



Performance Evaluation of South African Mutual Funds: The Effects
of Fees on Performance

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Abstract

This paper aims to evaluate the performance and the effects of fees on performance of South African equity, bond and money market mutual funds between June 2010 and July 2019. This paper tries to evaluate whether South African active mutual funds warrant their active fees. 31 equity funds, 14 bond funds and 21 money market funds are examined in order to compare the performance of the funds within the period. The fees of each of these fund categories are also analyzed along with fund performance. In order to measure these funds, the Information ratio (1973), the Sharpe ratio (1965), Jensen's alpha (1968) and the Sortino ratio (1980) methods are used. Jensen's alpha is also used in identifying selectivity skills of fund managers. None of the funds in the sample were found to outperform their respective benchmark over the sample period. Thus, because no fund was able to outperform their respective benchmark this also resulted in significant negative alphas across all fund categories. Equity funds had the highest return over bond and money market funds but were also found to have the highest fees while exchange traded funds (ETF) charged the lowest fees. The compounding effect of paying high fees was found to erode performance and to be more costly the longer the time horizon. This paper found that investment managers could not outperform their respective benchmark on a consistent, total risk-adjusted basis and took on unnecessary risk which was not rewarded in the form of higher returns. This paper concludes that passive investing style is more appropriate in South Africa as active managers were unable to justify the high active fees that they charged.

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Chapter 1: Introduction

1.1 Introduction

Globally, mutual funds have become a widely used investment vehicle for personal finance, retirement planning and asset management, valued at \$46.7 trillion worldwide at the end of 2019 (Investment Company Institute, 2019). Although in their infancy relative to the rest of the world, South African mutual funds have shown rapid growth over recent years. In South Africa, mutual funds (also known as Collective Investment Schemes or CIS) have grown from one fund in 1965 to 1265 registered domestic funds in 2019, valued at about R2.125 trillion (Associations for Savings and Investments South Africa, 2019). According to Old Mutual's Savings Monitor Survey (2015), pension funds rank as the second most widely used vehicle for savings. The appeal for CIS for South African investors lies in the fact that it provides ordinary people with an effective channel for income flow, capital appreciation and benefits such as risk spread through diversification, liquidity, and overall convenience. In recent years there has been controversy around fund performance after fees and how assets are allocated across different asset classes. The lack of outperformance in recent years has also questioned whether it is possible to outperform the market. This study will provide an examination of fund performance before and after fees by analyzing a selected sample of CIS funds across the different asset fund classes. The purpose of this research is to identify which class of funds outperform their respective benchmarks before and after fees on average.

Measuring investment performance is also important in testing the level of efficiency in the stock markets. According to Malkiel and Fama (1970), a strongly efficient market suggests that stock prices fully reflect all available information. If this hypothesis were true it would not be possible for active managers, that have consistent access to information, to produce above-market returns. The ability for funds to outperform remains an area of controversy, evident in the recent U.S. trend towards passive investing (Stein, 2018). This debate has caused a vast amount of research on whether successful active management is possible. According to Grinold and Kahn (2000), most literature focus on three separate questions: 1) whether the average manager outperformed, 2) whether the top performers are lucky or skillful, and 3) whether performance persists? This paper will only focus on the first two questions, as the last is beyond the scope of this paper.

The study of mutual fund performance began at the beginning of the 1960s, of which three of the most influential studies in the area of portfolio measurements were those of Treynor (1965), Sharpe (1966) and Jensen (1968). The methods developed in these studies are grouped under risk-adjusted performance measure approaches and are based on the foundations of the Capital Asset Pricing Model (CAPM). Tests conducted in research today are still mostly based on these methods. This paper will be using these four measures, namely: the Sharpe ratio, the Treynor ratio, Jensen's alpha, and the Information ratio. The Treynor and Sharpe ratios will be used to evaluate performance on a comparative basis. Jensen's alpha and the Information ratio will be used to gauge the skill of managers of mutual funds.

The body of international literature regarding mutual fund performance is vast, and rapidly growing. Most studies exhibit a mixed review of performance depending on the market studied. Although many studies have found evidence of outperformance (Lee and Rahman, 1990; Malkiel, 1995; Otten and Bams, 1998), many have also failed to find evidence of outperformance (Blake and Timmermann, 1998; Barras, Scaillet and Wermers, 2010).

All local and international literature considered will be used as guidelines in methodology and expectations of results. This paper aims to extend local research on mutual fund performance. This study is conducted to aid fund managers, investors and financial advisors in their research and investment decision-making process.

1.2 Research Problem Statement

Much of the research around the area of CIS in South Africa has tended to focus on an overview of collective investment schemes industry, performance, and funds. South African research is limited in this area, and it stems from the fact that research conducted in this area is focused on equity unit trusts, with little or no research done on the other fund asset classes. Internationally, there is more literature that explores the effects of fees on performance compared to domestic literature. The purpose of this dissertation is to expand on and add to the research in South Africa on these types of funds.

There has been a recent trend of migrating from an active investing style to a passive one in the United States due to a lack of outperformance on average, questioning whether active management or an active investing style warrants the high fees. Identifying the effects of fees on performance across different fund asset classes may benefit South African investors in making investment decisions and may also help to assist asset management companies with asset allocation and fee structure. Investor mandates determine the level of risk and subsequently which asset class the manager is allowed to invest in on behalf of the investor.

1.3 Research Question

By trying to determine whether CIS in South Africa can outperform the market on average, this leads to the primary and secondary questions:

1. Do South African Collective Investment Schemes outperform the market on average?
2. Does active management in South Africa warrant the high fees charged?

The research questions can be broken down into sub-questions making them easier to answer and investigate. The sub-questions are as follows:

- 1.1 Which asset fund classes outperform their respective benchmarks?
 - a) Do equity funds outperform their respective benchmarks on average?
 - b) Do bond funds outperform their respective benchmarks on average?
 - c) Do money market funds outperform their respective benchmarks on average?
- 1.2 Do they outperform their respective benchmarks before and after fees?

By evaluating all the sub-questions, the primary research question can be answered. By answering the primary research question, it can be ascertained whether an active or passive investing style is more appropriate in South Africa and whether active management is worth the high fees charged.

1.4 Aim

The primary aim of the study is to identify which fund classes outperform the market before and after fees.

1.5 Objectives

The objective of this paper is to evaluate performance across three different asset classes namely, equities, bonds, and money market. While evaluating performance, the effects of fees on performances are considered. The study will use a sample of South African domestic CIS funds which are grouped according to fund class. This will help inform investors which fund classes tend to perform better relative to others with regards to specific benchmarks on average, as well as inform investors on the potential effects of high fees on returns. Funds performing well before fees and not after can be identified and highlighted to asset managers to help them reconsider fee structure to obtain outperformance net of fees. After calculating the risk-adjusted performance of each fund, the significance will be tested by calculating Jensen's alpha and will be repeated after adjusting for fees. Performance measures will be used to standardize and rank the performance returns of each fund. Fees charged across different fund categories will be analyzed and investigated for comparison to the active funds. This will be conducted using a sample of South African Collective Investment Schemes.

1.6 Research Structure

- Chapter 2 – Background literature – discusses the background context and previous literature regarding performance and fees of South African and ICIS.
- Chapter 3 – Data analysis and methodology – discusses and outlines the data sourced and used in the analysis of this paper, how the data was cleaned as well as

methodologies used in analyzing data and calculating the performance returns and measures.

- Chapter 4 – Results – reports result and discusses findings of the study.
- Chapter 5 – Limitations and considerations – discusses the limitations of this study and recommendations for future research.
- Chapter 6 – Conclusion – summarizes and concludes based on findings.

Chapter 2: Background Literature

2.1 Mean-Variance Portfolio Theory

The mean-variance portfolio theory is a revolutionary investment model based on decision theory. This investment model was developed by Markowitz (1952) and was later used as a foundation by Sharpe (1964) and Litner (1965) to derive the CAPM, which will be discussed further in chapter 3. Before Markowitz developed the theory, it was generally accepted that to gain more return an investor would need to add more risk, indicating a linear relationship. However, Markowitz recognized that this linear relationship of risk and return is incorrect and rather is a non-linear relationship.

He introduced the notion of mean-variance efficient portfolio as one that provides a minimum variance for a given level of expected return and provides a maximum expected return for a given level of variance (Markowitz and Todd, 2000). He was also able to quantify risk and show that the variance of the portfolio decreases with diversification. Markowitz (1952) suggested that it wasn't enough to simply invest in a lot of securities, but rather to invest in securities across different industries with low covariances among themselves. Thus, by adding in uncorrelated assets, an investor could minimize risk and gain expected returns. Although pioneered by Markowitz, many academic scholars such as Sharpe, Tobin, and Litner have made valuable contributions to the development of mean-variance portfolio theory.

