only be identified by the bank using random assigned numbers.
- The spreadsheets are password-protected and only the researcher has access.
- The data are stored on the researchers' personal and work laptop and the bank has agreed to store the data on their data warehouse as an additional precaution.
- Data will be disposed of five years after completion of the study.

4.4.4. Limitations

Research studies are rarely without any issues as there are certain limitations that are often beyond the researcher's capabilities to resolve (Maree *et al.*, 2012:42). The study was based on investors at a single universal South African bank. The investment values reflect only the investments held at the bank and the researcher had no external knowledge of any investment products held at other institutions. The income level of these investors was also determined by funds flowing through the account held at the bank, and any participants that have a second account at a different banking institution could potentially be earning more than what is perceived at the participating bank.

4.5. Sampling procedure

Selecting a sample is one of the most important steps in a research study, as this sample reflects the overall population being studied. If the sample is skewed and does not include the same distinguishing features found in the population, the results will also be skewed (Sarstedt *et al.*, 2019:1). The reason researchers use samples is due to the difficulty of obtaining data of the full

population and possible ethical issues that could arise (Marshall, 1996:522). The sampling process identifies which population is being targeted, the sample frame, the required size of the sample, and the best sampling method to use.

4.5.1. Defining the target population

The target population was investors at a South African universal bank. The requirements were that these investors have a main transactional account at the bank with at least one additional investment product held. The purpose of the study was to determine how investors with different characteristics invest. The bank offers numerous banking services from day-to-day transactional services and retail banking needs to investment and insurance products.

The researcher obtained the sample data directly from the bank. The data contained demographics like age, race, gender and income level. The client's income level is determined by the bank based on funds flowing through the transactional account and internal segmentation rules. Clients earning salaries between set amounts are grouped into lower income, medium income, high income and wealthy. The income amount rules are disclosed in order to protect the anonymity of the bank as each bank in South Africa has its own individual segmentation rules. The data also contained amounts invested in three different investment products, which included cash, equities and unit trusts.

4.5.2. Sample frame

The population for this study was selected based on convenience as a reputable universal bank in South Africa was chosen based on their willingness to participate. The sample was obtained randomly from the bank's population in order to ensure the chosen investors share similar characteristics to the entire population of the bank. The sampling methods available and the method chosen for this study are discussed in the following section.

4.5.3. Sample method

The sampling method entails the techniques used to choose participants from a population to form part of a smaller representative sample (Novikov & Novikov, 2013:53). These methods have two subcategories namely probability sampling and non-probability sampling (Maree, 2012:172).

4.5.3.1. Probability sampling

Probability sampling methods are based on selection being made randomly. It holds that every unit that forms part of the population has an equal, non-zero chance of being selected (Maree, 2012:172). There are four common probability sampling methods, which include random-, stratified-, systematic-, and cluster sampling.

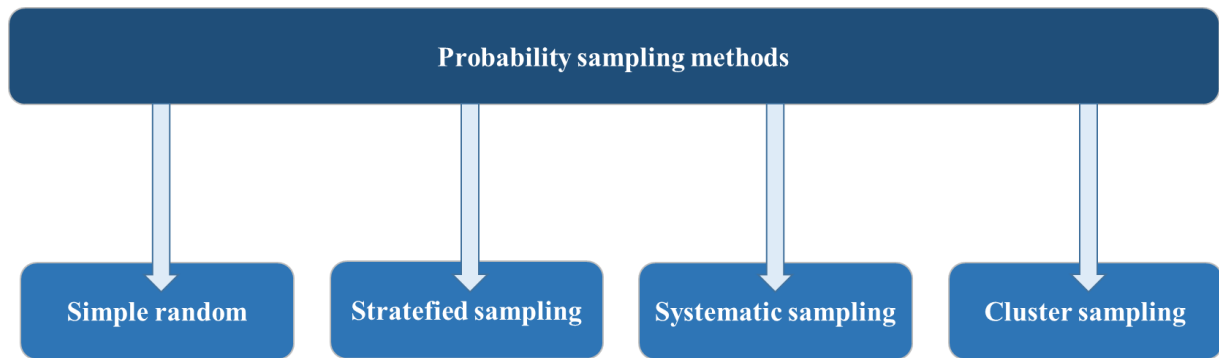


Figure 4.3: Probability sampling methods

Source: Lind *et al.*, (2006:213-217); Maree, (2012:172-176)

A simple random sample is a sample obtained randomly, which implies that each participant that formed part of a population had a non-zero chance of being selected (Marczyk *et al.*, 2005:56). Stratified sampling can be defined as a method where the entire population used for the study is subdivided into categories or strata. A comparative allocation is made to each stratum based on the distribution of the population to ensure the same percentage of elements is reflected in the sample (Rossi *et al.*, 1983:37). With systematic sampling, the selection is based on intervals determined by the sample percentage. The results will correspond to random sampling in cases where the elements are randomly numbered (Kothari, 2004:15). Cluster sampling consists of groups of elements that naturally group together. The technique first draws a sample of naturally occurring clusters and then draws a random sample from each cluster (Kothari, 2004:65).

4.5.3.2. Non-probability sampling

The purpose behind using non-probability sampling techniques is to gain descriptive insights, rather than making generalised conclusions about a population or group (Dawson, 2009:53). Non-probability sampling is most popular in qualitative studies, however, due to difficulties to obtain perfectly random samples, the techniques are also used in quantitative and mixed

methodological approaches (Kothari, 2004:59). There are four common non-probability sampling techniques, which include convenience-, snowball-, purposive- and quota sampling (Creswell & Plano Clark, 2015:334).

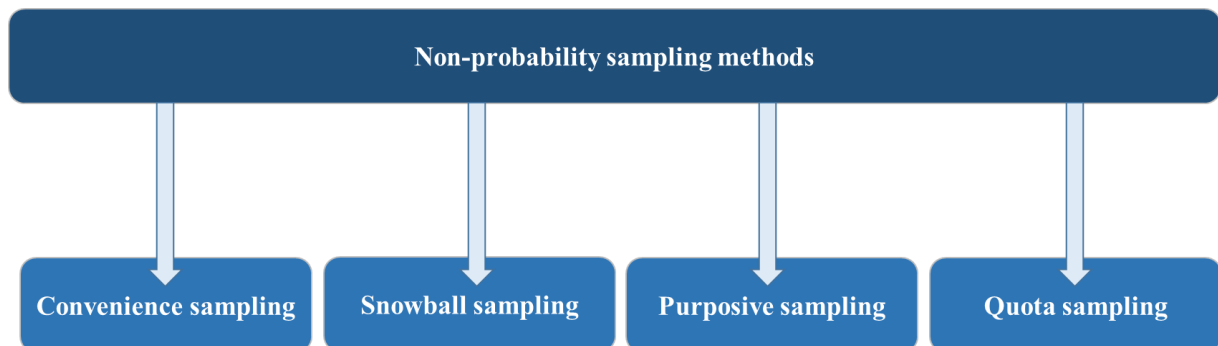


Figure 4.4: Non-probability sampling methods

Source: Dawson, (2009:53); Maree, (2012:176-178)

Convenience sampling is the easiest sampling method and is simply based on the data the researcher has easy access to. Snowball sampling uses convenience to gain access to the first participant and then attempts to gain insights from the first participant as to any new participants who are willing to partake in the study (Creswell & Plano Clark, 2015:334). Purposive sampling is based on the researcher's own experiences and assumptions about which participants will be the most valuable to the study. Quota sampling represents a group selected solely on a specific trait, like only including individuals with disabilities, or a specific race etc. (Kothari, 2004:16).

4.5.3.3. The sampling method used in this study

The sample used in the study was made up of 19 911 investors. The calculated sample size was determined by the bank to be 20 000 and the stratified random sampling technique was applied. The population data were divided into different strata to ensure the distribution percentages of age, race, gender and income level reflect the distribution per stratum seen in the entire population.

Table 4.2: Percentage investors per strata, population vs sample

Income level				
Description	Calculated Strata size	Sample size	% Population	% Sample
Low income	13 627	13 463	68%	68%
Medium income	4 167	4 156	21%	21%
High income	1 658	1 691	8%	8%
Wealthy	548	601	3%	3%
Age range				
<21	243	265	1%	1%
21-25	1 191	1 192	6%	6%
26-30	2 395	2 377	12%	12%
31-35	3 206	3 175	16%	16%
36-40	2 914	2 888	15%	15%
41-45	2 466	2 448	12%	12%
46-50	2 021	2 011	10%	10%
51-55	1 627	1 621	8%	8%
56-60	1 365	1 362	7%	7%
61-65	1 034	1 038	5%	5%
>65	1 539	1 534	8%	8%
Race				
African	12 939	12 776	65%	64%
Coloured	1 153	1 181	6%	6%
Indian	1 113	1 137	6%	6%
Other	87	142	0%	1%
White	4 708	4 675	24%	23%
Gender				
Female	10 409	10 363	52%	52%
Male	9 591	9 548	48%	48%
Total	20 000	19 911	100%	100%

Source: Author compilation.

From Table 4.2, the calculated strata were determined by calculating the percentage of investors of the population in each stratum and multiplying this with 20 000 (as determined by the bank). The actual sample data were obtained after running the stratified sampling procedure on the statistical analysis system (SAS) Enterprise Guide 7.1. The results obtained indicate that the sample closely resembles the distribution of investors across the different strata in the population, ensuring the sample is representative of the population being analysed.

4.6. Data analysis

Data analysis can be defined as the process where data are inspected for accuracy, cleaned and transformed in order to gain more insights (Myatt, 2007:2-6). When conducting data analysis, the researcher needs to be aware of factors that could influence the results that are not necessarily determined by the experimental procedure. These factors are caused by random chance, or uncertainties that exist with all measurement techniques also referred to as measurement error (Asteriou & Hall, 2016:22).

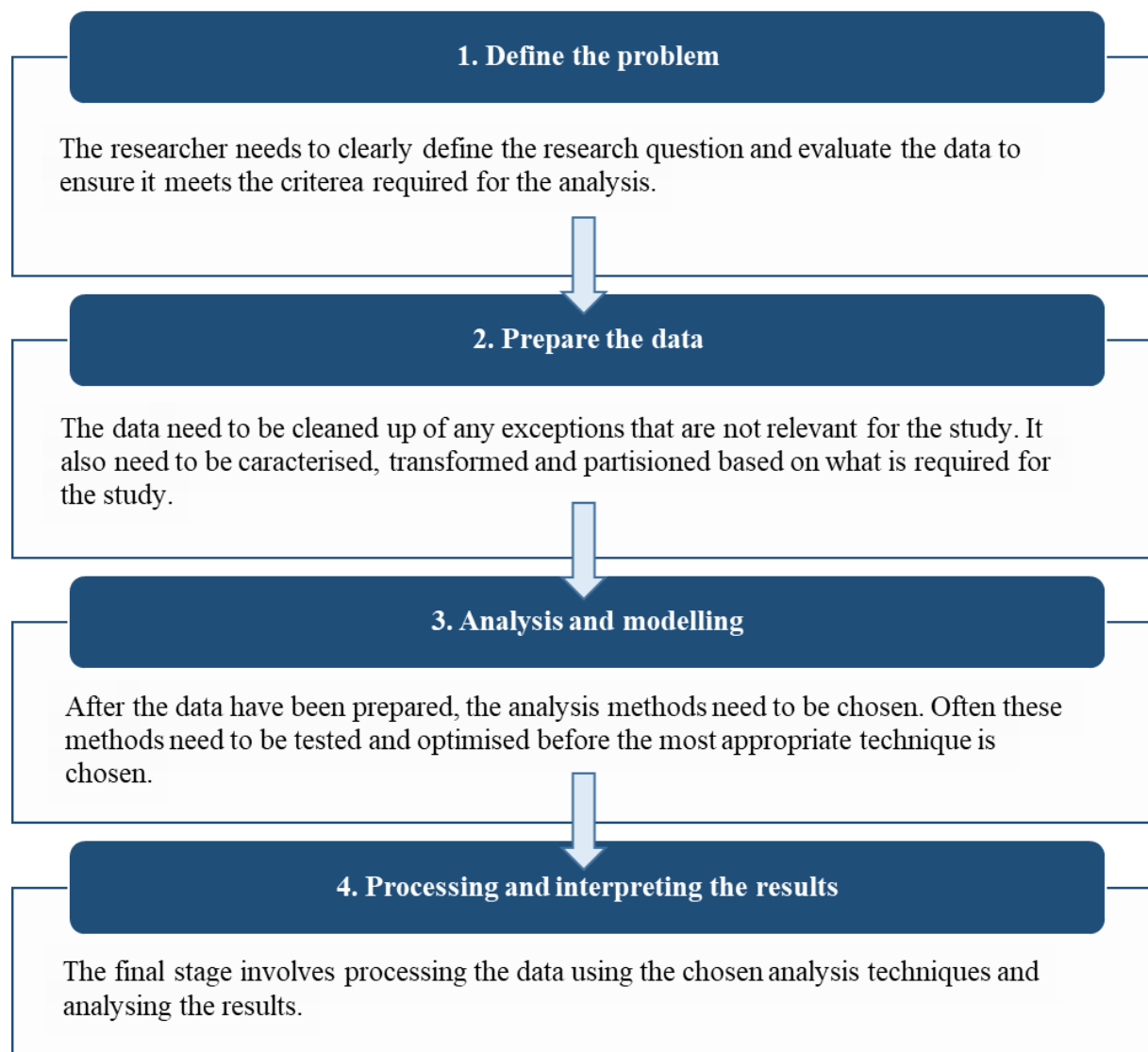


Figure 4.5: Data analysis process

Source: Myatt (2007:2-6).

Figure 4.1 shows the basic steps involved in data analysis. The first step is to clearly define the problem, which was done in Chapter 1 of the study. The following sections cover data preparation and analysis. The results after processing are analysed in Chapter 5.

4.6.1. Data preparation

Myatt (2007:2) highlights the importance of the data preparation step, as the data need to be thoroughly understood to ensure incorrect data are eliminated or corrected before any statistical analysis or modelling is conducted. This is especially important for secondary data, as the researcher needs to ensure the data meet the study's research objectives and that there are no misunderstandings around what each characteristic in the data represents (Hox & Boeijs, 2005:594).

4.6.2. Data modelling and graphing

Using statistics is an essential part of any study as it helps a researcher to identify relationships between different variables and how their changes will affect each other. Another concept often overlooked is that of data modelling and graphing (Asteriou & Hall, 2016:17). Microsoft Excel 2016 was used to model the data into graphs and to group the data together. By grouping data and creating cross-tabulations, a researcher can gain insights as to how the data are behaving. Graphs can help researchers identify trends, which cannot be easily identified by simply looking at the numbers (Asteriou & Hall, 2016:17). Nisar *et al.* (2013:255), highlight the importance of graphs due to their versatility and expressivity. The researchers also point out the usefulness of graphs in Big Data analysis due to the large amount of data inputs. In order to show important trends on graphs when complex data sets are involved, researchers need to think of innovative ways of modelling the data.

Some useful techniques include the following (Asteriou & Hall, 2016:22):

- Combo charts, where more than one chart type can be used on a single graph, as well as two measuring scales (different scales on the left and right for the two different charts).
- Using less common charts like bubble charts that can show more detail on a single chart when compared to more well-known graphs like pie- and bar charts.
- Breaking the graphs up to show different levels of the same demographic or characteristic on separate graphs.

For this study, the researcher used several of the charting techniques discussed as trend analysis formed a big part to prove the four empirical objectives formulated in Chapter 1. Lind *et al.* (2006:16) argue that researchers need to take extra care when using graphs, as inaccurate modelling could create non-existing trends and provide misleading insights. The researcher combined the trends with statistical results to formulate a holistic conclusion.

4.7. Statistical analysis

In order to quantify the data, descriptive- and inferential statistics were used. The SAS Enterprise Guide 7.1 was used for statistical analysis. When conducting any form of statistical analysis, the most suitable model is selected based on both the nature of what is being studied and the method used in which the data were obtained (Kumar Sahu *et al.*, 2015:1). Any measurement instrument used in the study needs to be both reliable and valid. Reliability refers to the overall consistency of a measure. The idea is that if the results obtained are similar after each measurement is given that external conditions remain unchanged, the measure is highly reliable (Marczyk *et al.*, 2005:103).

An important factor to remember is that reliability does not automatically mean the measure is valid. When considering the validity of a measurement, the idea shifts towards how accurately the results represent real world scenarios. It can be further defined that validity is the accuracy of a tool to measure what it is intended to measure (Noble & Smith, 2015:34). There are four types of validity the researcher needs to consider namely internal validity, external validity, construct validity and statistical validity (Bagozzi & Phillips, 1991:421; Marczyk *et al.*, 2005:67; Steckler & McLeroy, 2008:9).

Table 4.3: Types of validity

Validity type	Definition	Source
Internal validity	Refers to the possibility of a hypothesis being replaced by another plausible hypothesis. Internal validity determines the likelihood of there being an alternative explanation for the results of the study.	Steckler & McLeroy, (2008:9)
External validity	Denotes the fact that a study is restricted to the participants that form part of the sample being studied, as well as the conditions set by the researcher pertaining to the study. The effects of generalisations based on restrictive conditions, limited participants, time and place, all form part of external validity.	Marczyk <i>et al.</i> , (2005:67); Steckler & McLeroy, (2008:9)
Construct validity	Establishes the notion that the theoretical foundations the research is based on could create a causal relationship. There could be alternative explanations for the results obtained, not being addressed by the researcher.	Bagozzi & Phillips (1991:421); Steckler & McLeroy, (2008:9)
Statistical validity	Refers to the accuracy of the conclusion and the findings of the study. Statistical validity determines if the statistical conclusions derived from the findings are reasonable.	Marczyk <i>et al.</i> , (2005:67)

Source: Author compilation

Table 4.3 gives a brief description of the different types of validity issues a researcher could face. The following section covers the statistical measures used in this study. The researcher made use of descriptive- and inferential statistical methods.

4.7.1. Descriptive statistics

Descriptive statistics make it possible to determine certain characteristics of a sample, by grouping the sample into single figures, which describes the distribution shape, variability and central tendency (Turner & Houle, 2019:300). The most common descriptive statistics included mean, median, mode, variance, standard deviation, skewness and kurtosis (Bodie *et al.*, 2001:172-173; Myatt, 2007:61-62; Turner & Houle, 2019:301).

Table 4.4: Descriptive statistics

Measures of location		
Measure	Definition	Source
Mean	The sum of all values in the sample divided by the number of observations. Also known as the average, or arithmetic mean.	Turner & Houle, (2019:301)
Median	If the data are ordered from smallest to largest, the median value is the value exactly in the middle. Half of the values are larger and half of the values are smaller.	Bodie <i>et al.</i> , (2001:172); Turner & Houle, (2019:301)
Mode	The most frequent value in the sample data, i.e. the value that repeats the most.	Turner & Houle, (2019:301)
Measures of variability		
Variance	The spread between the mean of the data and squared units.	Bodie <i>et al.</i> , (2001:173); Salvatore & Reagle, (2002:13)
Standard deviation	The spread between the mean of the data and the actual data points (The square root of variance).	Bodie <i>et al.</i> , (2001:136-137); Salvatore & Reagle, (2002:13)
Measures of shape		
Skewness	Skewness refers to the extent to which the distribution of a sample differs from the normal distribution, which is asymmetrical.	Myatt, (2007:61); Turner & Houle, (2019:301)
Kurtosis	Kurtosis is a measure of the thickness of the tails of a distribution relative to the centre of the distribution. Normal kurtosis is equal to three and anything higher or lower indicates more extreme movements, either negative or positive, when compared to a normal distribution.	Myatt, (2007:62); Turner & Houle, (2019:301)

Source: Author compilation

4.7.2. Inferential statistics

Inferential statistics are deeply rooted in probability theories. The branch of statistics uses data and attempts to identify inference between different groups, which allows the researcher to make conclusions backed by statistical theories (Woodbury, 2002:263). A big part of inferential statistics is hypothesis testing. By testing a hypothesis, the researcher can determine if the data used or collected support the claim or hypothesis (Kumar Sahu *et al.*, 2015:1). Kothari (2004:185) argues that hypotheses need to be clear and precise. Myatt (2007:73)

mentions two concepts that need to be defined by the researcher before a hypothesis can be tested, namely the null hypothesis (H_0) and alternative hypothesis (H_a).

- The null hypothesis (H_0) – This is usually the opposite claim to what the researcher is trying to prove. If the researcher is trying to prove that there is a correlation, the null hypothesis would be that there is no correlation between the variables (Myatt, 2007:73).
- The alternative hypothesis (H_a) – This represents the idea the researcher attempts to prove, or the concept that needs to be tested (Lind *et al.*, 2006:279).

A third concept that needs to be understood in order to choose which hypothesis to conclude and which one to reject is the level of significance. The most popular and accepted significance levels are 1 percent, 5 percent and 10 percent (Woodbury, 2002:271). The significance level represents the level of uncertainty the researcher is willing to take if the wrong hypothesis is accepted (Lind *et al.*, 2006:279).

This study made use of t-tests, correlation analysis, linear regression and multiple regression analysis to gain insights on the amounts and types of products different investors are invested in.

4.7.2.1. T-test

The t-test is used to analyse differences in the means of a population being studied. One of the assumptions is that the distribution is normal and that the mean value is known (Keith, 2015:551-553). There are two subcategories of t-tests known as the independent sample t-test and the paired sample t-test. An independent t-test refers to the mean differences of two separate samples, independent from one another. The paired sample t-test uses the same participants, however the analysis looks at the means of two separate observations (Maree *et al.*, 2012:226-228). Kothari (2004:197) gives the formula to perform the paired t-test as:

$$t = \frac{\bar{x}_D - \mu_0}{\frac{s_D}{\sqrt{n}}} \quad (4.1)$$

Where s_D represents the standard deviation of the sample and n the sample size. The symbol $\bar{x}$ is the average differences while μ_0 represents the constant term. The researcher used the paired t-test to determine if there are any significant differences between how the sample split for male and female investors are distributed. The null hypothesis was formulated as:

$$H_0: \mu_1 = \mu_2 \quad (4.2)$$

If the null hypothesis is concluded it indicates that both mean variances are equal. The alternative hypothesis was formulated as:

$$H_a: \mu_1 \neq \mu_2 \quad (4.3)$$

If the alternative hypothesis is concluded it indicates that the mean variances of the gender distributions are significantly different.

4.7.2.2. Correlation

Correlation is the study of how related quantitative variables are with each other. The concept measures the linear relationship between these factors and shows if there is a positive or negative relationship, as well as the strength of the relationship (Lind *et al.*, 2006:375). There are a number of different measures for correlation, however, the most well-known are Pearson's product-moment correlation coefficient and Spearman rank order (Maree *et al.*, 2012:238-241).

Pearson's correlation is used to establish if there is a linear relationship between the two observations. The observations need to be scaled by intervals and can have one continuous and one dichotomous variable, which is seen in Formula 2.6 in Chapter 2 (Keith, 2015:549). The Spearman rank order differs by using variables that can both be ranked on an ordinal scale (Keith, 2015:551). Kothari (2004:139) gives the formula that can be used to calculate Spearman rank correlation shown as:

$$r = \frac{6 \sum_i d_i^2}{n(n^2 - 1)} \quad (4.4)$$

Where d_i represents the difference in rank of the i^{th} observation of each variable and n represents the number of observation (Kothari, 2004:139). Both the Pearson and Spearman correlation measures can have results between negative one and positive one (Keith, 2015:551). Woodbury (2002:521) found that a value between negative one and zero indicates the movements of the variables are inverse. If the one variable increases, the other would decrease or move in the opposite direction. A value between zero and one indicates the movements of the variables are positively correlated. If the one variable increases, the other would move in

the same direction. A value of zero indicates that there is no correlation between the variables (Lind *et al.*, 2006:377-378).

The researcher used the Spearman rank correlation to determine the relationship between the age of investors and the total value invested, as well as the values invested in cash, equities, and unit trusts. The null hypothesis was formulated as:

$$H_0: r = 0 \quad (4.5)$$

If the null hypothesis is concluded it indicates that there is no correlation between the variables being measured. The alternative hypothesis was formulated as:

$$H_a: r \neq 0 \quad (4.6)$$

If the alternative hypothesis is concluded it indicates that there is a correlation between the measured variables.

4.7.2.3. Linear regression

Linear regression attempts to model the relationship between a dependent variable and an independent variable on a straight line (Woodbury, 2002:543). Apart from being useful explain relationships between dependent and independent variables, linear regression is often used in research to predict and forecast the effects changes in the independent variable has on the dependent variable (Gujarati & Porter, 2010:21). Salvatore and Reagle (2002:128) provide the linear regression formula as:

$$Y_i = \beta_0 + \beta_1 X_1 + \varepsilon_i \quad (4.7)$$

Where Y_i represents the dependent variable. β_0 represents the intercept of the sample dependent variable while β_1 is the sample slope coefficient. The symbol X_1 represents the independent variable and ε_i is the error term. When conducting a regression analysis, there are a number of outputs received from the statistics tool used. One of the most useful measures is the R-square of the model that measures the goodness of fit. It provides the percentage of variance that can be explained by the model (Gujarati & Porter, 2010:113). For example, an R-square result of 0.52 indicates that 52 percent of the variance can be explained by the model.

The researcher used linear regression on four different occasions with age as the independent variable and total investment value, cash value, equities value and unit trust value as the dependent variables. The null hypothesis was formulated as:

$$H_0: \beta_1 = 0 \quad (4.8)$$

If the null hypothesis is concluded it indicates that there is no linear relationship between the dependent and independent variables. The alternative hypothesis was formulated as:

$$H_a: \beta_1 \neq 0 \quad (4.9)$$

If the alternative hypothesis is concluded it indicates that there is a linear relationship between the dependent and independent variables.

4.7.2.4. Multiple regression

Multiple regression is based on the same underlying principles as linear regression. The difference is that there is now more than one independent variable that is used to determine which of the variables have an impact on the dependent variable (Lind *et al.*, 2006:422). By using elimination techniques, the variables that do not have an impact can be excluded and the only factor influencing the predictive capabilities of the model is included. Variables can be significant on their own, or a combination of variables that are not necessarily significant on their own are significant when used together (Keith, 2015:18). Kothari (2004:318) gives the basic formula for multiple regression shown as:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon_i \quad (4.10)$$

Where Y_i represents the dependent variable. β_0 represents the intercept of the sample dependent variable while β_n is the sample slope coefficient for the n^{th} observation. X_n represents the independent variable for the n^{th} observation and ε_i is the error term (Kothari, 2004:318). Gujarati and Porter (2010:113) found that unlike a linear regression where the R-square is used to explain how predictive the model is, the adjusted R-square measure is more accurate for multiple regression analysis.

Multiple regression was used in the study to establish which of the demographics including age, race, gender and income level are predictive in nature. The model was processed four different times with the aforementioned demographics as independent variables and total

investment value, cash value, equities value and unit trust value as the dependent variables. The null hypothesis was formulated as:

$$H_0: \beta_{n-q+1} = \beta_{n-q+2} = \dots = \beta_n = 0 \quad (4.11)$$

Where q represents the exclusion restrictions on the model. If the null hypothesis is concluded it indicates that there is no linear relationship between the dependent and independent variables. The alternative hypothesis was formulated as:

$$H_a: H_0 \text{ is not true} \quad (4.12)$$

If the alternative hypothesis is concluded it indicates that there is a linear relationship between the dependent and independent variables.

4.8 Synopsis

The research methodologies available to the researcher was discussed in this chapter. It is essential to have a thorough understanding of the philosophical aspects of research in order to conduct an accurate scientific study. The first step is to evaluate the different ways in which reality can be perceived. These views on reality influence how the researcher will ultimately approach and interpret the study. The second step is to evaluate the different paradigms or world-views. Once this has been established the research approach needs to be selected. For this study, the researcher followed a positivist paradigm and a quantitative research approach.

The researcher made use of secondary data, which was obtained directly from the bank that agreed to participate in the study. The requirements and additional steps required when using secondary data were discussed, as well as the ethical implications, management of information, conducted and the limitations to the study. In order to ensure the sample being studied closely resembles the chosen population the importance of population selection and the different sampling methods were discussed. The researcher selected the bank based on convenience and employed the stratified random sampling technique to ensure an accurate sample is obtained.

Data analysis forms a big part of a quantitative research study. The researcher made use of secondary data and thus additional precautions had to be taken to ensure the data are cleaned and transformed to ensure the validity of the study. The chapter covered data preparation, modelling, graphing and statistical analysis. The statistical analysis portion covered both descriptive and inferential statistics. The main inferential statistics that were used in Chapter 5

to prove the empirical objectives included t-tests, correlation-, linear regression- and multiple regression analysis.

5.1. Introduction

The construction of the most efficient investment portfolio for an individual investor has largely revolved around the amount of risk the investor is able to and willing to accept. Gaining this insight is not always easy as direct input from the investor is required (Bodie, 2015:43). These strategies work well with affluent investors that have access to financial advisors. However, there are many lower income investors that would like to invest but do not know where to invest, or end up investing in the wrong instruments. This is due to the lack of adequate financial knowledge and advice (Bodie & Treussard, 2007:47). This chapter aims to provide insight into how investors from different demographics and income levels invest their funds and how Big Data can be used in conjunction with the investor life cycle. The study also tests the validity of the investor life cycle theory in a South African banking context.

Similar prior studies conducted by Bodie *et al.* (2007) have focussed on how investors should invest and were based on the investor's entire portfolio, including pension funds and other retirement funds. This study shifts the focus to investor's disposable income and the basic investments available to investors on a universal banking platform, and not necessarily investing towards retirement. Three different product classes were selected as these are the most common and easily accessible investment products to the average banking clients. Cash is the simplest investment product, as the funds are invested (either for a set period or with immediate access) and the investor earns a known percentage of interest (Rose & Hudgins, 2010:314-315). No transactional cash accounts (normal cheque accounts) were included in the study and only cash investment accounts like money market, fixed-term and notice accounts were included. Equities are more complex as an investor can earn dividend payments as announced by the company invested in, or experience capital gains as the company's value increases, causing the overall value of the equities to increase (Brigham & Ehrhardt, 2011:269). There are also a range of corporate actions events like mergers, acquisitions right offers and share consolidations where the investor's input is required or the investor may lose some of the invested funds if no action is taken (JSE, 2016:1). Unit trusts incorporate a range of different investment classes in a single product wrapper. These investments can be made up out of cash, equities, money market instruments, property, bonds and a range of other investments (Collinet, 2001:1-2). The success of these instruments depends on the skill of the portfolio manager looking after the fund. Unit trusts are often viewed as an alternative to investing in

equities as it gives the investor exposure to these more complicated investment products and are easier to invest in (Collinet, 2001:1-2).

The first section of the study aims to answer empirical objective one, which includes an analysis of the demographic factors that influence investment product selection. Each factor including, age, gender, race and income level is analysed separately, followed by a multiple regression analysis to determine the most relevant demographic factors to consider. The focus then shifts to empirical objective two, which is to analyse the individual investors' product choices over different income levels. A similar strategy is followed as was done to prove objective one, with the exception that every demographic factor is now analysed separately and split into the four different income levels. The final part of the study aims to prove empirical objective three and four, which is to model the data on the investor life cycle and to determine if South African investors conform to the patterns laid out by the investor life cycle theory.

5.2. Descriptive statistics for investment amounts per product

It is essential to understand the behaviour of South African investors in order to formulate theories on how to market investment products. Therefore, this section analyses the relationship between different demographic factors, the amount being invested, as well as the product types being invested in. The first step in the process was to use descriptive statistics to gain insights into how the total investment amount is distributed among the different products. Analysing the descriptive statistics is necessary to answer the first empirical objective, which is to determine the effect of the different demographics on investment product choices.

Table 5.1: Distribution of amounts invested

Statistical measure	Cash amount	Equities amount	Unit trusts amount	Total investment amount
Mean	48 801.13	106 415.50	332 501.10	55 826.70
Median	2 044.18	5 058.50	115 560.20	2 224.90
Variance	52 402 100 000	267 644 000 000	491 697 000 000	71 115 500 000
Standard deviation	228 914.95	517 342.90	701 210.75	266 674.86
Skewness	14.56	9.04	5.22	13.71
Kurtosis	309.26	97.30	32.63	260.66
Minimum	0.01	3.18	504.75	0.01
Maximum	7 289 199.86	7 205 594.93	5 482 868.45	7 289 199.86

Source: Author compilation

From Table 5.1, the mean investment amount for the total invested amount is 55 826.70, while the median is only 2 224.90. This is an indication that more investors invest smaller amounts compared to high investment amounts. This is also evident when analysing the skewness of 13.71, which indicates that the distribution is positively skewed to the right. The high kurtosis of 260.66 results in a leptokurtic distribution shape as a normal distribution has a kurtosis of 3. The high variance of 71 115 500 000.00 and standard deviation of 266 674.86 indicates that the investment amounts fluctuate quite dramatically from the mean value of 55 826.70 (Gujarati & Porter, 2010:78). Similar patterns emerge when analysing individual products. With all three products, the mean invested amounts are much higher than the median, however, the effects are less prevalent with unit trusts. For all three products, the distribution is positively skewed to the right with high kurtosis indicating leptokurtic distribution shapes. Variance and standard deviation are high, especially with unit trusts, indicating the values fluctuate dramatically from the mean value (Gujarati & Porter, 2010:78). Section 5.3 below place focus on how each demographic factor influences the total investment amount. The demographic factors include age, gender, race and income level.

5.3. Influence of demographic factors on investment product selection

The first empirical objective was to determine the demographic factors that influence investment product selection. The analysis will focus on each demographic and how they influence the total amount invested, as well as value invested in the different available investment products. The demographic factors include age, gender, race and income level.

5.3.1. Influence of age on total investment amount

Coco *et al.* (2005:526-527) found the investment horizon plays a significant role in the amount invested and the risk an investor is willing to or expected to take.

Table 5.2: Spearman correlation results for age and total investment amount

Demographics	Age	Interpretation
Total investment amount	0.18434	Weak positive correlation
	<.0001	Statistically significant

Source: Author compilation

Table 5.2 indicates the relationship between age and the total amount invested. The relationship is positively correlated and statistically significant at 1 percent. This implies that the older an individual is, the higher will be the amount invested.

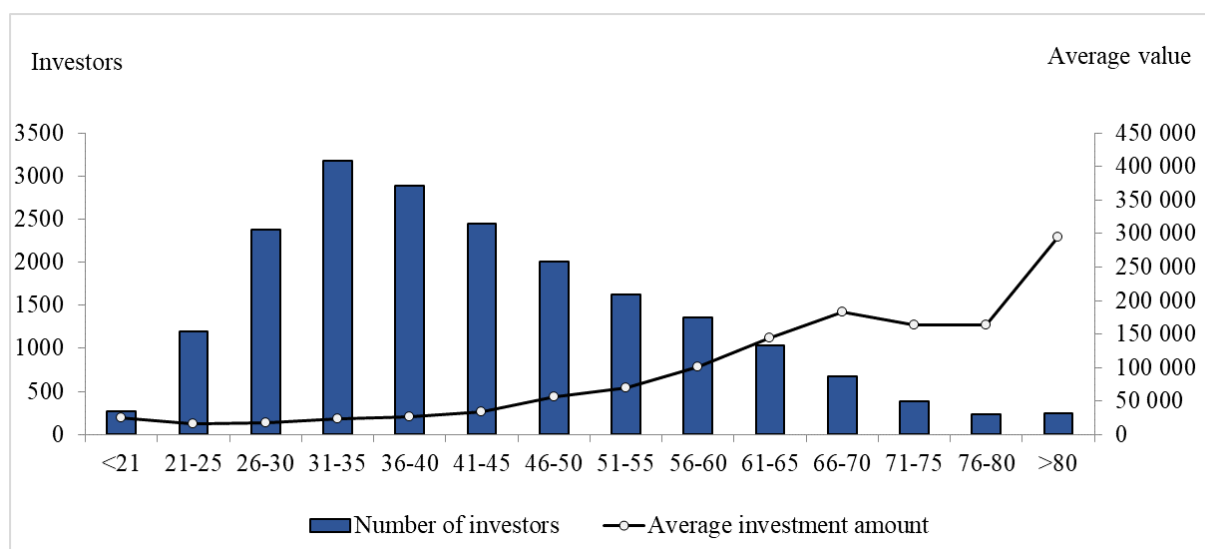


Figure 5.1: Average investment value per age group

Source: Author compilation

Figure 5.1 shows the number of investors on the left y-axis and the average value of invested amounts on the right y-axis. The x-axis reflects the different age ranges of the investors. From Figure 5.1, the number of investors reaches a maximum investment amount at the age group 31-35, however, a decline is seen after this age group. The average amount being invested increase with investors' age, which supports the basic theory of the investor life cycle, as individuals are saving more towards retirement. The graph also confirms the correlation results, suggesting that as investors age, the average investment amount also increases. In order to determine the effect of age on the investment amount of South African investors, a linear regression was performed with age as the independent variable and total investment amount as the dependent variable.

Table 5.3: Parameter estimates for linear regression

Dependent variable	Parameter	DF	Estimate	Standard error	t-value	Pr > t
Total invested amount	Intercept	1	-94192	5965.5	-15.79	<.0001
	Age	1	3480.254	131.512	26.46	<.0001

Source: Author compilation

The results showed that age has a statistically significant influence over the total value invested at a confidence level of 95 percent. The R-square of 0.034 indicates that 3.4 percent of the sample's total invested value can be predicted based on the age of the investor. Table 5.3 shows the parameter estimates that can be used to predict the total amount invested based on age.

5.3.2. Influence of age on investment product choice

The study found that age has a statistically significant influence on the total amount being invested. The subsequent sections analyse the effect of age on the different products available, which include cash, equity and unit trusts investments.

Table 5.4: Cross-tabulation of age group and investment products

Age range	Cash investors		Equity investors		Unit trust investors	
	Investors	Value	Investors	Value	Investors	Value
<21	261	5 882 310	7	90 089	3	627 342
21-25	1159	17 257 116	48	924 296	5	679 866
26-30	2300	38 442 043	122	1 939 982	7	589 791
31-35	3075	65 898 028	188	4 683 162	15	1 396 826
36-40	2754	67 825 070	219	8 483 004	10	1 669 700
41-45	2355	77 741 488	143	4 189 958	14	1 863 443
46-50	1933	89 918 745	136	20 471 346	12	3 902 551
51-55	1552	85 790 564	90	22 788 612	15	4 742 731
56-60	1307	112 907 954	72	13 147 500	22	11 849 396
61-65	995	121 595 913	45	16 168 909	40	12 262 915
66-70	653	104 036 494	22	5 799 963	20	14 344 792
71-75	373	58 916 952	12	2 898 635	3	803 968
76-80	227	33 517 263	6	2 628 226	3	1 942 519
>80	237	56 324 517	5	14 439 603	2	181 850
Total	19181	936 054 455	1115	118 653 284	171	56 857 690

Source: Author compilation

From Table 5.3 it is clear that the majority of the sample investors are investing in cash investments. Equity investments gain prominence with investors between the ages of 30 and 50, with unit trusts only gaining popularity with investors over the age of 56. The value of all three investment products also increases as investor age increases, with some exceptions for equities and unit trusts. The investment amounts start to decline after the age of 65, as this is generally retirement age where investors start using the invested funds for living expenses and wealth is transferred to their families as they pass on.

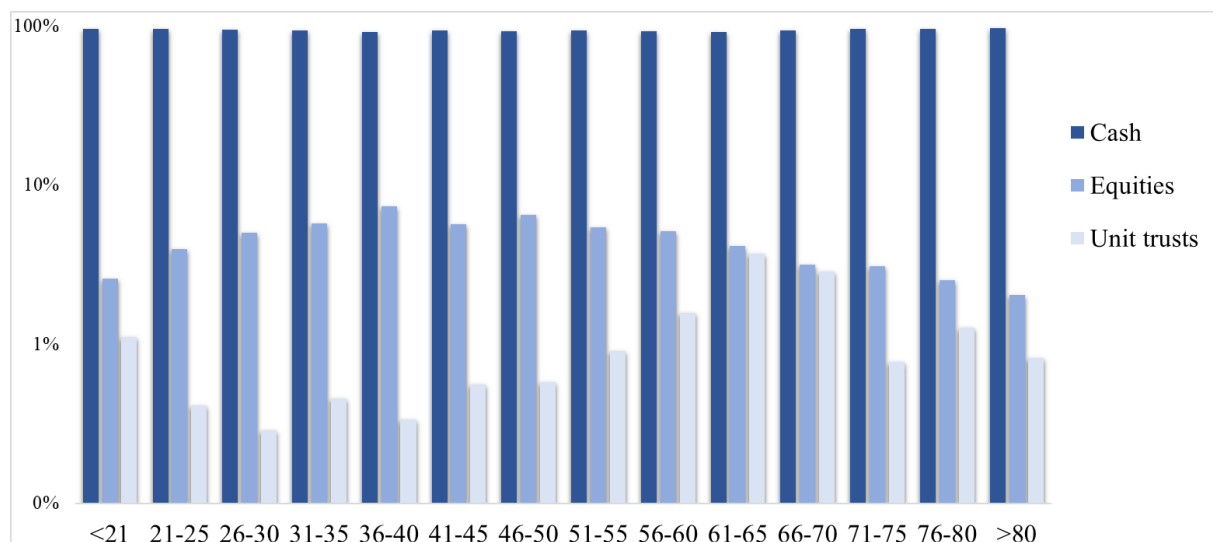


Figure 5.2: Logarithmic scale representation of investors per product type

Source: Author compilation

From Figure 5.2 the number of investors in cash is much higher than the other two products, so a logarithmic scale was used in order to illustrate the trends. The popularity of equities in the mid-age ranges can be seen, as well as an increase in the popularity of unit trusts among older investors. A linear regression was conducted three additional times with the dependent variable changed to cash value, equities value and unit trust value.

Table 5.5: Parameter estimates for linear regression

Dependent variable	Parameter	DF	Estimate	Standard error	t-value	Pr > t
Cash	Intercept	1	-75516	5035.71	-15	<.0001
	Age	1	2842.502	111.0144	25.6	<.0001
Equities	Intercept	1	-11938	2837.194	-4.21	<.0001
	Age	1	415.2035	62.54716	6.64	<.0001
Unit trusts	Intercept	1	-6737.55	1630.131	-4.13	<.0001
	Age	1	222.5489	35.93693	6.19	<.0001

Source: Author compilation

The results were statistically significant for cash, equities, and unit trusts at a confidence level of 95 percent. Cash had the highest R-square of 0.0319, followed by equities with 0.0022. Unit trusts had the lowest R-square of 0.0019. Table 5.5 shows the parameter estimates that can be used to predict the amount invested per product based on age.