The Markowitz model is based on a few assumptions concerning investor behaviour such as:

1. Investors prefer higher returns to lower returns for a given level of risk and similarly for a given level of expected return would prefer less risk over more risk.
2. A single-period model is used in which investor utility is measured as well as their utility curves displaying characteristics of diminishing marginal returns.
3. The risk of the portfolio is estimated using the variance of expected returns.
4. Investor decisions are based solely on risk and expected return, implying that their utility curves are a function of expected returns or expected variance only.
5. Each investment alternative considered by the investor is represented by a probability distribution of expected returns over some holding period (Reilly and Brown, 2012).

These assumptions suggest that a single asset or portfolio of assets is considered to be efficient if no other asset or portfolio of assets has a higher expected return with the same or lower level of risk or lower risk with the same or higher level of expected return. The work of Markowitz (1952) allowed academic scholars such as Treynor (1965), Sharpe (1966) and Jensen (1968) to develop basic models to measure the performance of mutual funds, which will be discussed in detail further on.

2.1.1 Mean of Portfolio Return

If we assume that there are n individual assets with a return of R for $R_1, R_2, R_3, \dots, R_n$ and these individual assets have an expected value of $E(R)$ for $E(R_1), E(R_2), E(R_3), \dots, E(R_n)$. We can thus construct a portfolio of individual assets with weights $w_i; i=1,2,3, \dots, n$ such that the expected rate of return for a portfolio of investment is the weighted average of expected rates of return for the individual assets in the portfolio (Grinold and Khan, 2000). This is represented by:

$$E(R_{portfolio}) = \sum_{i=1}^n w_i E(R_i) \quad (1)$$

Or

$$E(R_{portfolio}) = w_1 E(R_1) + w_2 E(R_2) + w_3 E(R_3) + \dots + w_n E(R_n) \quad (2)$$

where:

w_i = the weight of an individual investment in the portfolio

$E(R_i)$ = expected rate of return of investment i

Thus, the mean portfolio returns can be computed and used as an input for regression analysis.

2.1.2 Variance of Portfolio Return

The portfolio variance is a measure of the dispersion of the returns of a portfolio represented by σ_p^2 . Markowitz used the portfolio variance to quantify risk, but not only does it consider the riskiness of the asset, it also considers the co-movements among assets in the portfolio. The co-movements are represented by the covariance of two assets (Grinold and Khan, 2000). Thus, the portfolio variance is represented as:

$$\sigma_p^2 = \sum_{i=1}^n \sum_{j=1}^n w_i w_j \sigma_{ij} \quad (3)$$

where:

w_i or w_j = represents the weights of asset i or asset j

σ_{ij} = represents the covariance between asset i and asset j

σ^2 = represents the variance of the asset if $i = j$

The portfolio variance will be calculated and used as an input in the regression analysis.

2.2 The Efficient Frontier

Another result of Markowitz's portfolio theory is the development of the "Efficient Frontier". The Efficient frontier is a curve that contains the best of all possible risky asset combinations. Any portfolio that is found above the Efficient frontier cannot be obtained. Any portfolio that lies below the Efficient frontier is dominated by the Markowitz set of efficient portfolios and are said to be inefficient in providing sufficient profits based on the given level of risk. Formally, it represents the set of portfolios which has:

1. The maximum level of return for any given level of risk, or
2. The minimum level of risk for any given level of return. (Reilly and Brown, 2012)

This theory of the Efficient frontier was further developed by Tobin (1958). He developed a separation theorem in which he showed that under certain conditions, the Markowitz model implies that the process of investment choice can be broken down into two phases:

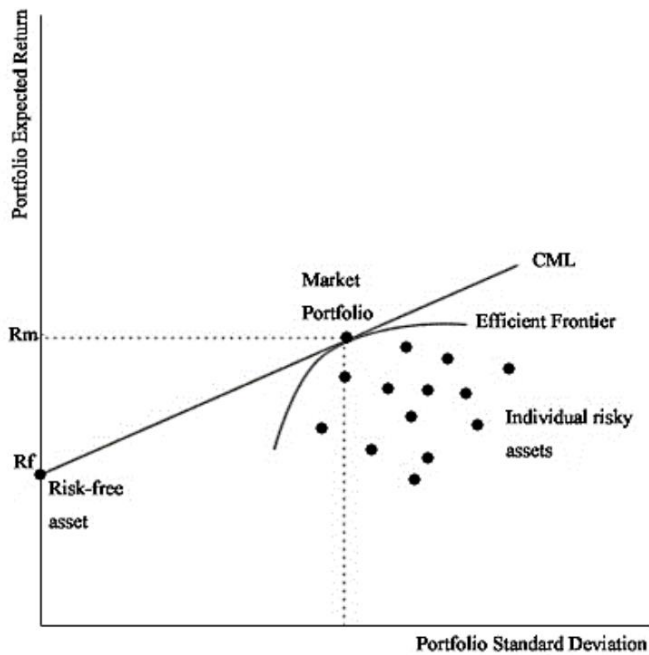
1. The choice of a unique optimum combination of risky assets
2. And a second separate choice that concerns the allocation of funds between such a combination and a single riskless asset (Tobin, 1958, Sharpe, 1964).

Most academic scholars were virtually using the same model for investor behaviour, but none had yet attempted to extend it to construct a market equilibrium model of asset prices under certain conditions of risk (Sharpe, 1964).

2.2.1 The Capital Allocation Line (CAL), Capital Market Line (CML), and the Market Portfolio

Using the utility theory, Markowitz's Efficient frontier and Tobin's separation theorem, Sharpe (1964) was able to derive a model of individual investor behavior under conditions of risk. After combining all optimum combinations of risky assets, he added a risk-free asset and introduced what was later known as the Capital Allocation Line (CAL). The introduction of the risk-free asset and thus CAL implies that all combinations involving any risky asset or combination of risky assets plus the riskless asset must have values of expected return and risk, which lie along a straight line between the points representing the two components. This is represented in the diagram below:

Figure 1: Capital Market Line



Source: (IFT, 2019)

The CAL originates from the risk-free asset and goes through a portfolio of risky assets (on the assumption one can borrow and lend at the risk-free rate). If a portfolio of risky assets is tangent to the Efficient Frontier, then the CAL becomes the Capital Market Line (CML), and the tangency portfolio is referred to as the market portfolio. Out of all possible combinations that involve a risky asset or set of risky assets the risk-free asset, the combination involving the market portfolio and the risk-free asset will dominate all other possible combinations (Sharpe, 1964). Thus, the market portfolio has the biggest Sharpe ratio which will be discussed further in chapter 3.

2.3 The Capital Asset Pricing Model

Tobin (1958) showed that one set of relative proportions of the risky asset would dominate all other possible combinations implying for any level of risk, it gave the investor the greatest expected return available to him at that risk level. He also showed that an investor's risk attitude will be reflected in the fraction of the value the investor is holding his portfolio in cash.

Treynor (1961) used Tobin's concept of dominance as a starting point to develop the groundwork for a theory of market value that incorporates risk. This was the first introduction of the Capital Asset Pricing Model (CAPM). The assumptions laid out by Treynor (1961) were very similar to the ones used by Markowitz, Sharpe, and Tobin. The assumptions are:

1. Investors are risk-averse
2. There are no taxes
3. There are no frictions which inhibit buying and selling such as brokerage costs
4. Investors maximize expected utility with primary concerns of risk and expected return
5. The effects of the individual investors decisions on prices is small enough to be disregarded

Sharpe (1964) extended on Markowitz and Treynor's (1961) work and derived conditions of equilibrium in the Capital Markets. He introduced the notion of systematic and unsystematic risk (firm-specific risk) and showed that there is only a consistent relationship between expected return and systematic risk, as unsystematic risk disappears through diversification. He also explained that all efficient combinations which lie on the CML will be perfectly correlated, due to common dependency on overall economic activity (the market). Concerning equilibrium conditions in capital markets as a whole, the theory leads to results consistent with CML. This implies that safe securities will yield a lower expected return with little response to changes in the economy compared to the riskier securities with a significant response (Sharpe, 1964).

Thus, Sharpe (1964) developed the first CAPM, which is a single factor equilibrium model used for determining the return of assets at a given level of risk. This framework allows investors to create efficient portfolios that combine risky and riskless assets that match their desired attitude towards risk. The main drivers of security returns in the CAPM model are the market risk premium and the covariance between the asset returns and market returns. The CAPM equation can be defined as:

Expected asset/portfolio return = Risk-free asset return +Beta*(Expected market risk premium)

$$E(R_p) = R_f + \beta_i [E(R_m) - R_f] \quad (4)$$

where:

R_f = the risk-free rate

$E(R_p)$ = the expected return on the portfolio or asset

$E(R_m)$ = the expected return on the market

$[E(R_m) - R_f]$ = the expected return on the market

β_i = the beta of investment

An important aspect of the CAPM model is the beta of the portfolio (β) as this represents the systematic portion of risk. The beta is obtained by calculating the covariance of the market return and the return of the asset divided by the variance of the market return. This can be represented as:

$$\beta = \frac{Cov(R_p, R_m)}{Var(R_m)} \quad (5)$$

where:

$Cov(R_p, R_m)$ = the covariance of the market return and the return of the asset

$Var(R_m)$ = the variance of the market return

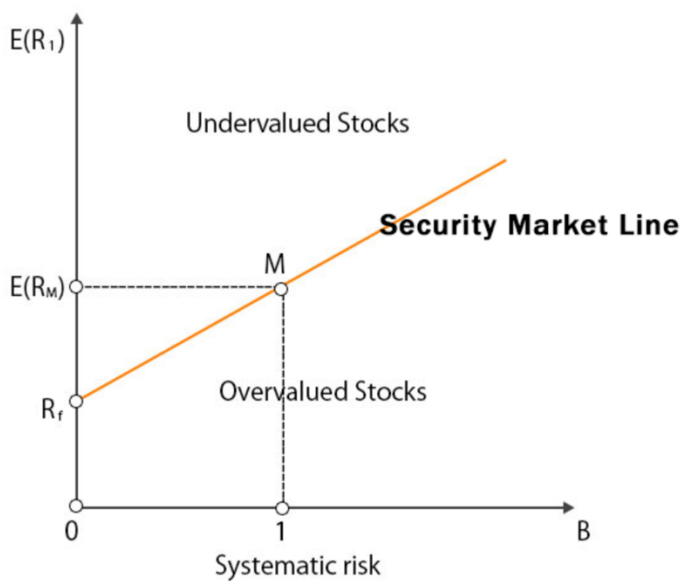
Some securities will be more sensitive to macroeconomic shocks than others. We can capture how securities respond to shocks as each security is assigned a sensitivity coefficient which is represented by the beta. Thus, the beta of a security measures how much risk the investment will add to the portfolio that mimics the market portfolio. If a stock is the same as the market, in terms of risk, it will have a beta equal to one. If a stock is riskier than that of the market, it will have a beta greater than one. If a stock has a beta of less than one, it's less risky than that of the market and the formula assumes it will reduce the overall risk of a portfolio.

Since beta represents the systematic portion of risk and the unsystematic risk represents the firm-specific risk, this would imply that the total risk of an asset is equal to the summation of these two risks. The unsystematic risk is the part of total risk that can be diversified away and is part of total risk which covaries with the rest of the market. As investors add more stocks to their portfolio, the portfolio standard deviation (σ) decreases but cannot be reduced to zero. The systematic risk cannot be diversified away and measures how the asset covaries with the market return (Bodie, Kane and Marcus, 2014).

2.3.1 The Security Market Line

As mentioned previously, the beta of a security is proportional to the risk the security contributes to the optimal risky portfolio, making it an appropriate measure of its risk. We can view the expected return–beta relationship as a reward-risk equation and this can be portrayed graphically as the security market line (SML) found below:

Figure 2: Security Market Line



Source: (WallStreetMojo, 2019)

The Security Market Line (SML) in essence, is the graphical representation of the risk-return relationship of the CAPM, where the expected return is on the y-axis and systematic risk (β) is on the x-axis. The SML graphs individual asset risk premiums as a function of asset risk. The relevant measure of risk for individual securities, which are held as parts of a well-diversified

portfolio, are the assets beta as it is the contribution of the assets to the portfolio variance (Bodie, Kane and Marcus, 2012). In contrast, the CML graphs the risk premiums of efficient portfolios as a function of portfolio standard deviation (σ).

Since the SML is the graphical representation of the expected return-beta relationship, this implies that in equilibrium, all “fairly” priced assets should lie on the SML. This shows that their expected returns are commensurate with their risk. The SML can thus provide investors with a benchmark for evaluation of investment performance, as it provides the required rate of return used to compensate investors for risk and the time value of money.

Graphically, since all “fairly” valued assets lie on the SML dictated by the CAPM, underpriced stocks would therefore lie above the SML and overpriced below. The difference between the fair expected rate of return and the actual rate of return is represented by the stocks alpha (α). Positive alpha represents superior performance in the CAPM and results from the manager’s ability of stock selection and market timing. In equilibrium, all fairly priced assets have an alpha of zero and underperforming assets would have a negative alpha. This is represented by the equation below:

$$\alpha_p = E(R_p) - \{[R_f + \beta_i[E(R_m) - R_f]]\} \quad (6)$$

Jensen’s alpha serves as a very useful metric as it can be used to evaluate, measure, and compare performance across different investors or portfolio managers. This will be discussed more in detail in 2.9.3

2.4 Efficient Market Hypothesis

The efficient market hypothesis (EMH) holds great importance when considering implications for active management, thus the EMH will be discussed first before considering these implications.

The concept of efficient markets assumes that all investors can freely access currently available information about the future and are capable of processing the information and adjusting their holdings accordingly (Sharpe, Alexander and Bailey, 1999). This concept guarantees that asset

prices fully reflect the investment value of the asset and implies that it is impossible to generate abnormal returns systematically, using available information (Aldriaan, 2000). The accepted view was that when information arises, the news spreads quickly and is incorporated into the prices of assets without delay. Due to this, Malkiel (2003) suggest that neither technical analysis, which is the study of past stock prices in an attempt to predict future prices, nor fundamental analysis, which is the analysis of financial information to help investors select undervalued stocks – would allow an investor to generate returns greater than those obtained by holding a randomly selected portfolio of individual securities with comparable risk.

According to the influential study on efficient markets by Malkiel and Fama (1970), the EMH can be classified into 3 forms namely weak-form, semi-strong form, and strong form of market efficiency.

The weak form of market efficiency is defined as reflecting all historical pricing in the value of an asset and according to this form, it is not possible for a technical analyst to systematically generate abnormal returns by looking at past prices (Malkiel and Fama, 1970). However, fundamental analysis may be possible to obtain abnormal returns.

The semi-strong form of market efficiency is defined as incorporating all publicly available information, implying that technical analysis and fundamental analysis cannot be used to generate abnormal returns. It is commonly believed that the investment performance of mutual funds is consistent with at least the semi-strong form of the EMH (Ippolitto, 1993), although there is the discussion if only the weak-form version holds.

The strong form of market efficiency is defined as including all publicly and privately available information. Under this form of market efficiency, no type of information can give an investor an advantage on the market, regardless of research conducted or information received (Ippolitto, 1993).

The theory of market efficiency is important to the CAPM, as one of the underlying assumptions is that investors are competitive. This implies that prices of assets are in equilibrium and the future expected return of the assets based on today's information will be zero (Aldriaan, 2000). Security price changes are assumed to follow the logic of a random walk, implying that the flow of information is unimpeded and price changes only occur due to

new news or information about the asset. Since news, by definition, is unpredictable, this implies that the resulting price changes are unpredictable and random too (Malkiel, 2003). If it were possible to use patterns to detect mispriced securities on a systematic basis, this would imply that returns do not follow a random walk and CAPM would not hold, thus evaluation methods based on CAPM would be inaccurate.

As it is commonly believed that the investment performance of mutual funds is consistent with at least the semi-strong, thus implying that active management is not possible. Active managers cannot use fundamental analysis to earn abnormal returns and any expenditure or effort spent on research and trading is a waste since asset prices already reflect all available information (Ippolitto, 1993). Passive management accepts all forms of the EMH, as passive managers believe that markets are so efficient it is close to impossible to earn returns greater than that of the markets.

The efficient market hypothesis gives rise to a paradox because if there are investors that do not believe in the efficient market hypothesis, it is not possible for efficient markets to exist. If information is freely available for everyone who participates in the markets, then no participants will have an incentive to gather information but if no one gathers information, then the market prices can't reflect the information. However, this problem can be overcome if the cost of gathering information is the same as the excess returns generated through the investor's analysis (Sharpe, Alexander, and Bailey, 1999).