5.3.3. Influence of gender on total investment amount

Prior studies on gender such as Dickason *et al.* (2017:9558) found that there are significant differences between how males and females perceive investment. The researchers found that male participants are more confident when it comes to investment when compared to female investors. Analysing the descriptive statistics for gender gives insights as to the differences between males and females for the sample.

Table 5.6: Descriptive statistics for gender

Gender	Female	Male
Mean	53 111.31	58 773.88
Median	3 160.32	1 513.05
Mode	1 000.00	100.00
Variance	56 539 400 000.00	86 926 600 000.00
Standard deviation	237 780.22	294 833.18
Skewness	13.60	13.41
Kurtosis	262.36	243.04
Minimum	0.01	0.01
Maximum	6 995 929.13	7 289 199.86

Source: Author compilation

Table 5.6 shows that the mean, minimum and maximum values for both genders are similar. Males have higher standard deviations and variance indicating that the values fluctuate further away from the mean when compared to females. Skewness and kurtosis are also very similar indicating that the shapes of the distributions are comparable. Both genders are positively skewed with outliers to the right. Kurtosis is very high indicating a leptokurtic distribution. In order to determine if the mean variance for gender is the same, a t-test was performed. The null hypothesis was formulated as $H_0: \mu_1 = \mu_2$. If the null hypothesis is concluded it indicates that both mean variances are equal. The alternative hypothesis was formulated as $H_a: \mu_1 \neq \mu_2$. If the alternative hypothesis is concluded it indicates that the mean variances of the gender distributions are significantly different. The results had a significance level of $<.0001$ and as a result, the Satterthwaite method was used.

Table 5.7: T-test results

Method	Variances	DF	t-value	Pr > t
Satterthwaite	Unequal	18347	-1.48	0.1378

Source: Author compilation

From Table 5.7 the null hypothesis cannot be rejected at a confidence level of 95 percent. There are no significant differences between the mean variances and both males and females have distinctly similar distributions.

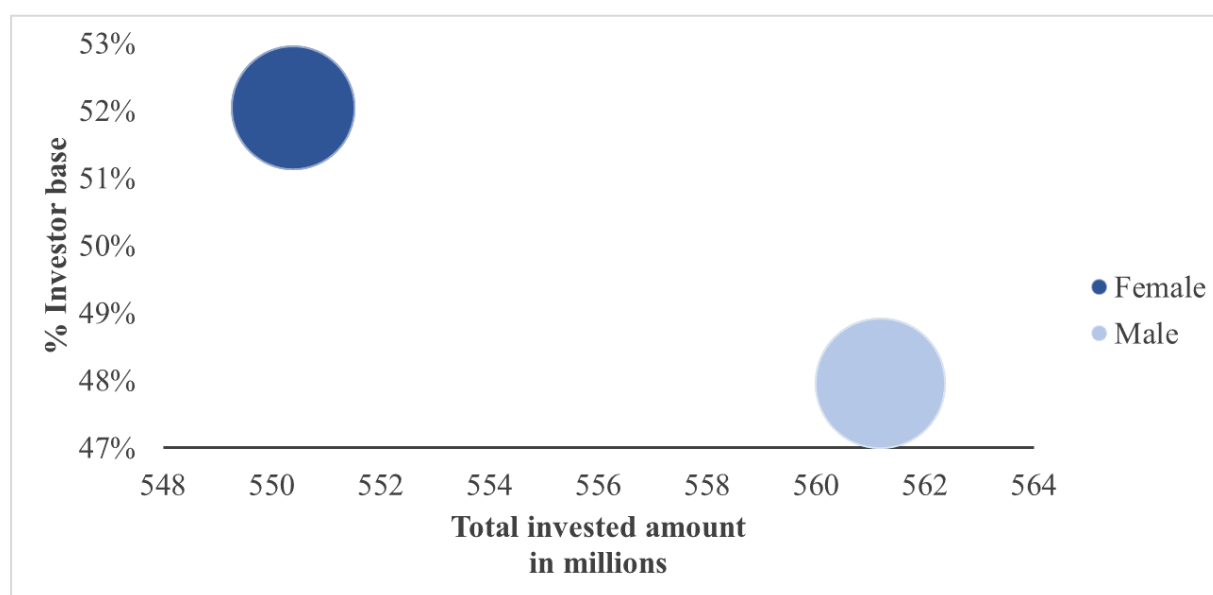


Figure 5.3: Invested amount per gender

Source: Author compilation

Figure 5.3 illustrates the difference between the amounts invested by female and male investors. The y-axis shows the percentage each gender represents in the total sample base, and the x-axis shows the percentage total investment. The bubbles represent the average size of the amount invested per gender. Females make up 52 percent of the overall sample, however, their total amount invested is only 50 percent of the entire sample. Females also invest 10 percent less than their male counterparts on average. Males make up 48 percent of the sample, however, they invest 50 percent of the total invested amount.

5.3.4. Influence of gender on investment product choice

The study found that gender influences the amount investors invest, although the distribution of total investment amounts looks similar across both genders. The next step in the study was to analyse the influence of gender on the types of products individual investors may consider investing in. Results from a study conducted by Bayyurt *et al.* (2013:82-83) found that males are more likely to invest in risky investment options compared to females who gravitate towards less risky alternatives.

Table 5.8: Cross-tabulation of gender and investment products

Gender	Cash investors		Equity investors		Unit trust investors	
	Investors	Value	Investors	Value	Investors	Value
Female	10119	483 539 119	366	36 870 479	95	29 982 864
Male	9062	452 515 336	749	81 782 804	76	26 874 827
Total	19181	936 054 455	1115	118 653 284	171	56 857 690

Source: Author Compilation

From Table 5.8, there are more females investing in cash and unit trusts, however, the amount being invested in each product is lower than the amount being invested by males. There are also almost double the number of males investing in equities with more than double the value compared to females. This is indicative that females lean more towards lower risk investment products as found by Bayyurt *et al.* (2013:82-83). An analysis of the average amount invested in each product per gender was also done with some interesting results.

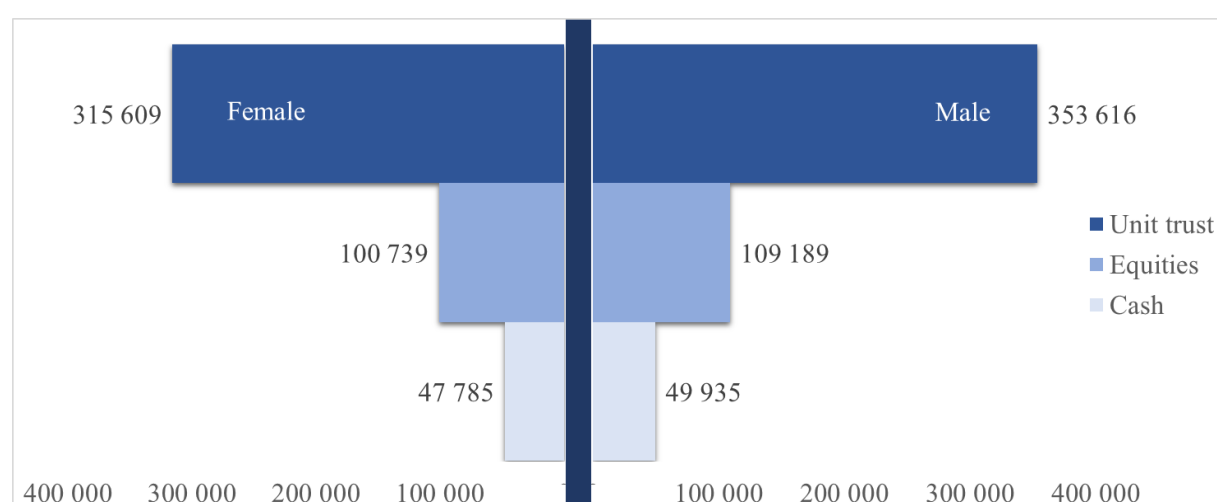


Figure 5.4: Average amount invested per product by each gender

Source: Author compilation

Figure 5.4 illustrates the average amount invested per gender. Males invest slightly higher average amounts when compared to females. The differences are small, however, indicating that even though more females invest in cash and unit trusts, male investors that also invest in these products invest similar amounts. Female investors are also less likely to invest in equities, however, the females that do invest in equities invest similar amounts to their male counterparts.

5.3.5. Influence of race on investment amount

Income inequality is a contentious subject in South Africa, as the damage done by the Apartheid era can still be seen when considering income level and general wealth in the country (Wilson, 2011:1). Due to cultural backgrounds and different historic viewpoints, race has an influence on how individuals invest and save (Du Plessis, 2008:116).

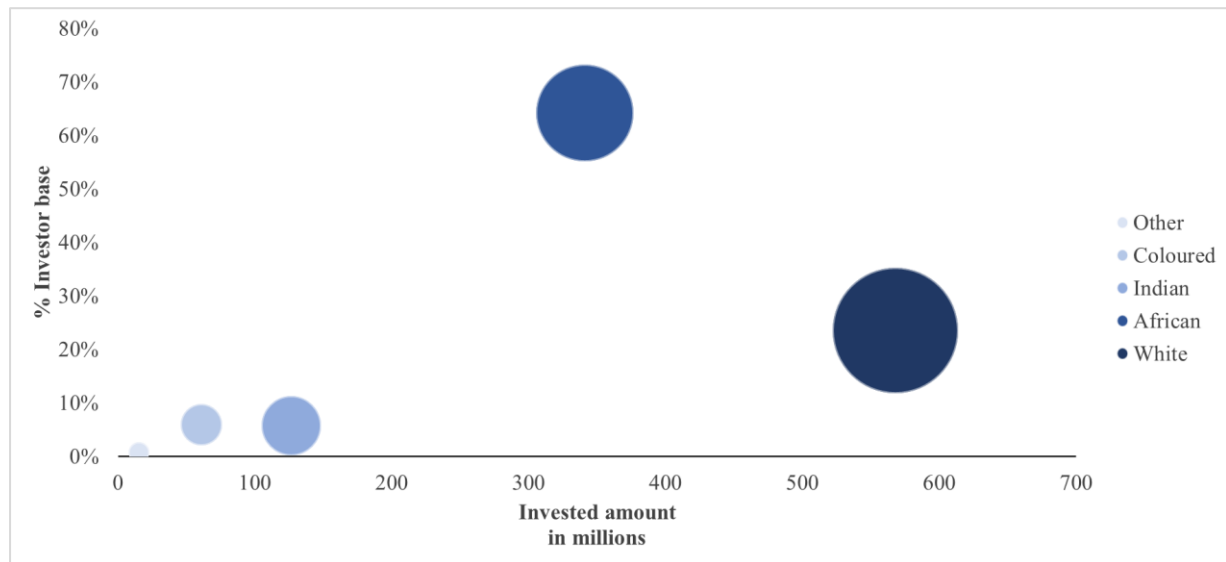


Figure 5.5: Total amount invested per race group

Source: Author Compilation

Figure 5.5 uses the percentage investors of the total sample base per race on the y-axis and the total invested amount in millions on the x-axis to illustrate how the invested amount is distributed based on different races. The bubbles are sized according to the amount invested. The highest total investment amount of 51 percent is distributed among White investors, even though White investors only make up 23 percent of the total investor base used in the sample. The second highest total invested amount of 31 percent is allocated to African investors, who make up the highest number of individual investors of 64 percent. Indian investors hold 11 percent of the total invested amount and make up 6 percent of the investor base, with Coloured investors holding 5 percent of the total investment amount and making up 6 percent of the investor base. Other races hold the lowest amount of the total investment amount at 1 percent and making up 1 percent of the total investor sample base.

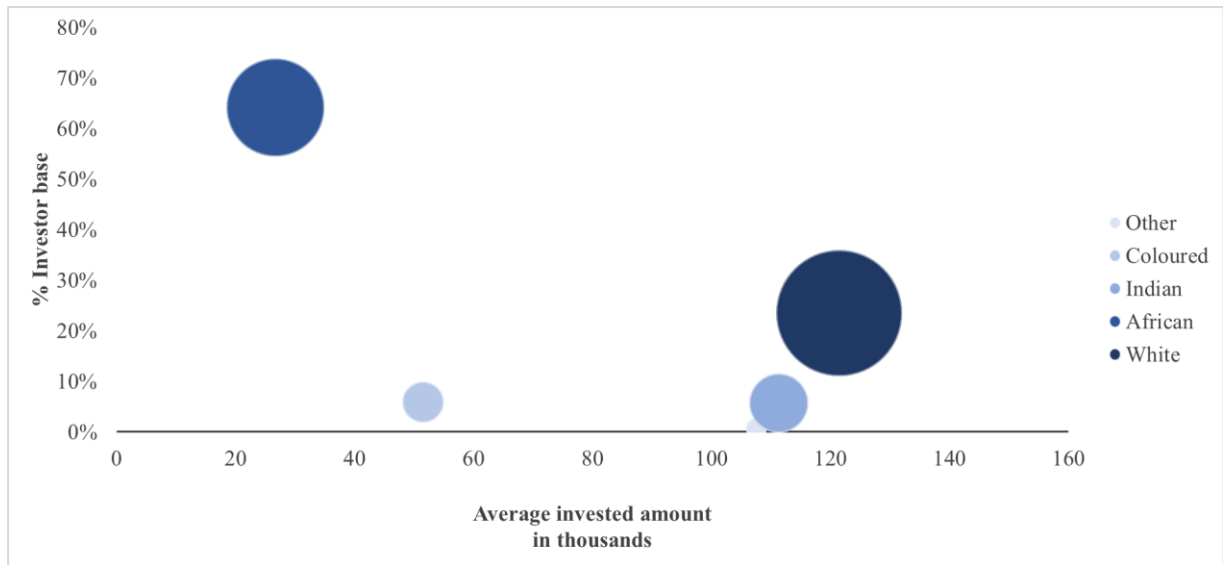


Figure 5.6: Average invested amount per race group

Source: Author compilation

Figure 5.6 is similar to Figure 5.5, with the exception of using the average investment amount instead of the total investment amount on the x-axis. White and Indian investors have similar average amounts, which is substantially higher than the two race groups with the lowest average investments. The results showed that even though “Other” investors only make up a small fraction of the total investor base and investment amount, they have a high average investment amount close to that of White and Indian investors. Coloured investors have the second lowest average investment amounts, with African investors having the lowest average investment amounts. The graph is reflective of the wealth inequality seen in South Africa after the end of the Apartheid era (Wilson, 2011:1). Investors from different backgrounds have different investment styles and preferences.

A study conducted by Mangoma and Wilson-Prangley (2019:14-15) investigated the phenomenon of Black Tax in South Africa. Black Tax in a South African context is the obligation or expectation that exists for young African professionals to send money to their struggling families. This results in lower disposable income amounts to be invested. There are countless newspaper articles chronicling stories regarding the effects of Black Tax on African professionals, with some referring to it as a burden, while others viewing it as helping the less fortunate (Mtlolo, 2018:1). Mongoma and Wilson-Prangley (2019:14) confirm that African professionals are unsatisfied with the amounts they are saving and investing. This could be an explanatory factor for the results in Figure 5.6 where African investors have a much lower average investment amount when compared to the other races. Researchers such as Cronjé and

Roux (2010:22-23) found that the emerging African middleclass in South Africa have started contributing significantly in the consumption side of the economy, however, their saving amounts remain low. This is indicative that the African middleclass is part of a debt culture, instead of a savings culture. The researchers also found that Chinese and Indian cultures are the exact opposite, with a savings culture (Cronjé & Roux, 2010:23). This is clear in the results with the other races category and Indians having higher average investment amounts.

5.3.6. Influence of race on investment product choice

Gutter and Fontes (2006:75) found that there are disparities between the amount of high risk assets which African investors are expected to invest in, compared with White investors. The researchers found that White investors are more likely to own high risk investments when compared with African investors.

Table 5.9: Cross-tabulation of race and investment products

Race	Cash investors		Equity investors		Unit trust investors	
	Investors	Value	Investors	Value	Investors	Value
African	12588	309 411 189	278	4 253 196	106	27 388 432
Coloured	1124	55 233 612	76	2 651 261	11	2 985 441
Indian	1061	107 562 947	131	16 736 156	10	2 259 897
Other	130	12 581 024	15	2 694 806	0	0
White	4278	451 265 682	615	92 317 865	44	24 223 920
Total	19181	936 054 455	1115	118 653 284	171	56 857 690

Source: Author compilation

From Table 5.9, the majority of investors from each race group are invested in cash, with African and Coloured investors 91 percent invested in cash. The lowest amount invested in cash is White investors with 79 percent invested in cash. Indian and other races have 85 and 82 percent invested in cash respectively. African investors have only 1 percent invested in equities and 8 percent in unit trusts. The number of African investors is much higher in equities than unit trusts, suggesting that lower amounts are being invested in equities when compared to unit trusts. Coloured investors are 4 percent invested in equities and 5 percent in unit trusts. The pattern resembles that of African investors with higher average amounts in unit trusts when compared to equities. Indian investors have 13 percent invested in equities and only 2 percent in unit trusts. Other races have 18 percent invested in equities with no unit trust investments. White investors have 16 percent invested in equities and 4 percent in unit trusts. The results

support the findings from Gutter and Fontes (2006:75) that White investors are more likely to hold risky investment products.

5.3.7. Influence of income level on investment amount

Researchers such as Du Plessis (2008:100) found that a higher income level would result in bigger investment amounts as investors have more disposable income. South Africa is one of the most unequal in the world in terms of income inequality. By analysing the patterns of wealthy investors compared to lower income bands, conclusions can be made around how investors with different income levels and needs invest their disposable income.

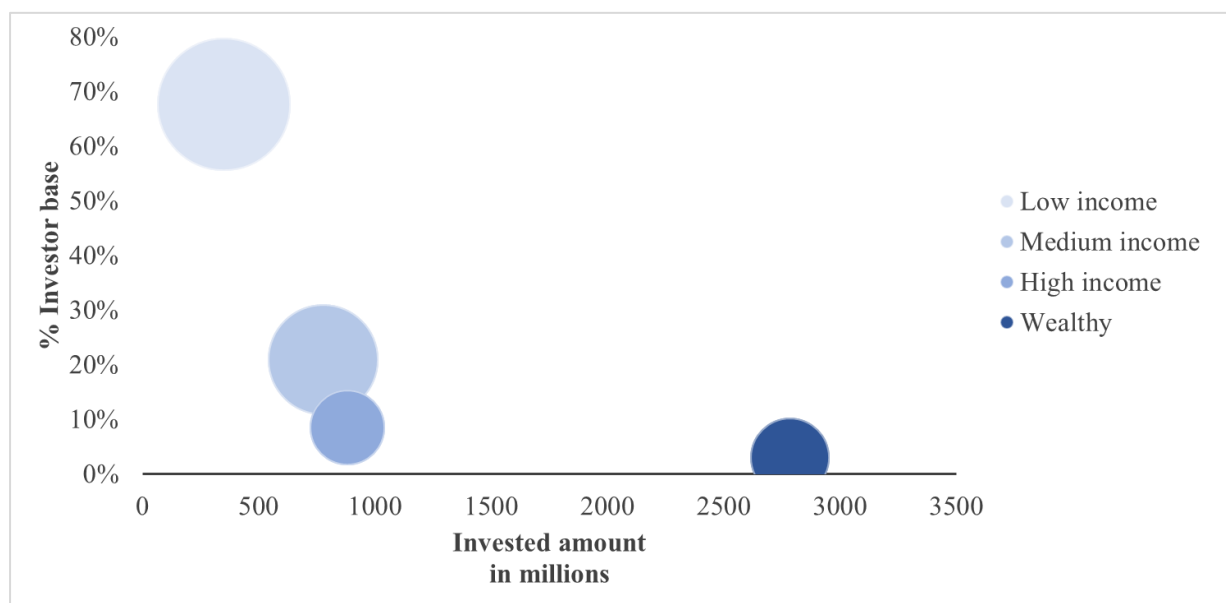


Figure 5.7: Average invested amount per income level

Source: Author compilation

Figure 5.7 indicates the wealth distribution among different income levels. The y-axis shows the percentage of the sample investor base and the x-axis the average investment amount. The bubbles are sized based on the total investment amounts per income level. The majority of investors fall into the lower income percentile, with 68 percent of the total sample investor base. These investors also make up the bulk of the total invested amount at 42 percent. They are on the lower end, however, when it comes to the average investment amount per individual. Medium income investors make up 21 percent of the sample base and hold 29 percent of the total invested amount. The average invested amount for medium income investors 122 percent more than that of the low income group. High income investors make up 8 percent of the sample base and hold 13 percent of the total invested amount. The average invested amount is 13

percent more on average compared to medium income investors. Wealthy investors only make up 3 percent of the sample, however, they hold 15 percent of the total invested amount. The average amount per investor is also a staggering 216 percent larger than the average amount for the high income category.

5.3.8. Influence of income level on investment product choice

Due to the difference in complexity and benefits of the three different investment products used in the study, it can be expected that individuals from different income levels will prefer different investment products. Wealthier investors are generally more educated compared to the lower income investors and will thus be more likely to have complex investment products.