2.5 Portfolio Management

Portfolio management or portfolio investment can be defined as the process by which money is managed (Sharpe, Alexander, and Bailey, 1999). Traditional portfolio management was based on mainly fundamental analysis, which is the process of researching the capabilities of a company to generate future cash flows. In previous years, the belief that it was possible to beat the market was generally more accepted, however, the recent evidence in the U.S. markets has made the possibility of beating the market more and more difficult. Thus, creating controversy over the possibility to outperform the market through active management.

2.5.1 Passive Management

Passive management or passive investing is an investing style where investors invest their money with a long-time horizon. Passive investors try to match the return of the market by creating portfolios that track a market-weighted index or portfolio. By tracking an index, this will result in diversification, therefore reduced risk as well as lower transaction costs due to low turnover (Moss, 2019).

In the U.S., there has been a trending move away from active investing and towards passive investing. When it comes to mutual funds and exchange-traded funds that buy U.S. stocks, those that passively track indexes now hold almost 50 percent of assets (Stein, 2018). The reason for this is because many investors can't seem to beat the market and indexes offer a way to get market exposure at lower fees. Exchange-Traded Funds (ETF's) charge lower management fees than mutual funds, many of which employ managers to buy and sell stocks to attempt to outperform some major index.

In the U.S. alone, assets in passive mutual funds and ETF's have increased from \$220 billion to \$7 trillion in just 20 years. Similar shifts appear to be occurring in other asset management industries around the world due to a lack of after-fees performance (McCabe, 2018). Johnny Lambridis, head of equity at Prudential Investment Managers (2017), states that passive investing is gaining ground in the South African market mainly due to lower fees compared to that of actively managed funds. However, he also states that this is largely due to misperceptions stemming from the U.S., where passive investing is becoming popular. Some misperceptions include active managers (with higher fees) are not delivering outperformance as well as most research around passive investing has been based on U.S. data, in which we cannot assume it applies locally (Lambridis, 2017).

2.5.2 Active Management

The other side of the spectrum is active management or active investing, which is an investing style used by investors who aren't as concerned with the long-term horizon as they are with the present. There are two forms of active management in which managers use to make short-term profits. These include stock picking (security selection) or market timing. The former involves

a manager's ability, via stock picking and microeconomic forecasting, to outperform the market. The latter is solely based on macroeconomic factors, where managers change the risk of their portfolio according to forecasts on future market performance (Moss, 2017; Grinold and Kahn, 2000).

The goal of an active manager is to outperform the market (or some appropriate benchmark). Active managers construct a risk portfolio to maximize their risk-reward payoff i.e., the highest payoff for the lowest risk. Therefore, they will exploit market inefficiencies by buying undervalued securities or short sell overvalued securities (Grinold and Kahn, 2000). All active managers reject the Efficient Market Hypothesis and thus the concept of equilibrium prices of the CAPM since they attempt to exploit these inefficiencies. However, there has been a mixed review in the literature on whether successful active management is possible.

Grinold and Kahn (2000) have argued that the process of successful active management has two key elements namely: finding superior information and using that information to build efficient portfolios. The following section will review the literature on fees to give insight into whether it is possible to obtain superior information and generate returns above that of the market.

2.6 Fees

As previously explained, active management requires more work as the manager needs to actively manage a portfolio compared to a passive manager who has more of a buy and hold strategy. Naturally due to more work, skills and knowledge being required to manage an active fund, there are more costs involved and thus higher fees are charged to incorporate these costs.

Portfolio management fees comes in many layers and can be quite complex to understand. As such, there are many investors who don't know what or how much fees they're paying. Due to this, the financial services board (FSB) and ASISA have been constantly trying to improve transparency of fees in South Africa (Alexander Forbes, 2019).

An investment product will generally come with four types of fees:

- Administration fees
- Portfolio Management fees
- Advice fees
- Ancillary fees

The most complicated areas associated with costs and fees of an investment are the portfolios costs and the overall cost of investment.

2.6.1 Portfolio Management Fees

As said previously, there are layers of fees that make what one pays for more difficult to understand. However, the total expense ratio (TER) was created to help make understanding and comparing fees within the industry easier.

According to Allan Gray's local investment platform fund list (2019), the TER is the annualized percentage of the funds average assets under management that has been used to pay for the fund's actual expenses, calculated over a three year period. TER includes base management fees, performance fees, fund expenses and other administrative costs. In essence, the TER represents the cost of running the CIS or exchange traded fund (ETF) and is calculated as the total management and administrative costs, divided by the total size of the fund, and then expressed as a percentage. TER should be used to evaluate whether the fund's performance offers value for money. The total expense ratio has become the 'Gold Standard' for clients and advisors, which has made comparing fees within the industry easy.

In recent years, the industry adopted a new measure called Total Investment Cost (TIC). TIC is equal to the sum of the unit trusts Total Expense Ratio (TER) and the transaction coats (TC), where available (Allan Gray, 2019), and TIC aims to be even more transparent than TER alone. TC represents the charges the fund incurs from buying into and selling gout of positions in the fund and other necessary costs. Over the course of the year, TC are totaled and expressed as a percentage of the total value of the fund. In summary, fees and costs are represented below:

Management fee = Cost of managing the fund

TER = Management fee + Administrative costs

TC = Transaction costs

TIC = TER + TC

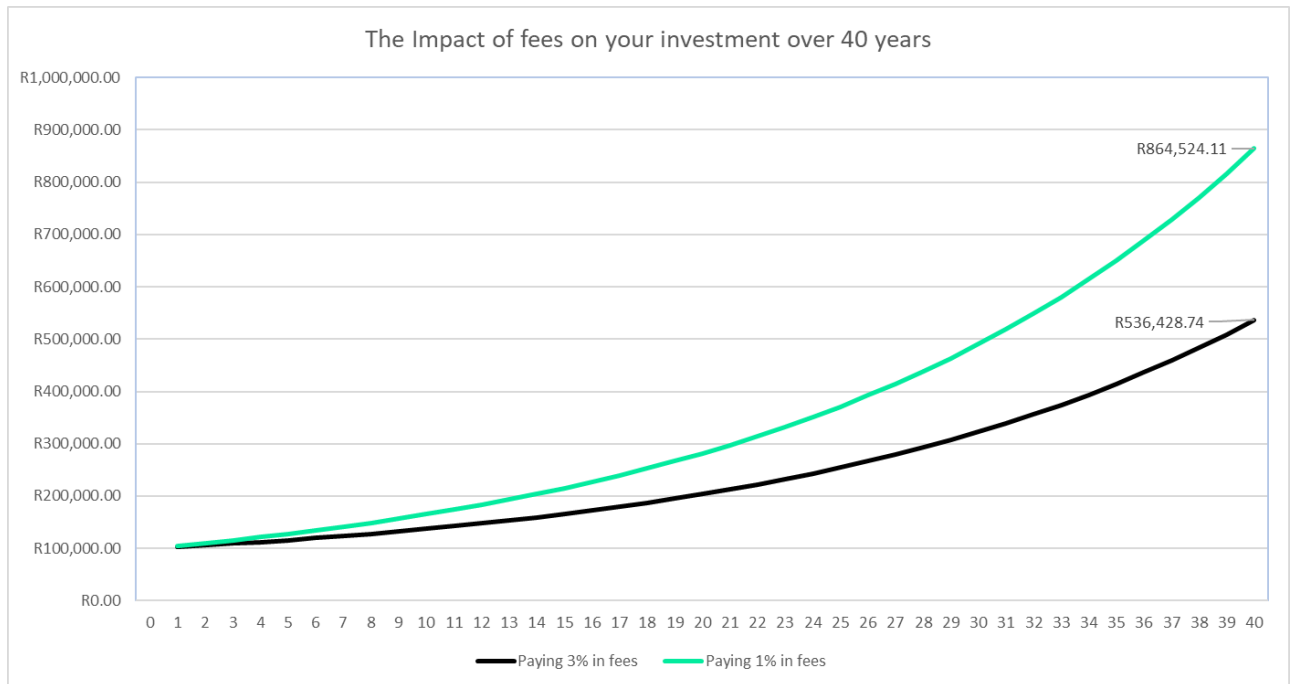
Adding to the above, ASISA introduced a more transparent metric called the Effective Annual Cost (EAC) to essentially allow investors to compare charges across suppliers at a product level. EAC is meant to represent the total cost per year that you're paying away to fees such as admin fees, platform fees, product fees, advisors fees, total expense ratio and transaction costs. EAC is currently the best industry measurement to help compare and understand fees.

The fees to be paid vary depending on liquidity of instruments and costs that come with how actively the fund is managed. In an ETF, which is a passive fund that track an index or a highly liquid fund such as a money market fund, you would pay lower fees compared to that of an equity fund or fund with an aggressive mandate.

A survey conducted by M&G (2017), across some investment houses around TIC charges found that you can invest in ETFs such as SATRIX 40 with a TER of as little as 0.10% and Sygnia's S&P 500 ETF with a TER of 0.16%. In a range of Old Mutual CIS funds, the cheapest fee belonged to a money market fund with a TIC of 0.47% and most expensive belonged to the Balanced A3 fund with a TIC of 2.33%.

Depending on the fund type and return of the fund, fees could greatly impact your returns. If an investor is invested in an actively managed fund that promises a 10% return with a fee of 2%, even if the fund manager achieves the 10% return the net amount is only 8%. An investor may find himself in a position where the fund he is invested in is performing better or matching the market return but underperforming after fees are considered. In this case it would be better to buy an ETF that mimics an index return with low fees. 10x Investments suggests that fees are the single biggest predictor of your investment's performance (10x Investments, 2020). 10x suggests that paying 2% more in fees can mean about 40% less for you when you retire, as costs compound over time much like returns.

Figure 3: Impact of fees on your investment over 40 years



Source: (Adams, 2021)

The figure above is based on a hypothetical initial investment of R100 000, earning 6% per annum after inflation, for 40 years. The difference of 3% compared to 1% fees can mean about R330 000 difference when you retire. 10x Investments (2020) also suggests that 93% of investors don't know what they're paying or assume they're paying less than 1%. In order to make the relatively high active fees worthwhile paying, the actively managed fund you're invested in needs to consistently outperform the market after fees on average. The next section will discuss the literature around fees and performance.

2.6.2 Fees and Performance

The Efficient Market Hypotheses (Malkiel and Fama, 1970), states that security prices reflect all available information thus expenditure of money on research and trading are wasted. It was commonly believed that mutual fund investment performance was consistent with this view due to early research by Treynor (1960), Sharpe (1966) and Jensen (1968) that found that mutual fund performance, net of expenses, was worse than what investors can earn by a basic buy and hold strategy. Research predating 1970 showed that mutual funds underperformed

common market indices, however, Ippolito (1993) found that most other studies that followed contradicted these earlier findings.

Research conducted by Sharpe (1964), Jensen (1968) and Treynor (1961) agree with the EMH, and the results of these studies suggest that fund fees and expenses are wasted. The modern version of EMH adapted by Grossman and Stiglitz (1980), introduced the proposition that gathering information is costly. The theory predicts that institutions that efficiently expend money to develop and act on new information ought to find alphas, net of expenses, that are statistically indistinguishable from zero. This implies that only some subset of investors and informed traders will earn higher returns than passive investors, although their profits from stock selection should only offset costs of collecting information. Ippolito (1993) found several studies that are generally consistent with the hypothesis that mutual funds are sufficiently successful in finding and implementing new information to offset their expenses, hence contradicting the earlier results of Sharpe, Jensen and Treynor.

A survey conducted by Copon et al (1996) suggest that many consumers are unaware of the fees that they pay for services rendered and of expenses occurred in operating a fund can erode a significant portion of the funds gross return and can have a major impact on fund performance over time. Expense ratio of a given fund allows investors to make a direct comparison of the costs charged by other competitor funds. Given that returns are volatile and hard to predict, and fund expenses are an important determinant of fund returns, investors would be better off paying more attention to fund expenses than to fund performance when selecting mutual funds.

A paper by Dellva and Olson (1998) investigated the relationship between various expenses and fees and risk adjusted performance. They suggest that fees may be justified if they allow the fund to lower other costs to improve performance. Additionally, that fees may also be justified if they provide more funding to gather information that can be used to improve its adjusted performance. Their sample size consisted of 568 equity mutual funds from 1987 to 1992. They ran a multiple regression test with performance as the dependent variable and different types of fees and expenses as their independent variables. Their results found that funds with superior performance, on average, also had lower expense ratios. Their results also

indicated that the more informationally competent funds are more efficient in their operations and thus can charge lower expenses while simultaneously providing higher risk returns. The conclusions of Dellva and Olson's paper (1998) are similar to the findings of previous research by Friend, Blume and Crockett (1970), Williamson (1972), Crenshaw (1997) which found that mutual fund managers were able to justify the expenses they charge.

A study by Soo-Wah Low (2008) examined the determinants of fund expense ratios in a cross-sectional sample of Malaysian unit trusts. The study sampled 65 Malaysian unit trusts using monthly return data from January 2000 to December 2004 and ran a multifactor regression model to analysis which factors could affect the management expense ratio of the fund. The results showed that larger funds have lower expense ratios than smaller funds due to economies of scale. Funds that belong to a large fund family are found to have lower expense ratios, indicating the presence of economies of scope. Like Dellva and Olson (1998), their findings indicate that funds with high return volatility are associated with low expense ratios, they also found that high portfolio turnover leads to a higher expense ratio.

Griffth (2009) investigated the relationship between mutual fund performance and expense ratios of South African mutual funds. He failed to find such an existing relationship between fund expenses and fund performance, which found to be interesting since the South African mutual industry has significantly higher expenses when compared to developed nations internationally. Contrasting Griffith's (2009) findings, Pardoe (2018) evaluated the performance of general equity unit trusts in South Africa and found that funds that charged lower management fees tended to outperform those with higher management fees.

2.7 Mutual Fund Performance

According to the strong-form of the Efficient Market Hypothesis theory, active management is impossible, and no source of superior information exists. Issue around manager performance became a popular topic of research soon after the development of the CAPM which provided a framework for scholars and investors to analyze performance (Grinold and Kahn, 2000). There has been a mixed review in terms of literature surrounding the topic of manager

performance but most literature focused on three separate questions: Has the average manager outperformed their respective benchmark? Are the top performers lucky or skillful? And does performance persist?

Tracy Jensen (2017), Chief Operating Officer of 10x investments, says that South African investors still favor active fund management, even though actively managed funds have no reasonable prospect of delivering superior returns over passive funds, which is a low-cost alternative. She believes there is no point to active managers as fees are expensive and managers can't beat the benchmark to merit the fees (Fin24, 2017). Despite the local debate on active vs passive management in South Africa, the literature on performance shows a mixed review.

Gilbertson and Vermaak (1982) investigated the performance of South African mutual funds for the period 1974-1981. They found that returns were generally lower than those achieved by three stock market indexes. They concluded that their findings are not consistent with the EMH and suggest that a degree of inefficiency exists in the pricing mechanism for Johannesburg Stock Exchange-listed shares. A similar study by Knight and Firer (1989) for the period 1977-1986, found that seven out of ten-unit trusts studied, outperformed the market on a risk-adjusted basis, however, with none having significant outperformance in the second period. Over the whole period, five-unit trusts outperformed the market and none of the unit trusts performed significantly worse than the market for any of the periods analyzed.

Lee and Rahman (1990) examined the market timing, selectivity ability and mutual fund performance on 93 mutual funds for the period 1977 to 1984. Their empirical results indicate that at the individual fund level, there is some evidence of superior micro and macroeconomic forecasting ability on the part of the fund manager.

Marcus (1990) investigated if the top-performing funds had statistically significant positive performance. This study by Marcus gives us more insight into the possibility of successful management as he finds that the top-performing funds do outperform. This coincides with the

findings of Jones and Wermers (2011), who suggest that it is possible to identify superior active managers although the average manager underperforms. He suggests that this can be done in advance using public information, and investors who can identify them should always expect to earn a relative return advantage.

Malkiel (1995) examined for outperformance of U.S. mutual funds between 1972 and 1990. He used the Jensen measure to examine for positive alpha and his results indicate there was no significant positive excess return. Dahlquist, Engström, and Söderlind (2000) investigated the mutual fund performance of 201 Swedish funds between 1993 to 1997. Their results found that regular equity funds generally outperformed while bond and money market funds performed less, and actively managed funds performed better than passively managed funds.

A study by Oldfield and Page (1997) investigated whether unit trust managers can earn abnormal returns consistently through asset selection and market timing. They examined 8 equity unit trusts and 9 specialized funds between 1987 to 1995 and found that South African managers do not add significant value through their asset selection and market timing activities.

Over a period of 23-years, Blake and Timmermann (1998) assessed the performance of 2300 open-ended U.K. mutual funds. Their results indicated that the average manager significantly underperformed on a risk-adjusted basis. However, Otten and Bams (1998) examined 506 mutual funds, free from survivorship bias, from the five most important mutual fund countries. Overall, they suggest that European funds can add value as they found significant positive after cost alphas.