Table 5.10: Cross-tabulation of income level and investment products

Income level	Cash investors		Equity investors		Unit trust investors	
	Investors	Value	Investors	Value	Investors	Value
Low income	13263	425 586 516	229	14 232 200	88	31 690 066
Medium income	3953	273 648 782	318	30 811 721	48	19 042 015
High income	1487	121 361 815	362	23 678 723	24	4 137 068
Wealthy	478	115 457 342	206	49 930 641	11	1 988 541
Total	19181	936 054 455	1115	118 653 284	171	56 857 690

Source: Author compilation

From Table 5.10, the number of low income investors in cash makes up 90 percent of all low income investors. Only 3 percent are investing in equities and 7 percent in unit trusts. For medium income investors, 85 percent is invested in cash, with 10 percent in equities and 6 percent in unit trusts. High income shows the trend continuing with cash declining to 81 percent, equities increasing to 16 percent and unit trusts decreasing to 3 percent. With wealthy investors, cash reaches its lowest point at 69 percent. Equities are at a high point of 30 percent and unit trusts only make up 1 percent.

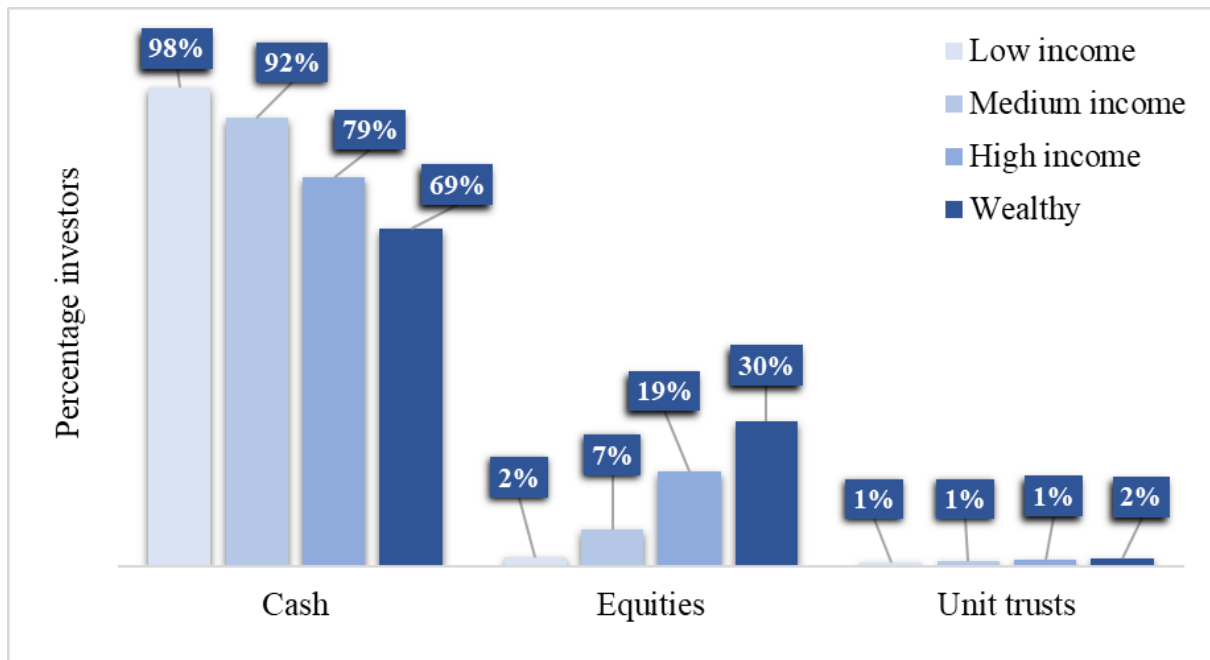


Figure 5.8: Investment products per investor based on income level

Source: Author compilation

Figure 5.8 illustrates the percentage distribution of the different investor products per income level. The figure clearly illustrates that there is a big difference between the product choices of investors in different income levels. The results show low income investors gravitate more towards cash investments, with wealthier investors starting to move more towards equities. This suggests that there is a strong correlation between the income level of an investor and the types of investment products they prefer. The results support that of researchers like Gutter, Fontes (2006:75) and Carroll (2000:23) who found that wealthier investors are more likely to invest in higher risk investment products when compared to lower income investors. In order to further establish the link between the different investment products and the demographics used in the study, the researcher conducted multiple regression analysis with the investment amount and products as the dependent variables and the demographics as the independent variables.

5.4. Multiple regression analysis of demographic factors and investment products

By establishing whether there is a linear relationship between demographic factors and the total amount being invested and the investment amount per product, a predictive model can be built that attempts to identify if there is a relationship between these factors and the amount being invested. The first multiple regression model used the total investment amount as the dependent

variable and investor age, race, gender, and income level as independent variables. A backwards elimination technique was used to disregard factors that were not statistically significant.

Table 5.11: Parameter results for total investment amount

Parameter	DF	Estimate	Std error	t-value	Pr > t
Intercept	1	-369375	49950	-7.39	<.0001
African	1	86398	13982	6.18	<.0001
Coloured	1	90176	26420	3.41	0.0006
Indian	1	99502	25222	3.95	<.0001
Other	1	-39634	59180	-0.67	0.503
White	0	0	.	.	.
Age * African	1	11022	1084.237887	10.17	<.0001
Age * Coloured	1	11319	1182.133525	9.57	<.0001
Age * Indian	1	12316	1162.244812	10.6	<.0001
Age * Other	1	15347	1649.857639	9.3	<.0001
Age * White	1	14193	1065.459373	13.32	<.0001
Female * High income	1	234396	62539	3.75	0.0002
Female * Low income	1	271085	50753	5.34	<.0001
Female * Medium income	1	243177	53210	4.57	<.0001
Female * Wealthy	1	-237840	78260	-3.04	0.0024
Male * High income	1	21471	57646	0.37	0.7096
Male * Low income	1	264690	50991	5.19	<.0001
Male * Medium income	1	83920	53005	1.58	0.1134
Male * Wealthy	0	0	.	.	.
Age * Female * High income	1	-8943.424595	1372.166916	-6.52	<.0001
Age * Female * Low income	1	-10209	1084.456039	-9.41	<.0001
Age * Female * Medium income	1	-9214.80379	1141.057696	-8.08	<.0001
Age * Female * Wealthy	1	6429.921853	1676.077572	3.84	0.0001
Age * Male * High income	1	-3302.991275	1250.627679	-2.64	0.0083
Age * Male * Low income	1	-10152	1092.189207	-9.29	<.0001
Age * Male * Medium income	1	-5121.156332	1135.644921	-4.51	<.0001
Age * Male * Wealthy	0	0	.	.	.

Source: Author compilation

The resulting model for total investment amount had eleven steps before the most efficient mix of factors were selected and the data were statistically significant at a 95 percent confidence level. Table 5.11 gives the parameter outputs for the model. Gujarati and Porter (2010:113) found that the adjusted R-square measure is more accurate than the normal R-square measure

for multiple regression analysis. The model had an adjusted R-square of 0.1006 indicating that 10.06 percent of the total invested amount can be predicted by age, gender, race and income level. The results confirm that race on its own has a significant impact on the expected investment amount. The combination of age*race, gender*income, and age*gender*income, were also statistically significant contributing factors. Analysing each parameter individually, starting with race, the model selected White investors as the base parameter with degree of freedom equal to zero. The model indicated that there is a high significance between the total investment amount for White investors when compared to African, Coloured, and Indian investors. The “Other” race group is not statistically significant. The combination of age and race also had high significance across all five race categories. With the combination of gender and income level the model selected wealthy males as the base with degrees of freedom equal to zero. Female investors with low-, medium-, and high income levels, as well as wealthy show statistical significance. Male investors with low- and medium income levels also show high statistical significance, while male investors with high income level are not statistically significant. The final parameter combined age, race and income level with wealthy males chosen as the base with degrees of freedom equal to zero. The combination of gender with age for all income levels were statistically significant. The focus now shifts towards how the demographic factors influence the type of investments an investor would choose to invest in by analysing the influence age, race, gender and income level have on each product’s value.

Table 5.12: Parameter results for cash investment amount

Parameter	DF	Estimate	Std error	t-value	Pr > t
Intercept	1	-323698	42539	-7.61	<.0001
African	1	70811	11907	5.95	<.0001
Coloured	1	77857	22500	3.46	0.0005
Indian	1	78188	21480	3.64	0.0003
Other	1	-83929	50400	-1.67	0.0959
White	0	0	.	.	.
Age * African	1	8726.1123	923.370424	9.45	<.0001
Age * Coloured	1	8944.91451	1006.741368	8.89	<.0001
Age * Indian	1	9944.90044	989.803526	10.05	<.0001
Age * Other	1	13616	1405.069649	9.69	<.0001
Age * White	1	11275	907.378062	12.43	<.0001
Female * High income	1	205516	53260	3.86	0.0001
Female * Low income	1	242463	43222	5.61	<.0001
Female * Medium income	1	218471	45315	4.82	<.0001
Female * Wealthy	1	-190107	66649	-2.85	0.0043

Male * High income	1	90156	49093	1.84	0.0663
Male * Low income	1	235778	43425	5.43	<.0001
Male * Medium income	1	104921	45141	2.32	0.0201
Male * Wealthy	0	0	.	.	.
Age * Female * High income	1	-6746.00865	1168.579664	-5.77	<.0001
Age * Female * Low income	1	-7955.8814	923.556209	-8.61	<.0001
Age * Female * Medium income	1	-7085.32258	971.759925	-7.29	<.0001
Age * Female * Wealthy	1	5113.40345	1427.399352	3.58	0.0003
Age * Male * High income	1	-3678.24652	1065.073102	-3.45	0.0006
Age * Male * Low income	1	-7919.29848	930.142013	-8.51	<.0001
Age * Male * Medium income	1	-4243.81734	967.150239	-4.39	<.0001
Age * Male * Wealthy	0	0	.	.	.

Source: Author compilation

The cash model had eleven steps before the most suitable combinations were selected. The model was statistically significant at a 95 percent confidence level and had an adjusted R-square of 0.0825. The adjusted R-square indicates that 8.25 percent of the amount being invested in cash can be predicted based on the available demographics. Race was again a statistically significant indicator. Other significant factors include the combination of age*race, gender*income, and age*gender*income. Analysing each parameter individually shows similar results to that of total investment amount. The model selected White investors as the base parameter with degree of freedom equal to zero. The model indicated that there is a high significance between the total investment amount for White investors when compared to African, Coloured, and Indian investors. The “Other” race group is not statistically significant. The combination of age and race also had high significance across all five race categories. With the combination of gender and income level the model selected wealthy males as the base with degrees of freedom equal to zero. Female investors with low-, medium-, and high income levels, as well as wealthy show statistical significance. Male investors with low- and medium income levels also show high statistical significance, while male investors with high income level are not statistically significant. The final parameter combined age, race and income level with wealthy males chosen as the base with degrees of freedom equal to zero. The combination of gender with age for all income levels were statistically significant.

Table 5.13: Parameter results for equities investment amount

Parameter	DF	Estimate	Std error	t Value	Pr > t
Intercept	1	-60502	18721	-3.23	0.0012
High income	1	-11834	21899	-0.54	0.5889
Low income	1	58362	19009	3.07	0.0021

Medium income	1	34393	19823	1.73	0.0828
Wealthy	0	0	.	.	.
Age * High income	1	2034.8	258.2258	7.88	<.0001
Age * Low income	1	74.411	72.54956	1.03	0.3051
Age * Medium income	1	769.85	143.0681	5.38	<.0001
Age * Wealthy	1	3189.9	400.5744	7.96	<.0001

Source: Author compilation

The equities model conducted thirteen steps before the most relevant demographic factors and combinations were selected. The model is statistically significant at a confidence level of 95 percent and the adjusted R-square is 0.0203. This indicates that 2.03 percent of the investment amounts in equities can be explained by the model. The model highlights that demographics like race and gender do not have statistical significance and that equity investments are more dependent on the income level of the investor and the combination of age and income level. The model selected wealthy investors as the base parameter with zero degrees of freedom. Low income showed high statistical significance, with medium- and high income showing no statistical significance. The combination of age and income level indicated that all income levels showed statistical significance, with the exception of low income, which showed no statistical significance.

Table 5.14: Parameter results for unit trust investment amount

Parameter	DF	Estimate	Std error	t-value	Pr > t
Intercept	1	-6737.548706	1630.130929	-4.13	<.0001
Age	1	222.548871	35.936929	6.19	<.0001

Source: Author Compilation

In order to establish if there were any statistically significant demographic factors to consider, the unit trust model conducted fourteen steps. The resulting model is statistically significant at a 95 percent confidence level, however, the adjusted R-square is extremely low at 0.0019. This indicates that the model only accurately predicts 0.19 percent of the value an investor is expected to invest in a unit trust. The only statistically significant parameter is the age of the investor.

5.5. Relationship between product choices and demographics based on income level

The study found that there is a significant difference between the amounts being invested by the different income levels and that demographics like age, race, and gender also influence these invested amounts. The second objective of the study was to analyse the individual

investors' product choices over different income levels. By analysing the data per income level, a better understanding can be formulated around how individuals in different financial situations invest. This will allow banks to market more relevant investment products to help investors reach their investment goals.

5.5.1. Influence of age on investment product choice per income level

Age is the cornerstone of the theory of the investor life cycle. By analysing the investment behaviour of investors in different age categories and combining this with their income level, the differences between investors of the same age in different income bands can be used to gain greater insights as to how investment behaviour differs.

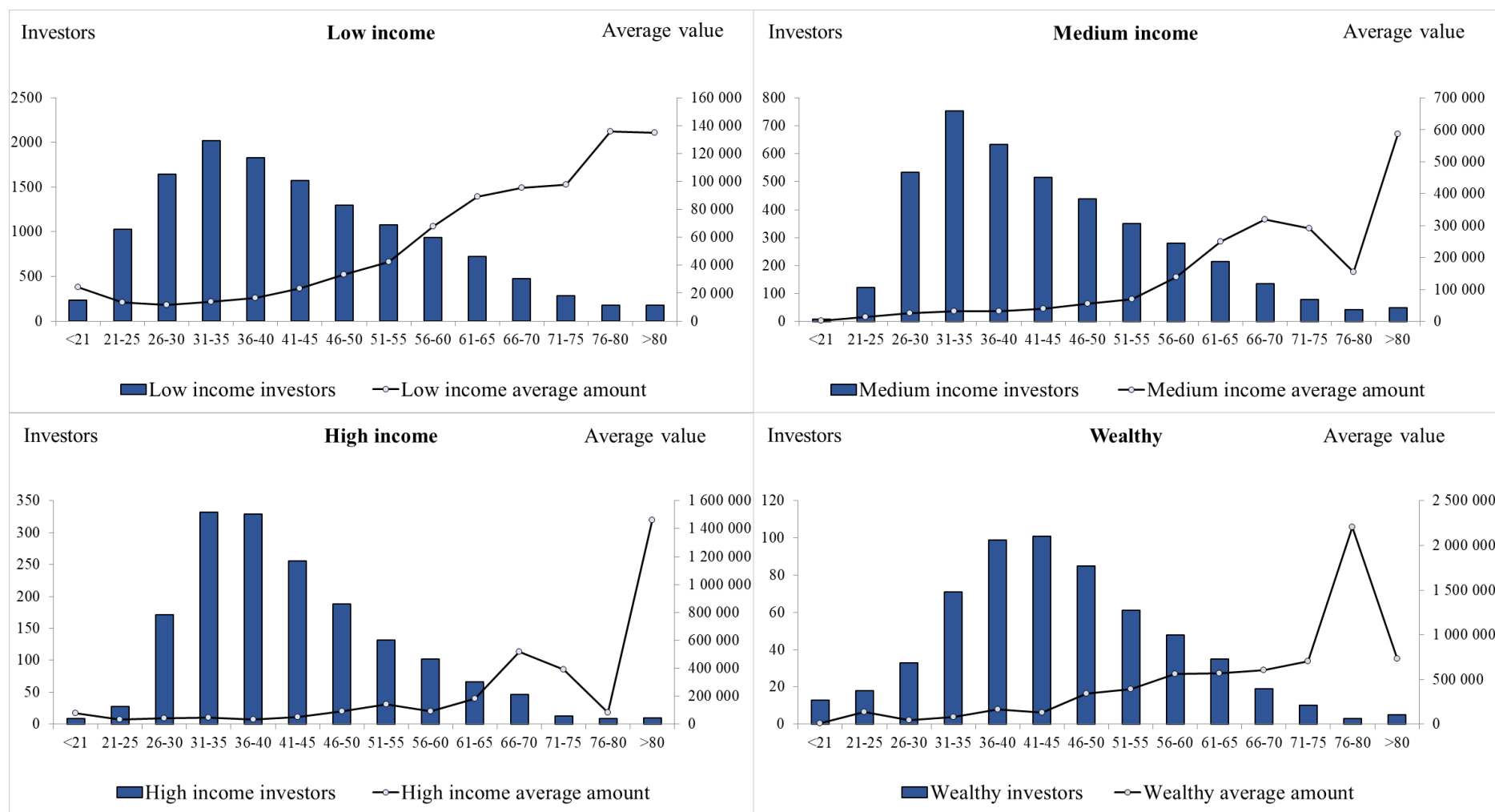


Figure 5.9: Number of investors and average value per age group of sample investors based on income level

Source: Author compilation

From Figure 5.9 the investment trends over the different age ranges on the x-axis are illustrated for each income level. The number of investors is shown on the left-hand y-axis and the average amounts invested on the right-hand y-axis. The number of investors starts reducing after reaching a high between the ages of 30 and 40. All four graphs follow a similar pattern with the investment amount increasing as individuals age. After retirement age of 60, there is an initial levelling out phase with lower income clients, however, the average investment amount starts to increase again after the age of 75. With medium and high income investors, a decrease occurs after the age of 70. This is followed by an increase with investors over the age of 80. Wealthy individuals do not follow the same pattern and there is a consistent increase after retirement age is reached up until the age of 80 where a sharp decline occurs. The increase after the investment amount decreases seen with medium and high income investors could potentially be due to investors moving their retirement funds from pension funds into safer alternatives like cash investments.

Table 5.15: Spearman correlation results for age and product values

Low income	Results	Interpretation
Total investment amount	0.18696	Weak positive correlation
	<.0001	Statistically significant
Cash value	0.18255	Weak positive correlation
	<.0001	Statistically significant
Equities value	0.04054	Weak positive correlation
	<.0001	Statistically significant
Unit Trusts value	0.04164	Weak positive correlation
	<.0001	Statistically significant
Medium income	Results	Interpretation
Total investment amount	0.23851	Weak positive correlation
	<.0001	Statistically significant
Cash value	0.22023	Weak positive correlation
	<.0001	Statistically significant
Equities value	0.07477	Weak positive correlation
	<.0001	Statistically significant
Unit trusts value	0.05663	Weak positive correlation
	0.0003	Statistically significant
High income	Results	Interpretation
Total investment amount	0.26624	Weak positive correlation
	<.0001	Statistically significant
Cash value	0.23085	Weak positive correlation
	<.0001	Statistically significant
Equities value	0.12719	Weak positive correlation

	<.0001	Statistically significant
Unit trusts value	0.03518	Weak positive correlation
	0.1481	Not statistical significant
Wealthy	Results	Interpretation
Total investment amount	0.25597	Weak positive correlation
	<.0001	Statistically significant
Cash value	0.25993	Weak positive correlation
	<.0001	Statistically significant
Equities value	0.07808	Weak positive correlation
	0.0557	Not statistical significant
Unit trusts value	0.01435	Weak positive correlation
	0.7254	Not statistical significant

Source: Author compilation

Table 5.15 shows the correlation between age and income level is similar across all four income levels. The results are statistically significant and weakly positive for all four income levels. High income has the highest correlation indicating that as investors age they will have higher investment amounts. Low income investors show the lowest correlation, indicating that the effect will be less visible when compared to the other income levels. Cash investments also show a similar trend which is to be expected since the majority of the total investment values comprise mostly out of cash across all four income levels. The different investment choices over the four income levels become clear when analysing the results for equities and unit trusts. For low income investors, there is a weak positive correlation between age and equities at 4 percent and unit trusts also at 4 percent. The effect is slightly higher for medium income with the relationship increasing to 7 percent for equities and 5 percent for unit trusts. With high income investments, the correlation for equities is 12 percent, with unit trusts not being statistically significant. Wealthy investors show a lower correlation than high income investors at 7 percent for equities, however, the result is not statistically significant. Unit trusts are also less correlated and not statistically significant. The reasoning behind some results not being statistically significant could be due to the low number of investors in these products by high income and wealthy investors that form part of the sample. This results in too few data points for any patterns to form.

In order to depict the data more effectively graphically, the age ranges were further grouped based on the phases of the investor life cycle. Brown and Reilly (2012:33) provide the parameters for the investor life cycle where the accumulation phase stretches from birth to

around the age of 34. After this, the investor enters the consolidation phase from age 35 to 60. Investors over the age of 60 enter the final, spending/gifting phase.