Manjenzi (2008) examined the performance of 15 South African mutual funds from 2001 to 2006 and his results indicated that the index showed better performance than the mutual funds and only one fund showed selectivity and market timing ability. Similarly, Mibiola (2013) evaluated the performance of 64 general equity unit trusts and his findings could not show strong evidence of superior performance to that of the market.

Barras, Scaillet, and Wermers (2010) use a simple technique to control for “false discoveries” or mutual funds that exhibit significant alphas by luck alone. They separated their findings into unskilled funds, zero-alpha funds and skilled funds. Their results show that 75 percent of funds have zero alpha (net expenses), although, a significant proportion of skilled (positive alpha) funds existed prior to 1996 but almost none by 2006.

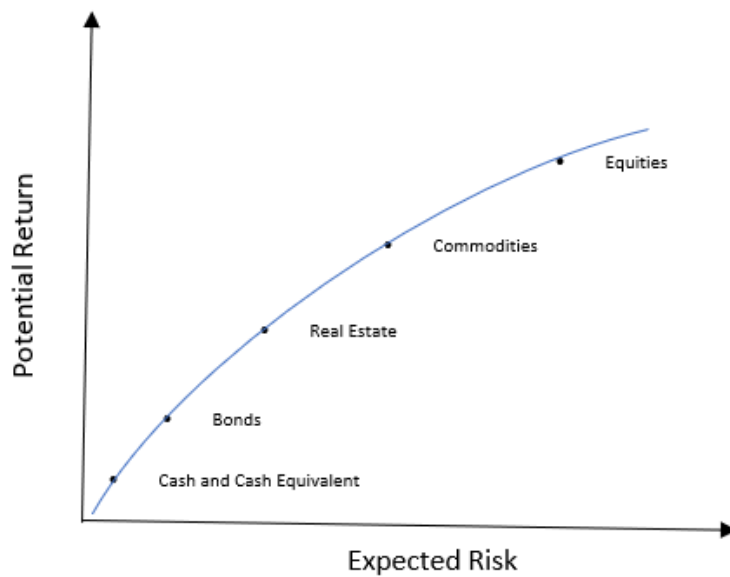
Tan (2015) evaluated the performance of 14 South African equity funds for the period 2009 to 2014, overlapping the era of quantitative easing. He found that South African fund managers could not display good performances in selectivity skills as only 1 out of 14 funds had statistically significant positive alphas during the sample period. A similar study by Pardoe (2018), evaluated 246 South African Equity funds for the period 2010 to 2017. His study found that only 13% of funds showed statically significant positive alphas with the average fund showing negative alpha and thus underperforming the benchmark.

Malefo, Hsieh, and Hodnett (2016) evaluated the performance of 20 actively managed funds in South Africa for the period 2002 – 2012. They found on average that most equity unit trust managers in South Africa do not outperform the market proxy on a consistent basis. Thobejane, Simo-Kengne, and Mwamba (2017) examined 191 South African equity unit trusts for the period 2006 to 2016, capturing different economic conditions. Their study found weak evidence of stock selection and market timing ability.

2.7 Asset Class

An asset class is a group of similar investment instruments grouped together based on having a similar financial structure. Different asset class investments are important for investors with different risk appetites as the different asset classes have varying risk profiles. Certain asset classes have a low-risk structure meaning potentially lower returns but less chance of losing money. The graph below demonstrates the risk return profile of the varying asset classes:

Figure 4: Risk Return Relationship of Asset Classes



Source: (Adams, 2021)

Equities are the riskiest out of the asset classes but also has the potential for the highest returns. An investor can potentially profit from Equities through an increase share price or by receiving dividends. Investors generally invest in Equities over a long investment period as they have the highest compounding returns over time. Real Estate and commodities are asset classes that are considered to hedge against inflation. These assets are generally illiquid by nature, making them considerably risky assets. Bond investments are investments in debt securities that pay investors a rate of return in the form of interest. These investments are considered to be less risky than Equity and investors tend to invest in this asset class over a medium investment period. Cash and cash equivalents such as money market funds are the least risky out of all the asset classes due to their high liquidity. Investing in a Money market fund or Cash and cash equivalent instruments means you're less likely to lose your money but also means potentially lower returns relative to the other asset classes (CAIA, 2020).

The type of asset class or fund that investors invest in depends primarily on risk appetite and the mandate of the fund. Equities have the potential for the highest returns but also have the greatest risk for loss, while investing cash means you're less likely to lose your money but also low returns on your investment.

2.8 Benchmarks

A benchmark is a point of reference for measuring performance; therefore, a choice of benchmark can greatly influence decisions throughout the investment process (Gauthron, 2014). Benchmark portfolios are used to evaluate manager performance depending on certain requirements such as: Following an investment mandate, earn above-average returns for a given asset class or diversify the overall portfolio to eliminate unsystematic risk (Kruger, 2018).

Certain characteristics are required when selecting an appropriate benchmark. These include:

- 1.**Unambiguous:** Names and weights of securities comprising the benchmark are clearly defined.
- 2.**Investable:** It must be possible for the client to hold the benchmark
- 3.**Measurable:** It must be possible to calculate the benchmark return on a reasonably frequent basis
- 4.**Appropriate:** The benchmark must be consistent with the manager's style or biases as the returns of the active portfolio should be highly correlated with the benchmark.
- 5.**Reflective of Current Investment Options:** The manager must have current knowledge of the securities that make up the benchmark.
- 6.**Specified in Advance:** The benchmark is constructed before an evaluation period begins (Kruger, 2018).

If an inappropriate benchmark is selected, which doesn't reflect the investment nature and purpose, the advisor or client that uses these benchmarks will incorrectly assess performance. In the South African context, there are a few benchmark constraints that impact investments such as market concentration, liquidity, and fund constraints across different asset classes. The most popular Equity benchmarks and how they address these constraints are discussed below:

•**All Share Index (ALSI)** - This is the top 99% of the market capitalization of the exchange, constituted on the basis of free-float market capitalization. Free float adjusts for a number of shares readily available in the market. The main concerns of using this as a benchmark is concentration and investability.

•**Capped Index (CAPI)** – This is implemented by capping the weighting of the shares in the index at 10%, while the remainder of shares in index is then up-weighted and secondary capping is applied to any that go above 10%. This addresses the issue of concentration but not investability.

•**Shareholder Weighted Index (SWIX)** - SWIX removes the foreign holdings of such shares from the ALSI to better represent the local investment universe as the biggest shares by market capitalization on the JSE are dual listed. This indirectly reduces the issue of concentration.

•**Top 40 Index (TOPI)** – The TOPI is the 40 Largest Companies by market capitalization on the JSE. This addresses the issue of investability as SATRIX provides an ETF that tracks its performance. There is also a capped and SWIX version of the top 40, the CAPI 40 and SWIX 40.

Fixed income managers who only invest in debt instruments would predominately use the FTSE/JSE All Bond Index (ALBI) or the Short-Term Fixed Income Index (STeFI). This would depend on the maturity of the fixed income instruments that the funds hold. Funds who hold fixed income instruments generally longer a year who tend to use the FTSE/JSE ALBI as a benchmark. The ALBI index is a composite which contain the top 20 vanilla bonds ranked dually by liquidity and market capitalization. The universe of this benchmark only consists of conventional vanilla listed bonds, with a fixed semi-annual coupon. Bonds which have a term that are less than or equal to one year are excluded from the universe (The Johannesburg Stock Exchange). Money Market funds which hold short term instruments (maturities of a year or less) tend to use the STeFI composite as a benchmark. The components of the STeFI index are weighted according to market capitalization and weightings are reviewed from time to time to reflect changes in market conditions (Alexandre Forbes, 2001).

Therefore, it is important to choose an appropriate benchmark depending on the fund mandate and asset class of instruments they're allowed to invest in. Having an appropriate benchmark will allow investors to correctly assess performance and make investment decisions regarding the funds in which they invested their money (Gauthron, 2014).

2.9 Performance Evaluation Models

Before the development of asset pricing models, investors evaluated portfolio performance based on historical returns. Although investors were aware of the concept of risk, there was no known way to measure it. Breakthroughs in portfolio theory in the 1960's from academic scholars such as Sharpe and Treynor, were able to quantify risk in terms of variability of returns.

The two factors of risk and return had to be considered separately, as there was no single measure which combined both these factors. Today there exists several portfolio performance evaluation techniques that gives investors the basic tools needed for measuring risk-adjusted performances. There are four major composite equity portfolio performance measures and each of these combine risk and return performance into a single value (Reilly and Brown, 2012). These measures are:

- The Treynor ratio
- The Sharpe ratio
- Jensen's portfolio performance measure
- The information ratio
- The Sortino ratio

These models are based on the CAPM and they measure relative performances of portfolios allowing investors to compare portfolios with different risk profiles.

2.9.1 The Treynor Ratio

Treynor (1965) was the first to develop a composite measure of portfolio performance and suggested that there exists more than one kind of risk in a diversified fund. (1) There is a risk produced by general market fluctuations i.e., the volatility of the stock market. (2) The risk resulting from fluctuations in particular assets held in a fund (Treynor, 1965).

Treynor introduced the “characteristic line”, used to identify risk due to market fluctuations. The characteristic line defines the relationship of returns between a managed portfolio and the market portfolio. The slope of this line is the portfolio’s beta coefficient, and a steep slope or high beta indicates that the portfolio is more sensitive to market returns and contains a greater market risk (Reilly and Brown, 2012).

Building on capital market theory, he also introduced a second line called “the portfolio possibility line”, which introduces a risk-free asset that can be combined with different portfolios to form this line. The purpose of this line is to measure fund performances which transcends differences in investor risk attitudes (Treynor, 1965). Treynor showed that rational, risk-averse investors would always choose the portfolio possibility line with the steepest slope as this would maximize investor utility. The slope of this portfolio possibility line (designated T) is equal to:

$$T_i = \frac{E(R_i) - R_f}{\beta_i} \quad (7)$$

where:

$E(R_i)$ = the expected rate of return for portfolio i

R_f = the risk-free rate

β_i = the slope of portfolio i's characteristic line

The numerator is the risk premium, and the denominator is a measure of risk (systematic), indicating that the total expression is the portfolio's risk premium return per unit of systematic risk. A larger T value implies a better portfolio for all investors regardless of their preference to risk. This implies that all risk-averse investors would prefer to maximize this ratio. Since the measure of risk used is the beta or systematic portion of risk, this indicates that the ratio assumes a completely diversified portfolio (Bodie, et al., 2012; Reilly & Brown, 2012).

We can compare a portfolio's Treynor ratio (T) to the SML as they are similar measures for the market portfolio. We can calculate the Treynor ratio for the aggregate market by setting beta equal to one (as this is equal to the market beta) and we will find that this is equal to the slope of the SML, as shown below:

$$T_m = \frac{E(R_m) - R_f}{1} \quad (8)$$

This implies that the slope of the portfolio possibility line plots on the security market line. As mentioned earlier, all fairly priced assets should lie on the SML in equilibrium. Thus, a portfolio with a higher Treynor ratio than the market will plot above the SML and will imply superior risk-adjusted performance. Therefore, the following conditions will help indicate which investors are outperforming the market and which are underperforming:

$T_i > T_m$, portfolio (asset) i plots above the SML and outperforms the benchmark.

$T_i < T_m$, portfolio (asset) i plots below the SML and underperforms the benchmark.

Using these conditions, investors can rank portfolios in terms of risk-adjusted performance.

2.9.2 The Sharpe Ratio

Sharpe (1966) also developed a composite measure to evaluate the performance of mutual funds. Although he extended Treynor's work on measuring mutual fund performance, Sharpe's work was more explicitly related to his earlier developments in capital market theory (Sharpe, 1966). Sharpe's measure is explicitly related to the CAPM, specifically dealing with the Capital Market Line (CML). Both the CML and SML are derived from the CAPM and are both half-lines that connect the risk-free asset with the market portfolio. The main difference is that the SML is defined in expected return-beta space and the CML is defined in expected return-standard deviation space. The Sharpe ratio of portfolio performance (designated S) can be calculated as follows:

$$S_i = \frac{E(R_i) - R_f}{\sigma_i} \quad (9)$$

where:

$E(R_i)$ = the expected rate of return for portfolio i

R_f = the risk-free rate

σ_i = the standard deviation of the rate of return for portfolio i

The numerator is the portfolio's risk premium and is the reward provided to investors for bearing risk. The denominator is a measure of total risk (σ) and is the amount of risk actually bore, indicating that the total expression is the portfolio's risk premium per unit of total risk (Sharpe, 1966). This measure is similar to Treynor's but differs in the sense that it uses the standard deviation of returns rather than only considering systematic risk (β) (Reilly and Brown, 2012).

The CML is the Sharpe ratio of the market portfolio, implying we can use the CML to compare portfolios. The Sharpe ratio of the market portfolio is as follows:

$$S_m = \frac{E(R_i) - R_f}{\sigma_m} \quad (10)$$

Thus, a higher Sharpe ratio than that of the market will plot above the CML, indicating superior risk-adjusted performance. Similarly, a lower Sharpe ratio than that of the market will plot below the CML, indicating underperformances. We can use the following conditions to help measure and rank different portfolios:

$S_i > S_m$, portfolio (asset) i plots above the CML and outperforms the benchmark.

$S_i < S_m$, portfolio (asset) i plots below the CML and underperforms the benchmark.

If the Treynor ratio and Sharpe ratio are similar, this indicates highly diversified portfolios. Since the Treynor ratio only considers systematic risk, it cannot capture the portion of variability that is due to a lack of diversification. This implies that the Sharpe ratio is a superior measure of past performance however, it is inferior to the Treynor ratio in predicting future performance (Sharpe, 1966).

2.9.3 The Jensen Measure

Similar to Sharpe and Treynor, Jensen (1968) developed an absolute measure for evaluating performance. The Sharpe and Treynor ratio are relative measures of performance used for ranking portfolio, but Jensen's measure aimed to measure if performance was "good" or "bad" based on some absolute standard.

Jensen's idea of portfolio "performance" referred mainly to forecasting ability and not portfolio efficiency. He described the concept of portfolio "performance" to have at least two distinct dimensions:

- 1 - The ability of the portfolio manager to increase returns on the portfolio through the successful prediction of future asset prices.
- 2 - The ability of the portfolio manager to minimize "insurable risk" born by the holder through diversification.

Since Jensen redefined performance to ones forecasting ability, he extended the CAPM model from a single period to a multiperiod world. This meant that investors are all allowed to have heterogenous horizon periods and asset trading takes place continuously through time. Equation (4) is expressed in realized returns as follows:

$$R_{it} - R_{ft} = \beta_i [ER_{mt} - R_{ft}] + \varepsilon_{it} \quad (11)$$

Where subscript t denotes an interval of time arbitrary with respect to length and starting and ending dates. By subtracting the risk-free rate from both sides and adding in an intercept term, we obtain the following:

$$R_{it} - R_{ft} = \alpha_i + \beta_i [ER_{mt} - R_{ft}] + \varepsilon_{it} \quad (12)$$

In equilibrium, the intercept term alpha (α) equals zero and thus the risk premium on the i'th portfolio should equal the market risk premium multiplied by systematic risk of portfolio i plus some error term. Graphically, both risk premiums should lie on the same line which is the security market line.

Alternatively, higher risk premiums are earned by superior portfolio managers who forecast market turns or consistently select undervalued securities. Thus, the intercept value, alpha (α), indicates whether an investment manager has superior or inferior investment abilities (Reilly and Brown, 2012). Alpha (α) can be obtained in the following equation:

$$\alpha_i = R_{it} - R_{ft} - \beta_i [ER_{mt} - R_{ft}] + \varepsilon_{it} \quad (13)$$

Formally, Jensen's alpha is thus the difference between the expected rate of return of portfolio i and what the expected rate of return would be if the portfolio were on the security market line. Given the portfolios systematic risk, alpha would be zero if the manager were earning fair returns based on the expectations of CAPM. A positive alpha would imply superior performance and a negative alpha would imply inferior performance. Since over and underperformance is compared to a market proxy, the choice of market index becomes an important issue because portfolio performance will be compared with the market portfolio (Jensen, 1968).

2.9.4 The Information Ratio

The information ratio, originally referred to as the “appraisal ratio”, was first introduced by Jack Treynor and Fischer Black in 1973 (Treynor and Black, 1973). The information ratio (IR) is a measure that seeks to summarize in a single number, the mean-variance properties of an active portfolio (Goodwin 1998). The IR measures a portfolio’s average return above that of a comparison or benchmark portfolio, divided by the standard deviation of excess returns (Reilly and Brown, 2012). The IR for portfolio i is calculated as follows:

$$IR_i = \frac{E(R_i) - E(R_b)}{\sigma_{ER}} = \frac{\overline{ER}}{\sigma_{ER}} \quad (14)$$

where:

$E(R_i)$ = the expected rate of return for portfolio i during the period

$E(R_b)$ = the expected return for the benchmark portfolio during the period

\overline{ER} = the average excess return for portfolio i

σ_{ER} = the standard deviation of excess return during the period

In the numerator, the mean differential represents the manager or investor’s ability to use her skill and information to generate portfolio returns which differ from that of the benchmark, against which her performance is being measured. The excess return (\overline{ER}) is considered to be the investor’s average alpha. The denominator measures the amount of residual (unsystematic) risk that the investor has incurred, in an attempt to gain those incremental returns. The σ_{ER} coefficient is also known as the tracking error of the portfolio and can be considered a “cost” of active management in an attempt to gain incremental returns (Reilly and Brown, 2012; Israelsen, 2004).