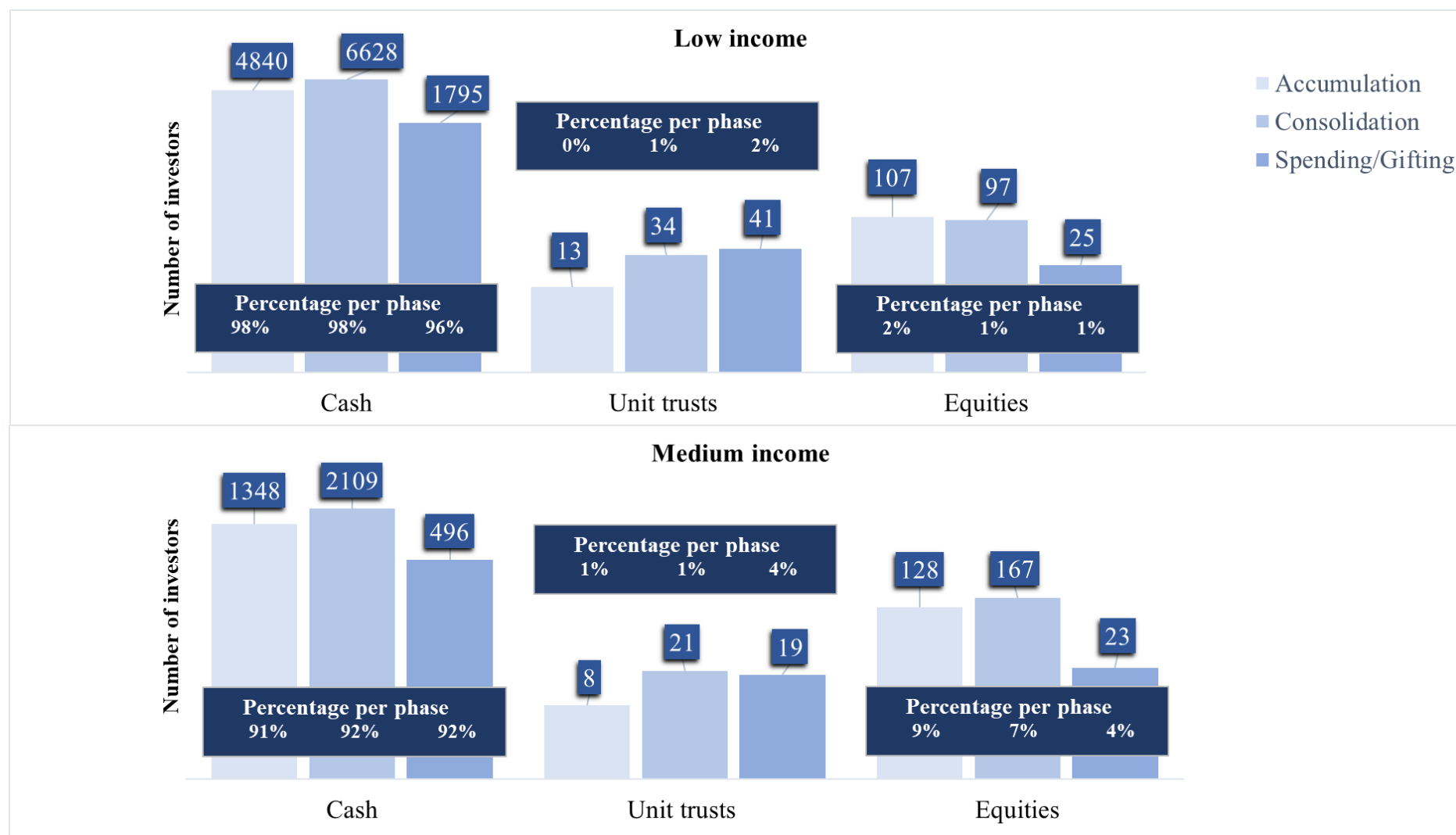


Figure 5.10: Number of investors per product and life cycle phase low- and medium income

Source: Author compilation

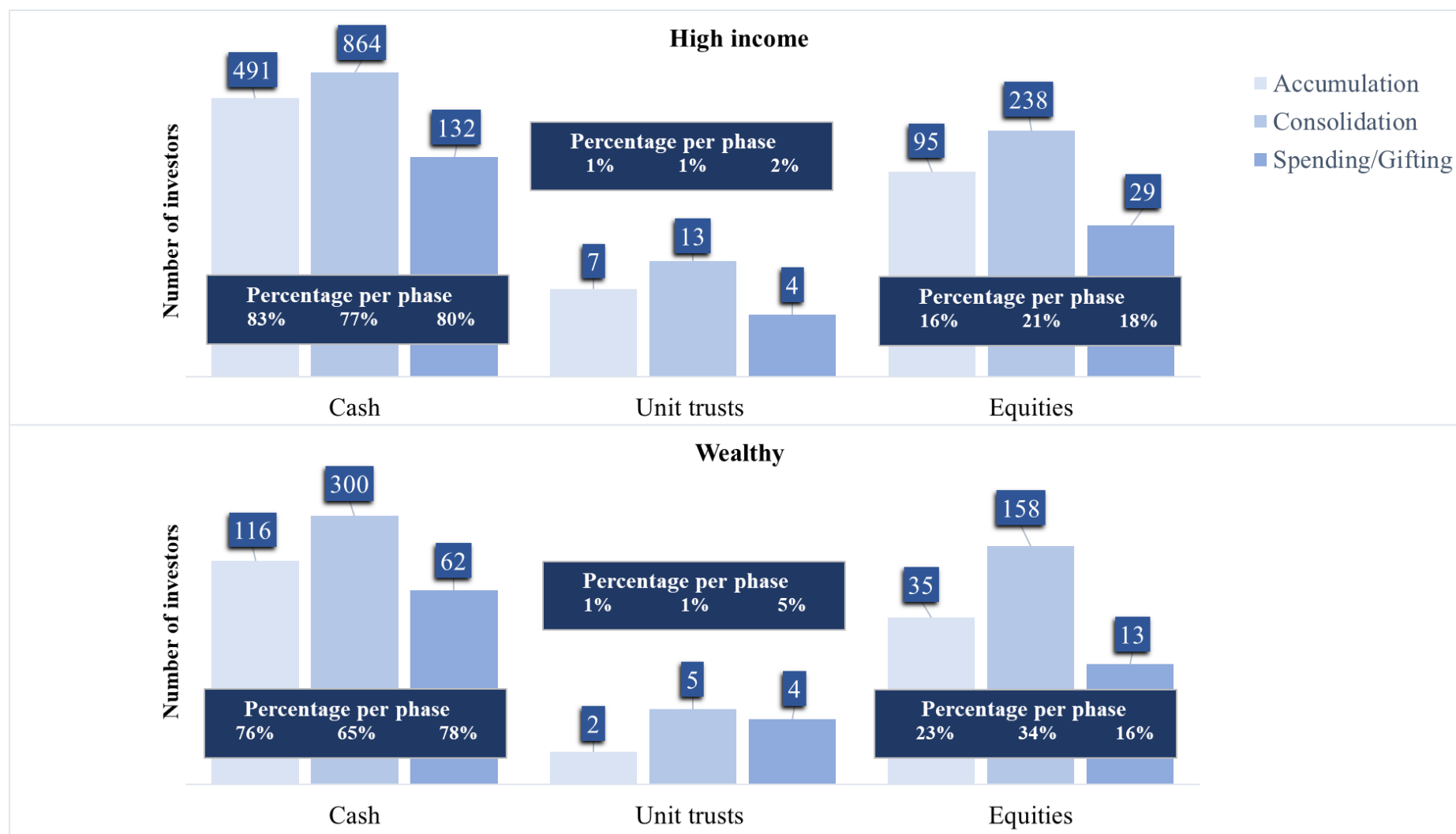


Figure 5.11: Number of investors per product and life cycle phase high income and wealthy

Source: Author compilation

Figure 5.10 and 5.11 show the number of investors per product in each of the different life cycle phases. The graphs also show the different distributions based on income level. A logarithmic scale was used to smooth out the data. Low income investors have the majority of their funds invested in cash. The graph shows that unit trusts become more popular as individuals age. The opposite is seen with equities, with younger individuals more prone to invest in these products. Medium income investors have similar distributions to low income investors, with all ages investing mostly in cash. Unit trusts increase in popularity as investors age, with equities being more popular with younger investors. The trend starts to reverse with high income investors. The amounts invested in cash is still higher than any of the other two products for all age groups, however, unlike the lower income levels, this has declined below the 90 percent mark. The percentage of investors in unit trusts is the highest in the final spending/gifting phase, although there are more investors in the consolidation phase. Equity investments also become more popular with each life cycle stage now investing in the double digits. The highest percentage of equity investors is in the consolidation phase of the life cycle followed by the accumulation phase. This trend continues with wealthy investors, with relatively more investors moving away from cash investments and more toward equities. Cash investments are at its lowest percentages across all three life cycle stages. Unit trusts are at its highest percentage in the final spending/gifting phase, following a similar pattern across all four income levels. The results further support the findings by Gutter, Fontes (2006:75) and Carroll (2000:23), who found that wealthy investors prefer higher risk investments over low risk investments. The findings also further contradict that of the investor life cycle, with the highest percentage of clients in each income level investing more in cash in the accumulation phase of the investor life cycle, instead of in riskier assets like equities.

5.5.2. Influence of gender on investment product choice per income level

Males and females have different views on how to invest their funds. Results indicate that there are no statistically significant differences between the distributions between male and female investors. The study will establish if these differences are more evident for different income levels.

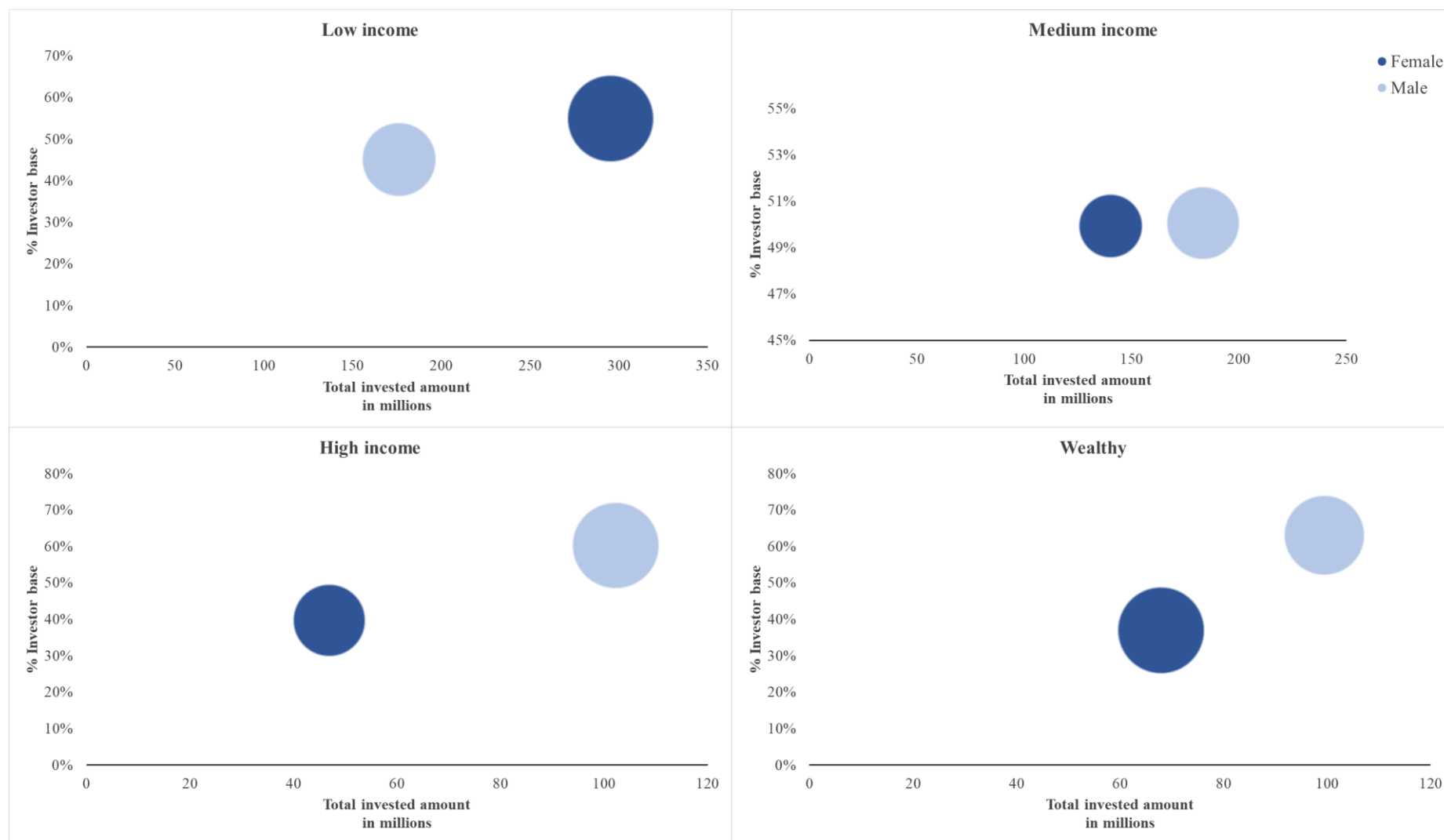


Figure 5.12: Percentage invested amount per gender based on income level

Source: Author Compilation

Figure 5.12 graphically represents the difference between the amounts invested by females and males based on the different income levels. The y-axis shows the percentage each gender represents in the total sample base and the x-axis shows the percentage total investment. The bubbles are sized according to the average investment amount per gender. For the low income segment, there are 10 percent more female investors compared to male investors. Female investors also invest higher total and average amounts than their male counterparts. Females invest 38 percent more on average and hold 63 percent of the total invested amount in the low income segment. In the medium income segment, there is an equal amount of male and female investors. In this segment, males tend to have higher total and average investment amounts. The average investment amount for males are 30 percent more compared to females and they hold 57 percent of the total investment amount. A similar trend is seen for high income and wealthy investors, with each segment having more male investors compared to females and higher total investment amounts. The high income segment has 60 percent male and 40 percent female investors. Males also hold 69 percent of the total investment amount and invest 44 percent more on average. The wealthy segment is made up of 63 percent males and 37 percent females. The trend is slightly different with regard to investment amounts, as males hold a larger portion of the overall investment amount (59 percent), however, females invest on average 17 percent more than their male counterparts.

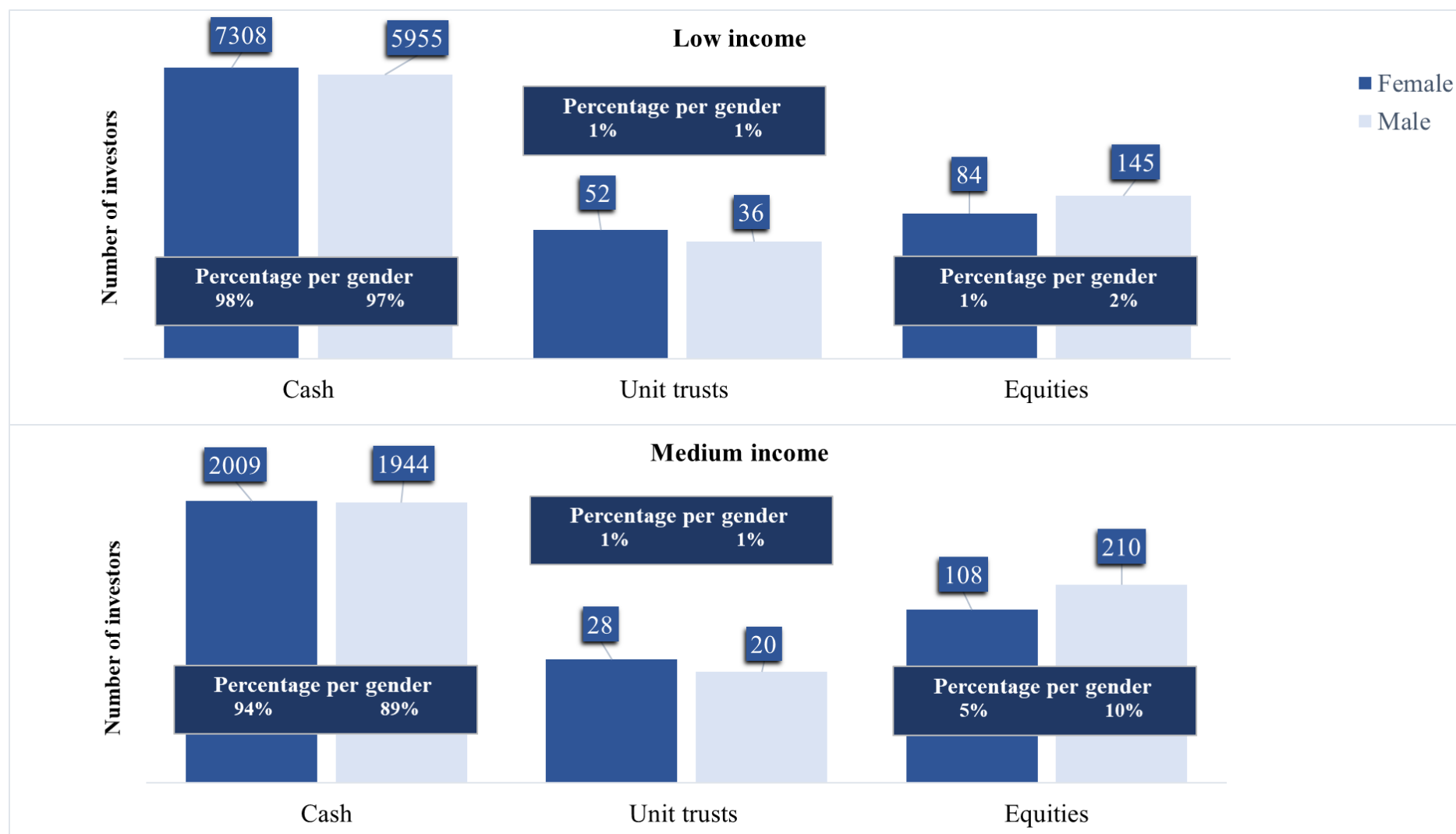


Figure 5.13: Number of investors per product and gender for low- and medium income levels

Source: Author compilation

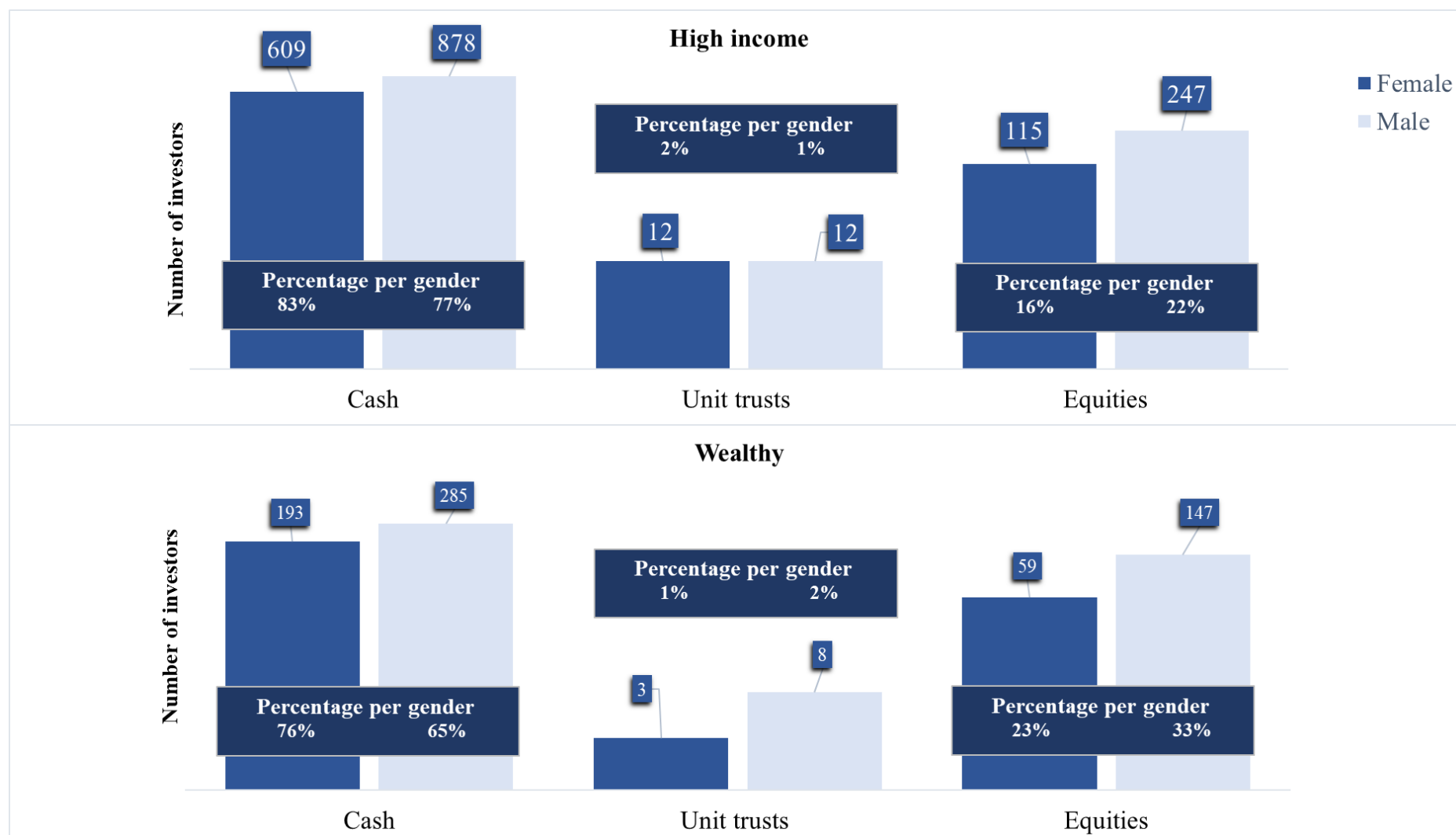


Figure 5.14: Number of investors per product and gender for high income and wealthy income levels

Source: Author compilation

Figure 5.13 and 5.14 illustrate how many investors of each gender invests in the different investment products based on their income levels. The results for low income investors are very flat, with each gender investing similar percentages in each of the different products. The exception comes in the form of males investing slightly more in equities and less in cash. This trend continues across all income levels, where unit trusts remain evenly distributed, however, male investors seem to be investing more in equities and less in cash when compared to female investors. This further supports the findings of Bayyurt *et al.* (2013:82-83), that male investors are prone to invest more in risky investments when compared to female investors.

5.5.3. Influence of race on investment product choice per income level

As previously discussed, race has a big impact on how investors invest their disposable income. By further segmenting these clients into their respected income levels, more insight can be gained around how investors from different racial backgrounds and income levels invest.

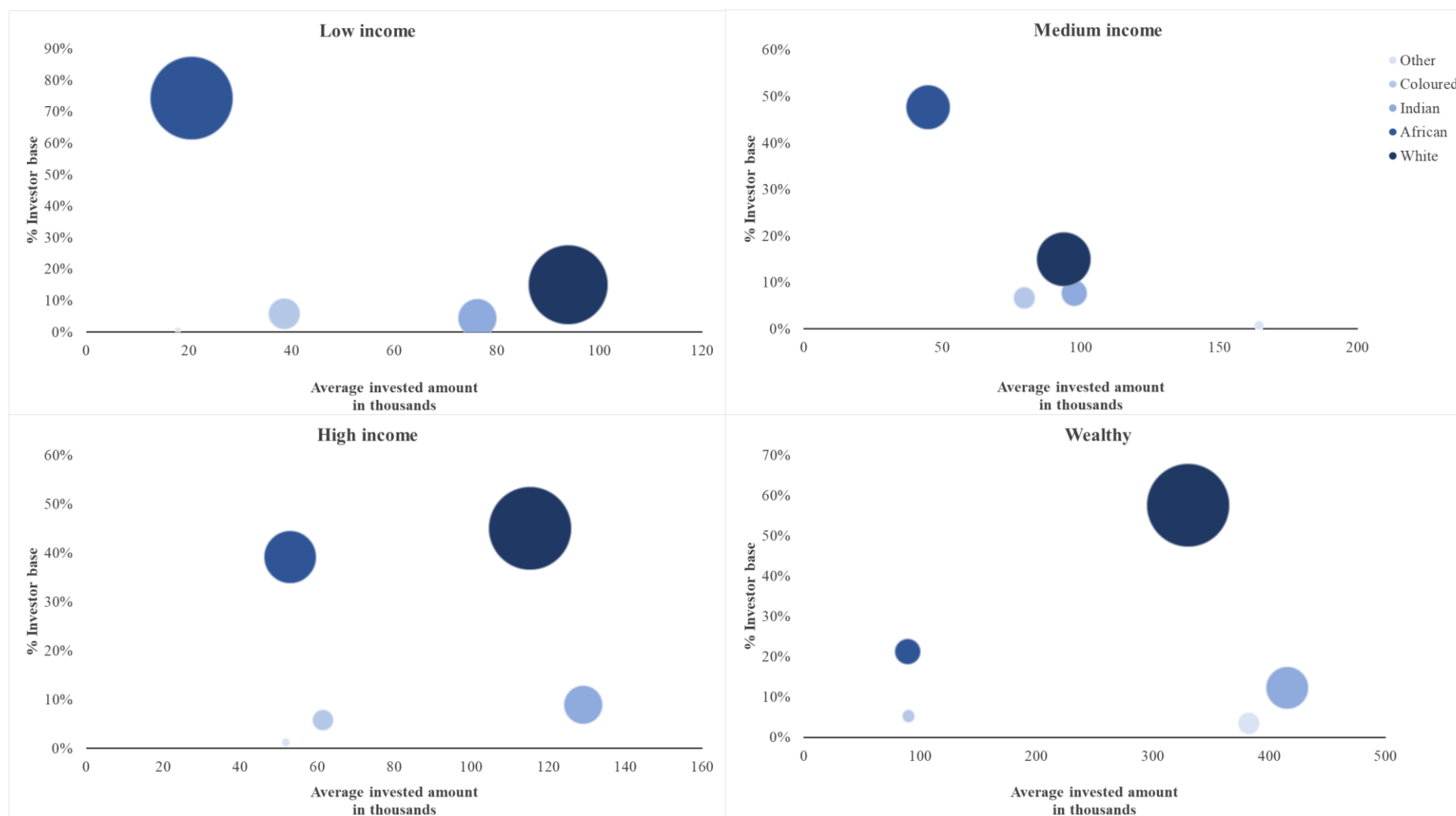


Figure 5.15: Percentage invested amount per race based on income level

Source: Author compilation

Figure 5.15 depicts the average invested amounts per income level. The percentage of investors of the total sample base per race on the y-axis and the total invested amount in millions on the x-axis to illustrate how the invested amount is distributed based on different races. The bubbles are sized according to the percentage investment amount. The low income segment has a similar pattern as the overall base, with African investors making up the largest percentage of the investor base, however, their total investment amount is second highest with the second lowest average investment amount. The figure shows that African investors made up the largest portion of investors in each income group, excluding wealthy, where they make up the second largest race group. In each income level, they had the lowest average investment amounts. This shows that even wealthier African individuals are investing far lower amounts when compared to the other race groups. The trend is similar for Coloured investors. Mangoma and Wilson-Prangley (2018:14-15) found that Black Tax had a significant impact on the amount of disposable income African professionals have available to invest in South Africa. Cronjé and Roux (2010:22-23) also found that African investors have high debt and low savings amounts. The figure confirms that across all income levels, African and Coloured investors are investing less than other race groups, even when their income levels are high. Indian and Asian investors have a savings culture that is also seen in the results, with Indian investors having the highest average investment amounts in the wealthiest two income level groups (Cronjé & Roux, 2010:22-23). White investors make up the largest part of high income and wealthy investors. This highlights the existing income inequality in South Africa following the Apartheid era (Wilson, 2011:1).

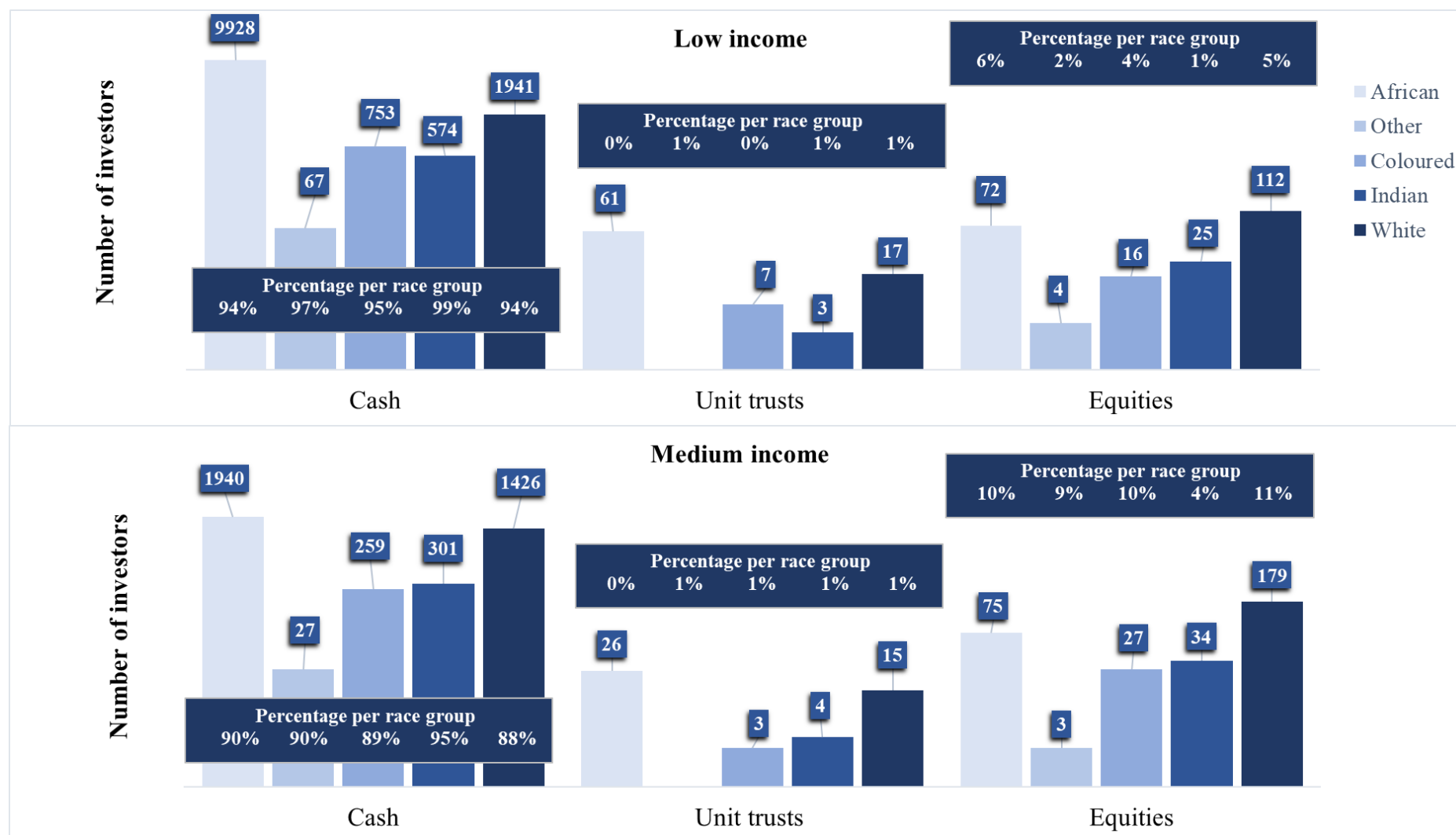


Figure 5.16: Number of investors per product and race for low- and medium income levels

Source: Author compilation

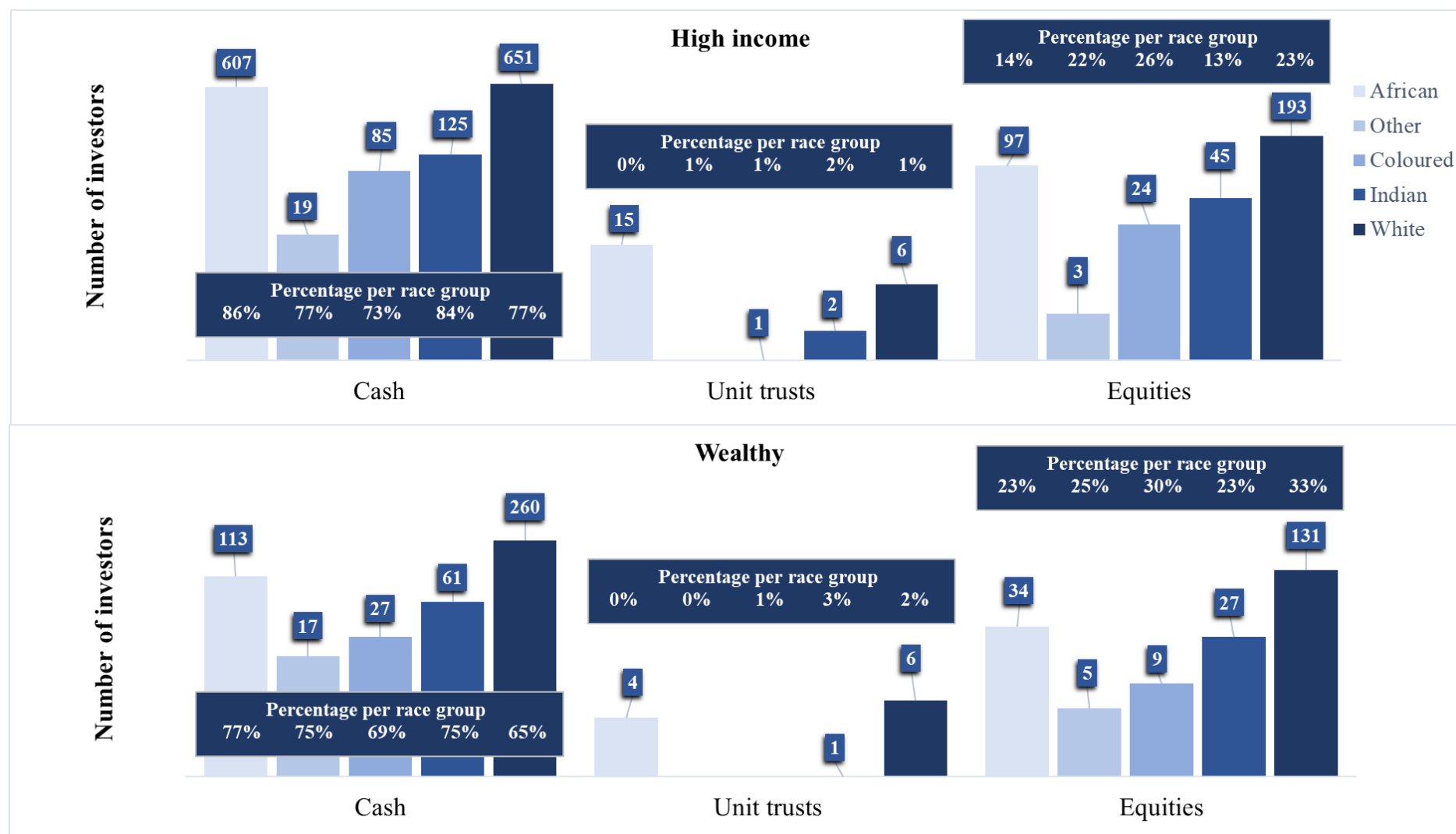


Figure 5.17: Number of investors per product and race for high and wealthy income levels

Source: Author compilation

Figure 5.16 and 5.17 break down the number of investors of the different racial groups investing in the different investment products based on their income levels. A trend that is visible across all income levels is that the percentage of African investors in equities are much lower than that of other racial groups, suggesting that African investors are prone to invest more in low risk investment options. African investors in the wealthier income levels are more likely to invest in unit trusts when compared to the other groups. The graph also shows that even though Coloured investors follow a similar trend to African investors when it comes to the average amount being invested, these investors are far more likely to hold equity investments and have more diversified investment portfolios. White and Indian investors show similar percentages of their funds invested across the different income levels, with both groups investing more in equities as their income level increases.

5.6. Modelling South African investors on the investor life cycle

The third empirical objective is to model South African investors onto the investor life cycle. From the analysis conducted thus far, it is clear that the majority of South African investors are more likely to invest in investments that are regarded to be safe. Equity investments are more popular among affluent investors between 40 and 60 years of age. In order to gain more insight as to the level of risk South African investors take per phase on the investor life cycle, the researcher grouped the age bands as laid out by Brown and Reilly (2012:33). Cash investments were ranked as low risk while all equities were ranked as high risk. Unit trust investments were ranked based on their composition. Unit trusts with majority invested in low risk assets were ranked as low risk, with more balanced funds ranked as medium risk. Funds with majority of assets in high risk investment products were ranked as high risk.

Table 5.16: Percentage invested per life cycle phase

Phase in investor life cycle	Low risk	Medium risk	High risk
Accumulation	92%	1%	7%
Consolidation	83%	4%	13%
Spending/Gifting	84%	6%	10%

Source: Author compilation

Table 5.16 gives an outline of the percentage each phase on the life cycle invests based on risk level. The analysis shows that contrary to the theory, South African investors in the accumulation phase invest primarily in low risk investment products. The phase also has the lowest investment percentage invested in both medium and high risk products. The

consolidation phase shows an increase in both medium and high risk investments and is also the phase with the highest amount invested in high risk products. In this phase investors should move away from risky products and invest more in medium and low risk products, however, this is not entirely the case. The final phase shows investors once again moving away from high risk products. However, this phase does have the highest percentage invested in medium risk products compared to the previous phases.

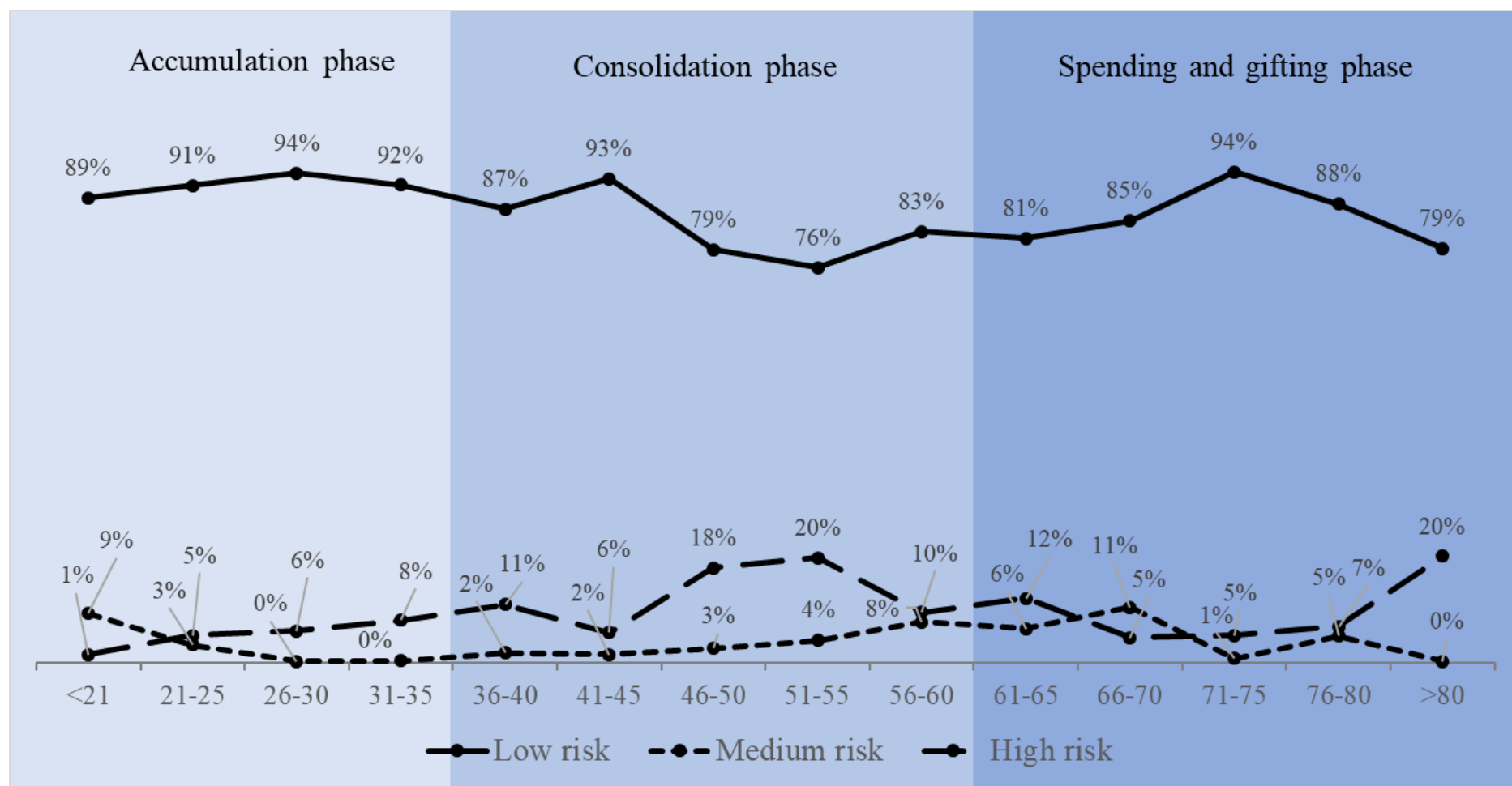


Figure 5.18: Sample modelled on investor life cycle

Source: Author compilation

Figure 5.18 models the percentage of investments per age group based on the different risk levels per investment. The theory is that investors in the accumulation phase should invest more in high risk investments as the expected investment horizon is much longer. This is, however, not the case, with the bulk of these investors holding low risk investments. High risk investments increase in this phase as investors age towards the consolidation phase. Medium risk investments are seen with investors under the age of 21, however, it decreases to close to zero and slowly starts to increase towards the consolidation phase. The consolidation phase is theorised to be where an investor starts moving more towards medium risk investments as the overall investment horizon is shorter. The curve initially moves more towards lower risk investments, however, the trend reverses after the age of 40, with investors moving more towards higher risk investments. High risk investments reach the highest percentage with investors between the age of 51 and 55. Medium risk investments increase gradually in this phase reaching its second highest percentage on the life cycle at the age level between 56 and 60. Portfolios are more diversified in this phase when compared to the other two phases. The final phase shows a shift back towards low risk investments with low risk reaching a high of 94 percent for the age range 71 to 75. Medium risk investments also become slightly more popular with these investments reaching its highest level at the age level 66 to 70. After the age of 75, the investors again move away from low risk investments and more towards high risk investments, once again reaching its highest point of 20 percent for investors over the age of 80. In order to determine if these patterns differ for individuals of different income levels, the study will now analyse each income level separately. Investors from different income groups have different needs. Syed *et al.* (2017:197) found that income level has a significant impact on the amount an investor can invest based on their disposable income.

Table 5.17: Percentage invested in risky investments per income level

Income Level	Low Risk	Medium Risk	High Risk
Low income	90%	6%	4%
Medium income	85%	5%	10%
High income	81%	2%	17%
Wealthy	69%	1%	30%

Source: Author compilation

Table 5.17 shows the amount of risky assets held per income level. Investors in the lower income segments hold most of their investments in lower risk products. They also have larger

percentages in medium risk investments. Wealthier clients have higher portions of their investments in high risk products when compared to lower income segments.

Table 5.18: Percentage invested per life cycle phase for low income investors

Phase in investor life cycle	Low risk	Medium risk	High risk
Accumulation	95%	2%	3%
Consolidation	92%	5%	3%
Spending/Gifting	87%	8%	5%

Source: Author compilation

Table 5.18 shows a similar trend to that seen in the overall sample, however, the effects are less pronounced. Low income investors also have higher percentages invested in low income investments when compared to the total sample. In the accumulation stage, investors have the bulk of their investments in low risk investments and very low and equal amounts in medium and high risk products. This again contradicts the theory that these investors should have a higher percentage of high risk products. The consolidation phase shows a modest increase for medium risk investments with a very small increase in high risk investments. Investors are moving more towards medium risk investments as the theory suggests, however, the effect is smaller than what would be expected, and investors are moving from low risk to medium risk investments and not high risk to medium risk as the theory suggests. The spending and gifting phases see the percentage distributions change slightly, with a significant increase in the percentage invested in medium risk investments. Equity investments also increase slightly more than 1 percent.

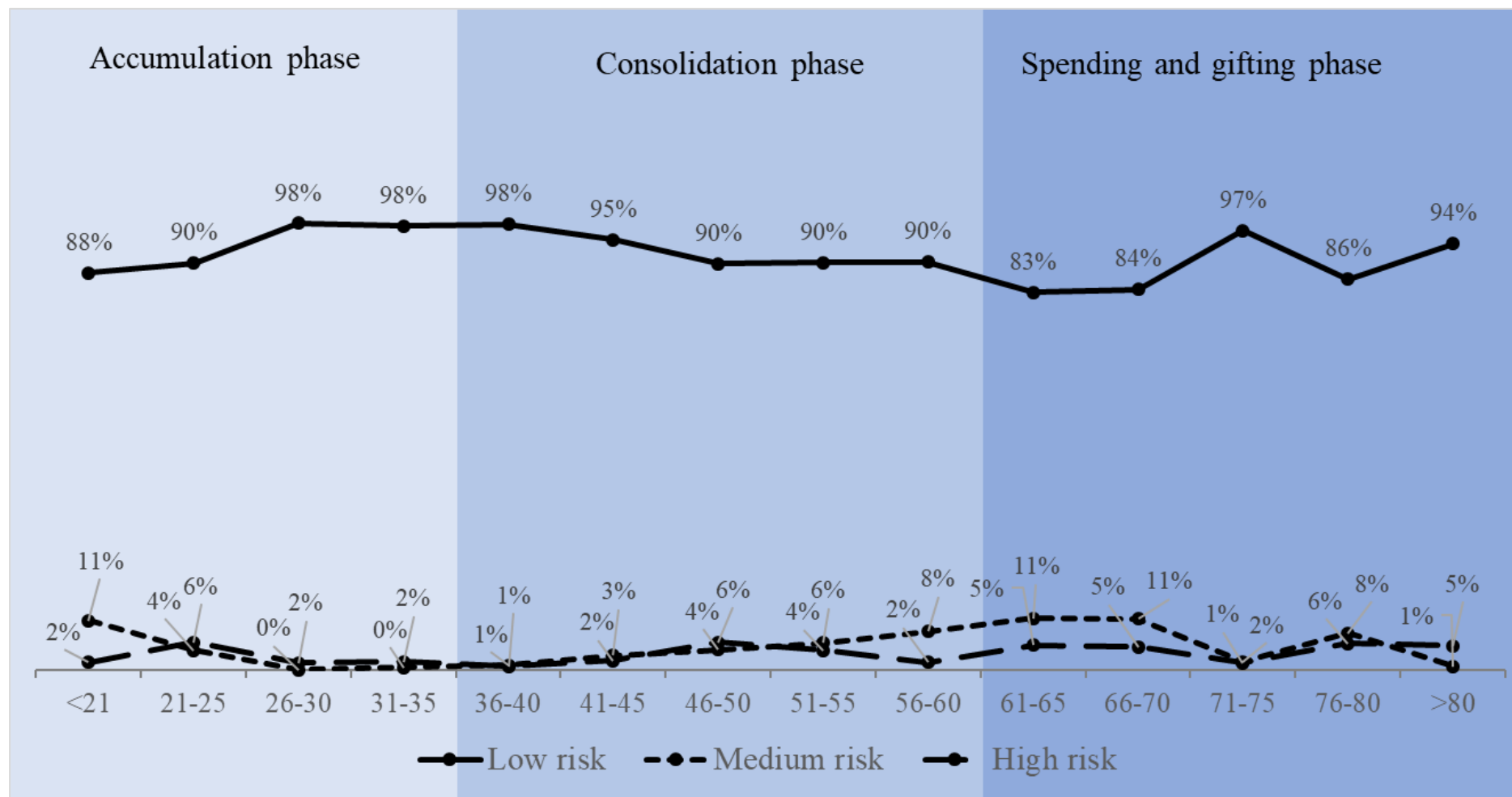


Figure 5.19: Low income investors modelled on investor life cycle

Source: Author compilation

Figure 5.19 models the portfolio distributions for low income investors. During the accumulation phase, low risk investments starts comparatively low with more investors investing as they age towards the accumulation phase. Medium risk investments are initially high, but decreases as investors age. High risk increases slightly for the age group 21 to 25, however, declines to close to zero until investors enter the consolidation phase. The consolidation phase reflects a different trend, with cash investments declining as investors age towards the spending/gifting phase. Medium and high risk investments increase very slightly. The final phase shows medium and high risk reaching the highest levels for low income investors.

Table 5.19: Percentage invested per life cycle phase for medium income investors

Phase in investor life cycle	Low risk	Medium risk	High risk
Accumulation	91%	0%	8%
Consolidation	87%	5%	8%
Spending/Gifting	82%	6%	11%

Source: Author compilation

Table 5.19 shows the percentage per risk level for the different life cycle phases of medium income investors. The results resemble the distribution seen from the overall sample, more so than the percentages seen from low income investors. Low risk investments are at the highest point during the accumulation phase. Medium risk investments are very low in this phase with high risk investments slightly higher than the overall sample. The consolidation phase sees medium risk investments increase, however, from more low risk investments instead of high risk to medium based on the theory. Low and high risk show a slight decline when compared to the accumulation phase. The spending/gifting phases reflect an increase in both medium and high risk investments, with low risk investments reaching its lowest level. This contradicts the theory that these investors should move their funds to low risk investment products.

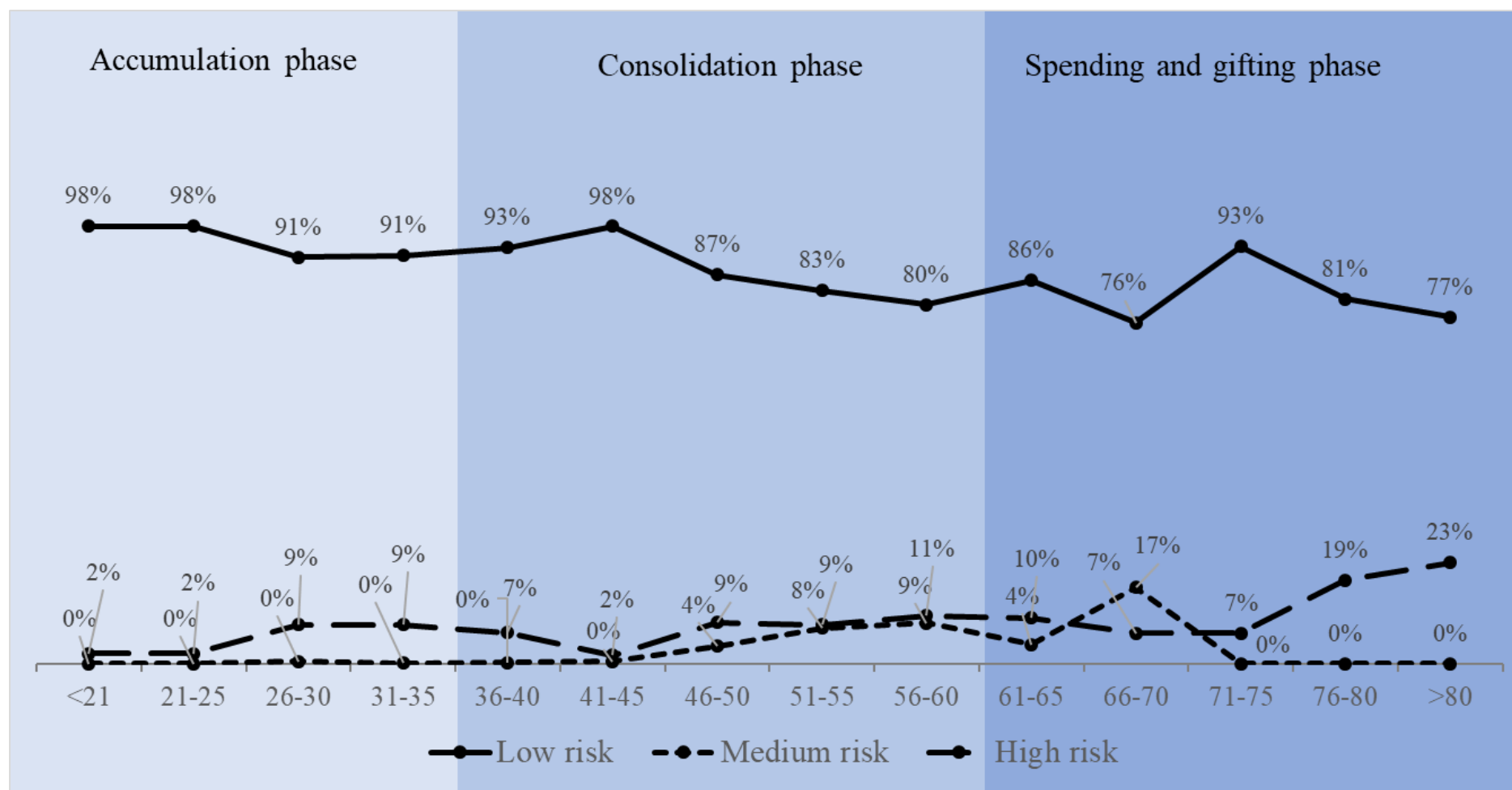


Figure 5.20: Medium income investors modelled on investor life cycle

Source: Author compilation

Figure 5.20 reflects the percentage of distributions for medium income investors. Unlike low income investors, the trend for low risk investments decreases in the accumulation phase, with high risk investments increasing towards the consolidation phase. Medium risk investments are close to zero throughout the entire phase. The consolidation phase shows an initial increase to a high level of 98 percent at the age level 41 to 45, however, a constant decrease is seen until the investor moves into the spending/gifting phase. The reverse is seen with high risk investments with an initial decline at the 41 to 45 age level, after which there is a slight but constant increase. Medium risk investments also show an increase from near zero levels in the previous phase to a high of 9 percent. The final phase is more volatile, with low risk investments decreasing initially, however, the trend reverses and increases for the age group 71 to 75. After this, there is a downward trend again for the remainder of the life cycle. Medium risk investments reach its highest level of 17 percent at the age level 66 to 70. High risk investments are stable until the age level 71 to 75 where there is a sharp increase to a maximum of 23 percent.

Table 5.20: Percentage invested per life cycle phase for high income investors

Phase in investor life cycle	Low risk	Medium risk	High risk
Accumulation	91%	1%	8%
Consolidation	80%	3%	17%
Spending/Gifting	79%	1%	20%

Source: Author compilation

From Table 5.20 the percentage distribution for high income investors shows a shift away from low risk investments towards higher risk investments. This is reflected in the product analysis conducted where the results showed that equity investments become more attractive, the more affluent the investor. Medium risk investments are at its lowest point during the accumulation phase with low risk at its highest. High risk investments are most popular in the consolidation phase with medium risk investments increasing to its highest level over the life cycle. Low risk investments decreased drastically in this phase. In the final phase, low risk investments decrease slightly with the biggest increase seen in high risk investments. Medium risk investments show a big decrease in this phase.

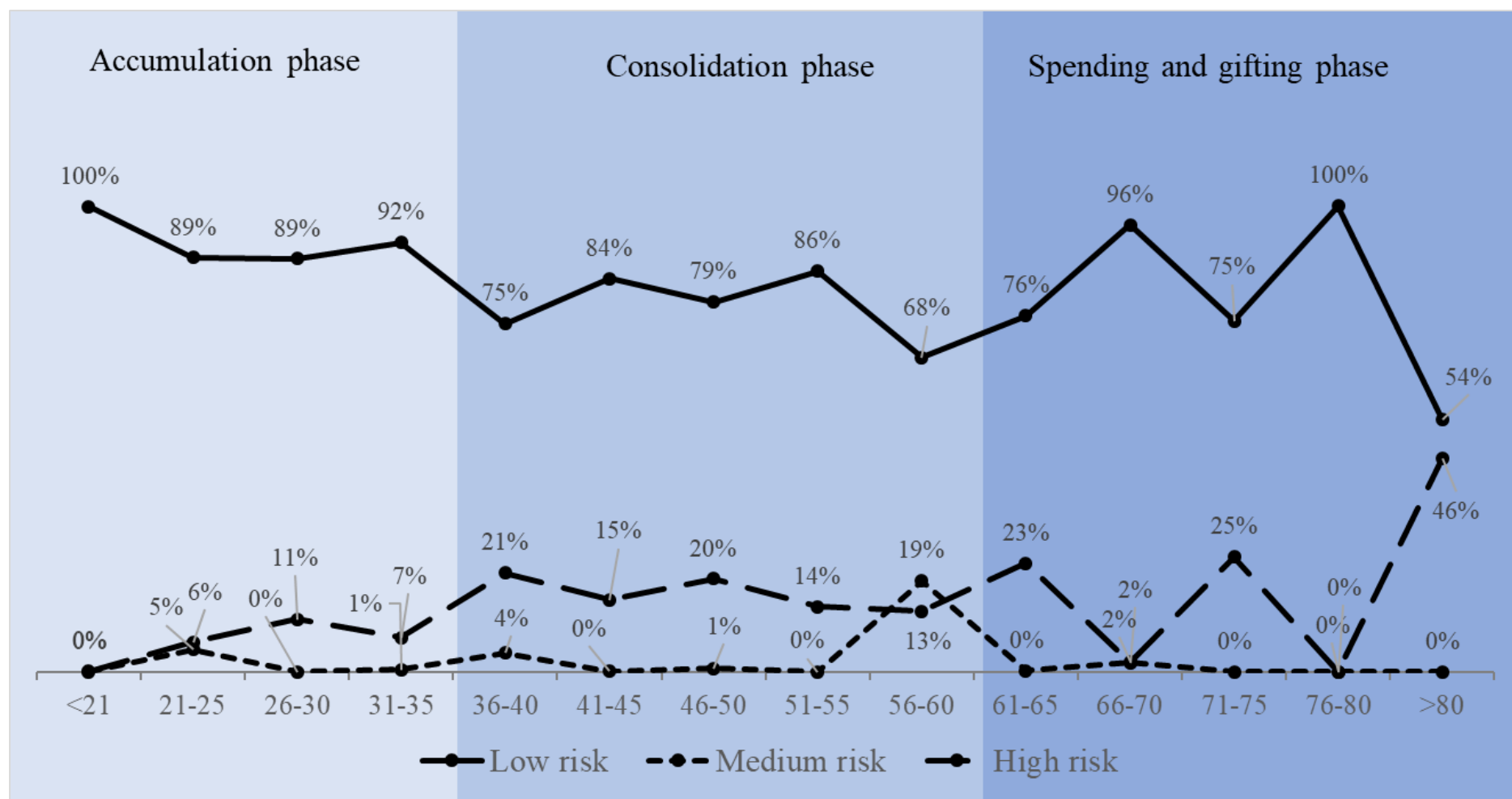


Figure 5.21: High income investors modelled on investor life cycle

Source: Author compilation

Figure 5.21 reflects the percentage of distributions for high income investors. In the accumulation phase, investors initially start off with 100 percent of their funds in low risk investments. As they age, high risk investments become more popular, with medium risk investments initially increasing after which there is a decline. The transition from accumulation to consolidation phase shows an increase in high risk investments, reaching a high point of 21 percent and remaining in the double digits range throughout the phase. Low risk investments are generally lower than in the accumulation phase showing a downward trend as investors age. Medium risk investments remain low, with a single spike at the age level of 56-60 where it makes up 19 percent of the investor portfolios. The final phase shows high volatility, with high risk investments reaching high points of 23, 25, and 46 percent. Each high is followed by a decline close to 0 percent. The same is seen with cash, with each age range either having a very high portion invested in cash, or less than 80 percent. Medium risk investments show almost no trend, remaining at close to zero levels and only reaching a maximum of 2 percent in the age range 66-70.

Table 5.21: Percentage invested per life cycle phase for wealthy investors

Phase in investor life cycle	Low risk	Medium risk	High risk
Accumulation	74%	0%	26%
Consolidation	61%	1%	38%
Spending/Gifting	86%	1%	14%

Source: Author compilation

Table 5.21 shows how wealthy investors are investing less in low risk investments when compared to the other income levels. The accumulation phase shows investors still investing the majority of their funds in low risk options and nothing in the medium risk products. High risk investments are higher than in any of the previously analysed income levels. The consolidation phases show a similar trend, with the highest percentage invested amount across all income levels and phases of 38.09 percent. Investors are also not investing in medium risk investments with only 0.73 percent opting for these products. The final phase shows investors choosing lower risk investment options.

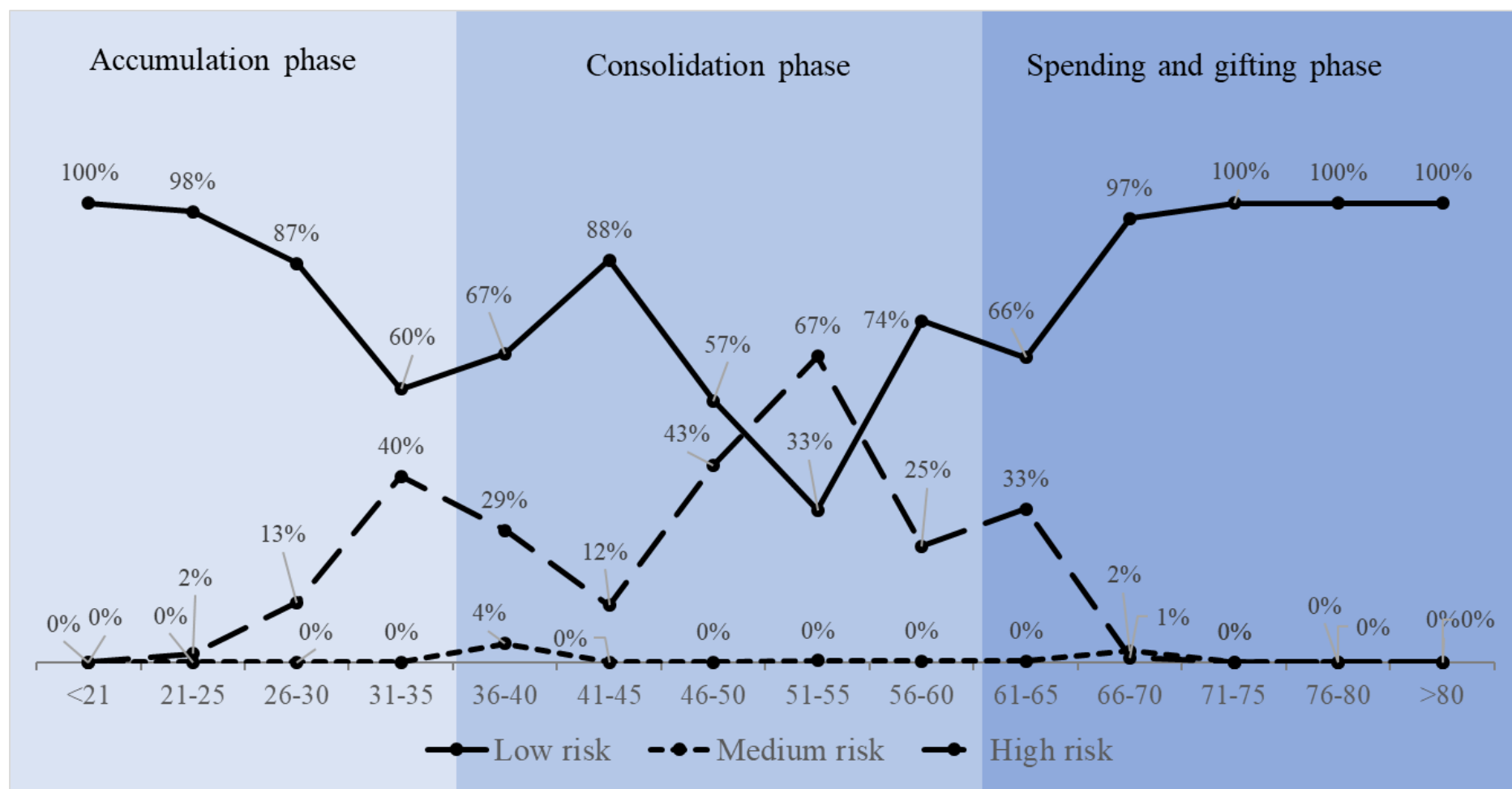


Figure 5.22: Wealthy investors modelled on investor life cycle

Source: Author compilation

Figure 5.22 reflects the percentage of distributions for wealthy investors. The distribution shows clear trends in the first and final phase, however, the consolidation phase is highly volatile. The accumulation phase starts with the majority of investments in low risk products, with a shift towards high risk investments. Medium risk investments are close to zero percent throughout the phase. The consolidation phase shows an initial decrease in high risk investments, however, these investments increase to its highest point throughout the study of 67 percent and is more than low risk investments for the first time at the age group of 51 to 55. Medium risk starts at its highest point of only 4 percent and decreases back to close to zero levels throughout the remainder of the phase. The final phase is reflective of what is expected from the investor life cycle, as investors gravitate back to low risk investments and away from medium and high risk. A possible explanation for the volatile distributions seen in Figure 5.22 is the emergence of trust funds, especially with wealthier investors. These investors have reached a certain level of wealth and are no longer investing in their personal capacities. A trust can be defined as a legal entity that holds different investments for the grantor (the individual that establishes the trust). Trusts are overseen by a trustee who is an individual or company appointed by the grantor. The grantor also assigns a beneficiary who is the individual that will receive the funds after all the conditions pertaining to the trust is fulfilled. In this way, the trust contents do not belong to the beneficiary and the contents are administered in such a way to benefit the beneficiary in the future. Wealthy individuals establish trusts for a number of different reasons, including tax advantages, ensuring future generations are well looked after, limiting the risk of the funds being spent recklessly and to protect an investor's most valuable assets.

5.7. Summary

The purpose of the study was to establish which demographic factor influences investment product choices and to determine how investors from different income levels invest their funds. The study also modelled South African investors based on the theory of the investor life cycle to determine if these investors are behaving as expected. Emphasis was placed on the different income levels, as this was found to be a big influencing factor when it came to investment product choice and ultimately the amount of risk investors would be willing to accept.

The analysis confirmed that each demographic factor played a role in the overall amount being invested. There was a statistically significant correlation between the age of an investor and the total value being invested. Older individuals can be expected to hold higher investment

amounts when compared to younger investors. The analysis also found that investors in the consolidation phase of the investor life cycle held more equity investments, while unit trusts were most popular among older investors. Cash investments were popular for all age groups, which indicates that the majority of South Africans prefer safe investment options. The distributions for gender was found to be similar for male and female investors, however, by running a multiple regression analysis, the researcher determined that gender in combination with the other demographic factors, was a predictive variable to determine the value of the investor's investments. There were also differences in the types of products male and female investors preferred, with male investors showing a higher likelihood to invest in equities. Race was significant as the legacy of Apartheid can still be seen, with a large portion of the total invested amount, held by White investors. The study also found that Indian and certain of the other smaller racial groups had a savings culture, while African and Coloured investors were part of a debt culture. Young African professionals also deal with the South African phenomenon of Black Tax where these individuals have less disposable income as they also need to send money home to care for their less fortunate families. Analysing the effects of income level, the researcher found that there is a big difference in the average amount being invested by the wealthiest investors when compared to the rest. This highlights the income inequalities prevalent in South Africa. The investment product analysis revealed that as income levels rose, the probability of an investor investing in equities increased, with the highest portion of equity investments found in the wealthy investor segment. Unit trust investments were low across all income levels, however, there was also a slight increase in the value being invested with wealthier investors. The results indicate that lower income investors prefer safe investment options, while wealthier investors can afford to take more risks.

The study further analysed how age, gender and race affected investment product choices over different income levels. Investors followed a similar pattern as they aged over the life cycle, except for lower amounts being invested by low income and high investment amounts by wealthier investors. Each income level also showed that equity investments are most popular in the consolidation phase, with unit trusts only gaining some ground in the spending/gifting phase. Even though the trends were similar across all income levels, the effects were more prominent in each higher income group when compared to the lower group. Analysing gender indicated that male investors are more likely to invest in equity investments, although more females started investing in equities as their income levels rose. This indicates that income level influences investment product choice across the two genders. The analysis of race across

the different income levels produced some interesting results. The results support the theory that African investors have less disposable income, regardless of their income level. Indian investors had the highest average investment amounts for the two highest income levels, with White investors holding the highest total investment amounts over all four income levels.

The data were modelled onto the investor life cycle, with results indicating that South African investors do not invest their funds as would be expected. South Africans are far more likely to invest in low risk investment options. The accumulation phase had the lowest amount in high risk across the cycle and the highest amount in low risk investments, which is the exact opposite to what the theory suggests. The consolidation phase has the highest percentage invested in high risk and the lowest amount in cash. The spending/gifting phase has the highest amount invested in medium risk investments and the second highest in high risk investments. The results suggest that South Africans are starting to invest their disposable income in higher risk investments much later in the cycle, than what the life cycle theory suggests (bearing the limitation of the study in mind that only investments at the universal bank is being considered). The study also focussed on the investor life cycle over the different income levels, finding that low income investors only start investing in high risk investments in the final spending/gifting phase. Medium income investors start investing in higher risk investments at the end of the consolidation phase into the spending/gifting phase. High income investors start sooner, with some high risk investments in the accumulation phase and a big spike at the beginning of the consolidation phase. Wealthy investors show an increase in high risk investments much earlier than the other income levels, with high levels of high risk investments throughout the consolidation phase. The results indicate that there is a barrier to cross for low income investors to start investing in high risk assets. This also highlights the bank's task to educate investors on having more diversified portfolios and to introduce medium risk investment options that are easy to gain access to.

CHAPTER 6: SUMMARY, CONCLUSION AND RECOMMENDATION

6.1. Summary

Traditional investment theory focusses on how investors should be investing and not necessarily on how they are investing. Advisory services are not always available to all investors, especially investors in the lower income brackets. Banks can determine which investors are not investing as the theories suggest and educate them using marketing campaigns. South African banks are constantly dealing with new emerging competitors, which is exacerbated by an ever-changing digital environment. This forces the industry to be more innovative and focus on improving the efficiency of services provided, especially within the investments space. Relying on traditional banking services is no longer an option, as the majority of the competing institutions provide a whole range of diversified financial products and services. In order to promote client retention, banks can entrench existing clients into investment products, which will make them less likely to leave the bank as the bank creates multiple relationships with the client. Banks have access to a wealth of data on their existing client base. This provides them with the unique opportunity to promote healthy financial habits and gain insights on the investment needs of their clients.

The primary objective of the study was to test the validity of the current client investment life cycle theory in a South African universal bank.

6.2. Overview of the study

Chapter 1 introduced the study and the investor life cycle, which is the main concept on which the study is based on. The chapter also focussed on the problems in the banking industry and the importance of the study. The main theoretical and empirical objectives of the study were introduced with a brief discussion around the research design and methodology. The ethical considerations were also highlighted.

6.2.1. Theoretical objectives

The following theoretical objectives were formulated in order to achieve the primary objective:

- I. Contextualising the validity of investor life cycle theory.
- II. Conduct an in-depth analysis of how investors are characterised in different risk-taking categories.

- III. Link investor life cycle with an appropriate level of risk.
- IV. Analysis of the South African banking industry.
- V. Provide a theoretical background on the importance of Big Data in banking.
- VI. Link the importance of the banking industry to investor needs.

Chapter 2 established the theoretical framework behind individual investment decisions by elaborating on **theoretical objective I, II and III**. The concept of risk profiling was introduced along with the methods South African banks use to group investors into different risk categories based on their individual considerations, objectives, constraints and risk tolerance. The chapter also focussed on the different asset classes available to investors as each of these classes have different advantages and disadvantages, which is essential for diversified portfolios. The main asset classes discussed included cash and other marketable securities, bonds, real estate, equities and alternative investments. The chapter further elaborated on the importance of asset allocation and provides an understanding of the methods available to calculate an asset's risk and return, as well as all the different asset pricing models.

The main theoretical concept for the study is introduced in Chapter 1 as the investor life cycle is also further elaborated on in Chapter 2. The four distinct phases are introduced as the accumulation, consolidation, spending, and gifting. The initial accumulation phase is where the investor starts to accumulate wealth. At this stage there is a longer expected investment horizon, the investor can invest in riskier assets as they have time to recoup any possible losses. Following the accumulation phase, the investor will enter the consolidation phase where they have a shorter investment horizon and would rather seek to preserve the value of their investments for retirement. When retirement approaches an investor will enter the spending phase, where they will likely seek out the safest investments as they are no longer accumulating new wealth and rather surviving off existing investments. The final stage is the gifting phase, where investors no longer require the large amount of wealth they accumulated and they start sharing the wealth with family or donating to charity.

As the empirical portion of the study focussed on modelling South African investors onto the investor life cycle based on the predicted phase, the researcher focussed on understanding the theory behind the cycle, as well as previous studies conducted on the investor life cycle. Chapter 2 also focussed on how investors can be unpredictable due to the concept of behavioural finance, which holds that an investor may not react rationally and always invest as expected. Emotions play a big role when investing and decisions are often based on personal

feelings or moral values, instead of the logical reasoning which could potentially maximise an investor's earnings.

Chapter 3 aimed to achieve **theoretical objectives IV, V and VI**. The banking industry is discussed and a theoretical base for the banking industry in South Africa was provided. Chapter 3 also elaborated on the current challenges that need to be addressed as part of the problem statement in Chapter 1. The term “bank” is thoroughly defined with a distinction drawn between commercial-, investment-, and universal banking. The different risks inherent in the banking industry are also discussed. The main risks in the banking sector include credit-, market-, and operational risk. Other important risks considered include liquidity-, reputational-, strategic-, business- and systemic risk. In order to ensure the banking industry monitors these risks, there are strict regulatory requirements each bank needs to adhere to. The most prominent acts and regulations discussed were the Basel Accords, NCA and POPIA.

Chapter 3 also contains extensive research on the challenges South African banks are faced with. The most prominent of these include technological advances, competitors, unstable political and economic climates, a lack of knowledge sharing, and strict regulatory and supervisory requirements. As part of the problem statement, the researcher highlighted the importance of banks to promote investment activities, and how this will improve client retention. A reliance on traditional services like safekeeping of funds and extending credit should no longer be a bank's only focus. The chapter also introduces the concept of Big Data and how banks can use the extensive data they collect on their clients to better understand their individual needs. By using large volumes of data and sophisticated statistical modelling, banks can make predictions as to which investment product is most suitable for investors with similar demographics. Due to these insights, banks can play a significant role in educating their clients on healthy investment habits.

Chapter 4 revolved around the research design and methodology used in the study. The chapter starts with an analysis of all the different views on reality, paradigms and approaches available to a researcher when conducting a scientific study. After careful consideration, the researcher chose a positivist paradigm and the quantitative research approach as existing numeric data were tested and analysed using statistical and data modelling techniques. The researcher also made use of secondary data as the required data were available from a South African universal bank directly. The requirements and additional steps to be considered when using secondary

data were discussed, as well as the ethical implications, management of information, and the limitations to the study.

The focus then shifted to the different sampling methods available to the researcher and the most applicable method was chosen. The population was chosen based on convenience as a reputable bank agreed to participate in the study. The population of the bank was then sampled based on the stratified random sampling technique to ensure the sample closely resembles the population being studied. The data analysis section covered how the data were prepared, modelled and analysed. The researcher made extensive use of graphing techniques to identify trends and to ultimately model investors onto the theoretical investor life cycle. The study also made use of descriptive and inferential statistics. These concepts were defined and the formulas and measures used in the study, as well as the hypotheses linked, were discussed. The researcher made use of t-tests, correlation-, linear regression- and multiple regression analysis to proof the empirical objectives.

Chapter 5 answers the empirical objectives formulated in Chapter 1. This was achieved by using the quantitative methodology and statistical techniques discussed in Chapter 4.

6.3. Findings of the study

The following empirical objectives were formulated in order to achieve the primary objective, which was to test the validity of the current client investment life cycle theory in a South African universal bank.

6.3.1. Empirical objective 1: Determine the demographic factors that influence investment product selection

The researcher analysed each demographic factor individually using graphs, correlations and linear regression analysis. After each factor was analysed, a multiple regression analysis was conducted four times to determine if the mix of demographics have an influence on the total amount-, cash-, equities-, and unit trust amounts invested. The analysis found that each of the demographic factors influenced the total amounts being invested. There was a high correlation between age and the total amount invested, which indicates that older investors are likely to hold higher investment amounts. The analysis also found that investors in the consolidation phase of the investor life cycle held more equity investments, while unit trusts were most popular among older investors. Banks can use this information to promote investment products

that are popular among specific groups to other investors with the same characteristics that are currently not investing. The findings can also be used to change investor behaviour by making use of marketing campaigns. These campaigns can be directed at educating younger investors on the importance of higher risk investments.

Cash investments were popular for all age groups, which indicates that the majority of South Africans prefer safe investment options. The distributions for gender was found to be similar for male and female investors, however, by running a multiple regression analysis, the researcher determined that gender in combination with the other demographic factors, was a predictive variable. There were also differences in the types of products male and female investors preferred, with male investors showing a higher likelihood to invest in equities. Race was significant as the legacy of Apartheid can still be seen, with a large portion of the total invested amount, held by White investors. The study also found that Indian and certain of the other smaller racial groups had a savings culture, while African and Coloured investors were part of a debt culture. Young African professionals also deal with the South African phenomenon of Black Tax where these individuals have less disposable income as they also need to send money home to care for their less fortunate families. Analysing the effects of income level, the researcher found that there is a big difference in the average amount being invested by the wealthiest investors when compared to the rest. This highlights the income inequalities prevalent in South Africa. The investment product analysis revealed that as income levels rose, the probability of an investor investing in equities increased, with the highest portion of equity investments found in the wealthy investor segment. Unit trust investments were low across all income levels, however, there was also a slight increase in the value being invested with wealthier investors. The results indicate that lower income investors prefer safe investment options, while wealthier investors can afford to take more risks. Banks can use the information to educate clients on products like unit trusts where they can get some exposure to higher risk investments, with a reduced amount of risk and higher potential returns.

6.3.2. Empirical objective 2: Analyse the individual investors' product choices over different income levels

By analysing the data per income level, a better understanding can be formulated around how individuals in different financial situations invest. Investors followed a similar pattern as they aged over the life cycle, except for lower amounts being invested by low income and high investment amounts by wealthier investors. Each income level also showed that equity

investments are most popular in the consolidation phase, with unit trusts only gaining some ground in the spending/gifting phase. Even though the trends were similar across all income levels, the effects were more prominent in each higher income group when compared to the lower group. Analysing gender indicated that male investors are more likely to invest in equity investments, although more females started investing in equities as their income levels rose. This indicates that income level influences investment product choice across the two genders. The analysis of race across the different income levels produced some interesting results. The results support the theory that African investors have less disposable income, regardless of their income level. Indian investors had the highest average investment amounts for the two highest income levels, with White investors holding the highest total investment amounts over all four income levels.

6.3.3. Empirical objective 3: Determine individual investors' phase on the investor life cycle

The life cycle phase was based on previous research where the age ranges for accumulation phase stretches from birth to around the age of 34. After this, the investor enters the consolidation phase from age 35 to 60. Investors over the age of 60 enter the final, spending/gifting phase. Based on these ranges, investors were modelled onto the investor life cycle. This was achieved by graphing the consolidated investment amounts for low-, medium and high risk based on the different age ranges using line charts.

6.3.4. Empirical objective 4: Identify if South African investors conform to the patterns laid out by the investor life cycle theory

South Africans are far more likely to invest in low risk investment options. The accumulation phase had the lowest amount in high risk across the cycle and the highest amount in low risk investments, which is the exact opposite to what the theory suggests. The consolidation phase has the highest percentage invested in high risk and the lowest amount in cash. The spending/gifting phase has the highest amount invested in medium risk investments and the second highest in high risk investments. The results suggest that South Africans are starting to invest in higher risk investments much later in the cycle, than what the life cycle theory suggests. The study also focussed on the investor life cycle over the different income levels, finding that low income investors only start investing in high risk investments in the final spending/gifting phase. Medium income investors start investing in higher risk investments at

the end of the consolidation phase into the spending/gifting phase. High income investors start sooner, with some high risk investments in the accumulation phase and a big spike at the beginning of the consolidation phase. Wealthy investors show an increase in high risk investments much earlier than the other income levels, with high levels of high risk investments throughout the consolidation phase. The results indicate that there is a barrier to entry for low income investors to start investing in high risk assets.

6.4. Conclusion

The main purpose of the study was to analyse how South African banking clients invest versus what the theoretical patterns the investor life cycle proposes. The study highlighted the value of Big Data analysis for banks when it comes to promoting investments to existing clients. With mounting pressure from competing firms, South African banks need to adapt and focus on expanding their product ranges, especially in the investment space. The analysis found that South African investors do not invest as the investor life cycle theory proposes. South African investors are skewed more towards low risk investment options like cash, across all age ranges. Female investors are especially risk averse, however, the effect becomes less prominent as income level rises. There are also still inequalities between the different racial groups, with African investors of all income levels investing less than the other groups. Banks can play a significant role in driving behavioural changes and promoting a culture of investing, rather than promoting more debt products.

Banks have the means and abilities to gain insights from the vast amounts of data available on their clients. Using these insights, banks can model investor behaviour and promote healthy investment habits. By combining the theory of the investor life cycle, with the data available, banks can improve the returns their clients are expecting and improve client retention.

6.5. Recommendations

Banks can use a similar analysis to promote relevant investment products to their clients. By overlaying all the other data available that could not be supplied for the study due to ethical considerations, even more accurate predictive models can be built. Banks can include data like regions, education level, marital status, number of dependents, rewards programme levels and a range of other factors that could potentially be indicative of investment needs. Banks can also use the data as additional information when financial advisors meet with clients to determine their current investment needs.

6.6. Avenues for further research

The study was limited to a single major universal bank in South Africa. If data can be obtained from the other major banks, a more holistic view can be obtained from investors across South Africa. Further research could potentially also include more demographic factors or combine the data with needs analysis performed for each investor. One of the most interesting results of the study was that African investors invest less than the other racial groups even when they are in the wealthiest income brackets. Future research could analyse this phenomenon in more detail to determine if this is relevant across South Africa and provide explanations as to why this is.

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ANNEXURE A: ETHICAL CLEARANCE



ETHICAL CLEARANCE LETTER OF STUDY

Based on the approval by the Economic and Management Sciences Research Ethics Committee (EMS-REC) on 02/04/2018, the North-West University Research Ethics Regulatory Committee (NWU-RERC) hereby approves your project as indicated below. This implies that the NWU-RERC grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

Project title: Analysing investor risk profiles in a South African bank.																													
Project Leader/Supervisor: Mrs Z. Dickason, Ms S. Ferreira and Dr E. Swanepoel																													
Student: D. Kellerman																													
Ethics number:	<table border="1"><tr><td>E</td><td>C</td><td>O</td><td>N</td><td>I</td><td>T</td><td>-</td><td>2</td><td>0</td><td>1</td><td>8</td><td>-</td><td>0</td><td>7</td></tr><tr><td colspan="2">Institution</td><td colspan="4">Project Number</td><td colspan="2">Year</td><td colspan="4">Status</td></tr></table> Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation			E	C	O	N	I	T	-	2	0	1	8	-	0	7	Institution		Project Number				Year		Status			
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Application Type:																													
Commencement date: 2018-04-02		Expiry date: 2019-04-01	Risk: Low																										

Special conditions of the approval (if applicable):

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, the following general terms and conditions will apply:

- The project leader (principal investigator) must report in the prescribed format to the EMS-REC:
 - annually (or as otherwise requested) on the progress of the project, and upon completion of the project
 - without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project; and
 - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the EMS-REC. Would there be deviation from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date, a new application must be made to the NWU-RERC via EMS-REC and new approval received before or on the expiry date.
- In the interest of ethical responsibility, the NWU-RERC and EMS-REC reserves the right to:
 - request access to any information or data at any time during the course or after completion of the project;
 - to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process;
 - withdraw or postpone approval if:
 - any unethical principles or practices of the project are revealed or suspected;
 - it becomes apparent that any relevant information was withheld from the EMS-REC or that information has been false or misrepresented;
 - the required annual report and reporting of adverse events was not done timely and accurately; and/or
 - new institutional rules, national legislation or international conventions deem it necessary.

The EMSREC would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the NWU-RERC or EMS-REC for any further enquiries or requests for assistance.

Yours sincerely,

Prof D. Viljoen

Chair NWU Economic and Management Sciences Research Ethics Committee