Equation (15) is the simplest form of the IR and Goodwin (1998) argues that this is the simplest interpretation of the ratio and most useful for investors. The most straightforward interpretation

is one in which the active manager is confined to the universe of a benchmark index (for example the S & P 500) and must maintain the same level of systematic risk as the index i.e., beta equal to one. Using equation (12) and setting beta equal to one, we get the following:

$$\begin{aligned}
 (R_{pt} - R_{ft}) - (R_{bt} - R_{ft}) &= (R_{pt} - R_{bt}) \\
 &= ER_t \\
 &= \alpha + \varepsilon_t
 \end{aligned}
 \tag{15}$$

This indicates that excess return over the benchmark is the sum of the alpha plus residual risk, leading equation (14), where IR is the risk-adjusted alpha. Thus, the simple IR is the most useful when the benchmark has been carefully chosen to match the style of the manager. Therefore, fixing beta equal to one is a sensible assumption as the benchmark roughly matches the systematic risk of the manager (Goodwin, 1998).

Goodwin (1998) noted that the Sharpe ratio is a special case of the IR when the risk-free represents the benchmark portfolio (a shorted security to finance the long portfolio). He also showed that if the excess portfolio returns are estimated with historical data using the same single- factor regression equation used to compute Jensen's alpha, IR thus simplifies to:

$$IR_i = \frac{\alpha_i}{\sigma_e}
 \tag{16}$$

where:

σ_e = the standard error of the regression

The active manager can add value by underweighting or overweighting individual assets, relative to the weightings of the benchmark, while at the same time maintain the same level of market risk. Grinold and Kahn (2000) suggested that a reasonable IR level should range between 0,5 and 1, with 0,5 being "good" and 1 being exceptional. Thus, we can use the IR to gauge the skill of managers of mutual funds and see if the average fund manager can beat the benchmark.

2.9.5 The Sortino Ratio

The Sharpe ratio is used due to its ease of comparison across fund classes. While the Sharpe ratio is popular and widely used, the Sortino ratio improves on the Sharpe ratio in a few areas while providing a different perspective on performance.

The Sharpe ratio does not distinguish between upside and downside risk and penalizes them equally. The Sortino ratio provides an accurate rate of return given the likelihood of downside risk, and the indicator examines changes in the risk-free rate, hence enabling investors to make more informed decisions (Rollinger and Hoffman, 2013).

The Sortino Ratio, S_t , is defined as:

$$S_t = \frac{[R_i - R_{target}]}{TSSD} \quad (17)$$

Where:

R_i = Average rate of return for portfolio i

R_{target} = The investors target rate or required rate of return for the investment strategy under consideration.

TSSD = Target semi-standard deviation

The R_{target} can be any target rate such as a benchmark return or a flat rate but for the purposes of this analysis, the target rate will be set to equal the risk-free rate given by the average 91-Day T-bill rate. The TSSD is a semi-standard deviation that only focuses on the downside risk and can be calculated using the formula below (CAIA, 2020):

$$TSSD = \sqrt{\frac{1}{N} \sum_{i=1}^N (\min(0, R_i - T))^2} \quad (17)$$

Where:

R_i = i^{th} return

N = Total number of returns

T = Target rate of return

While the standard deviation is dispersed around its mean, we can see above that TSSD is a dispersion of data below some selective target return with all above target rate of return treated as underperformance of zero. The Sortino ratios of funds will be calculated and ranked to compare performance of mutual funds within the same asset class for the purpose of analysis.

2.10 Refinement of Negative Ratios

All the reward-to-variability ratios mentioned above are measures of volatility-adjusted performance. The key difference across these ratios are how they define ‘excess return’.

The Sharpe ratio and Treynor ratio compares the return of an asset to the return of a risk-free rate such as T-bills, whereas IR measures excess return against a relevant index or benchmark. Despite how excess return is defined, it can be negative causing the reliability of the measure to deteriorate (Israelsen, 2005). Due to negative excess returns these measures become nonsensical and would be ranked incorrectly, thus would need to be refined. To modify the Sharpe ratio, we would use the following equation:

$$\text{Modification of } SR = \frac{ER}{SD(ER/abs(ER))} \quad (18)$$

Where:

ER = Excess Return

SD = Standard Deviation

abs(ER) = absolute value of Excess Return

The standard SR is modified by adding an exponent to the denominator where the exponent is excess return (ER) divided by the absolute value of excess return (abs(ER)). Due to the mathematical properties of the ratios being identical, this refinement can be applied to all the ratios mentioned above (Israelsen, 2005).

When ER is positive, the modified and original ratio is identical but when ER is negative, they can be very different. Although the magnitude of the modification of the ratios has little value, it will aid in correctly ranking funds according to residual return over residual risk, whether or not the excess return is positive or negative.

Chapter 3: Data and Methodology

3.1 Data

Most of the data used in this study was sourced from Profile Group which comprises of 2176 funds across domestic, Namibian and offshore unit trusts. The data obtained consists of monthly NAV data, used to calculate the funds monthly returns, and fund TER's for a nine-year period from 31 July 2010 to 30 June 2019. The sample of funds were selected based on a criterion and will be explained in more detail in the sections to follow. The funds were grouped and sorted according to fund type/class i.e., Equity, Bond and Money Market funds and further subdivided by associated benchmark where applicable. Other return data such as the various benchmark returns were sourced from Profile Group PTY and the risk-free rate (91-day T-Bill) was sourced from the South African Reserve bank website.

3.1.1 Sampling Period

The selection of the sample period is pivotal for analysis, as different length sample periods or the period itself could affect your results. Economic cycles alternate between a boom which consists of high economic growth or a recession, a period of stagnant growth. Economic growth plays a role on the entire economy and filters down into different asset classes. In times of recession or stagnant economic growth, reserve banks tend to cut interest rates to incentivise spending and borrowing to promote economic growth. Lower interest rates imply cheaper borrowing costs which makes Equities more attractive as profits are higher. However, lower interest rates generally come at a cost of increased money supply which causes inflationary pressures. When growth and inflation pick up, reserve banks would tend to increase rates to slow down on spending and borrowing to curb inflationary pressures. This results in Equities becoming less attractive as borrowing costs are higher, however, debt instruments start becoming more attractive as investors start looking for yield pickup. In isolation, increases interest rates also causes the rand to strengthen relative to the dollar which aids in economic growth. Therefore, the selection of the sample period is important because depending where you are in the economic cycle can affect your results. Pardoe (2018) and Tan (2105) chose a sampling period post the great financial crises of 2008 while Malefo, Hseih and Hodnett (2016)

and Thobejane, Simo-Kengne, and Mwamba (2017) chose a sample period during the great financial crises of 2008. Most papers on which this study was based chose a sampling period of 6 to 10 years. Consistent with prior research, this paper uses a nine-year sample period from 31 July 2010 to 30 June 2019.

3.1.2 Selection of Mutual funds

The paper aims to explore the relationship of mutual fund performance and fees in South Africa across the different asset classes. Only domestic unit trusts were included which narrowed the sample size down to 1658 funds. The two main funds in South Africa are R class and A class funds, mimicking a study done by Tan (2015), R class and institutional funds are ignored, bringing the number of funds down 833 funds. Only Equity and Fixed Income funds were considered while funds of funds (FoF) were excluded due to fees being double counted resulting in 578 funds remaining. Fixed Income funds were separated into Money Market (short term) funds and Bond funds, while property funds were excluded. As previously mentioned, funds were subdivided by benchmark so funds that had unique benchmarks or benchmarks that didn't add value to the study were removed, leaving a remainder of 234 funds. Funds that did not have return data coinciding with the nine-year sample period were excluded. The cumulative returns of funds that did not fit the nine-year sample period after cleaning can be found in *Table 37* in the appendix. The following number of funds were obtained:

- 31 Equity funds
- 21 Bond funds
- 14 Money market funds

Therefore, 66 funds in total across the different categories were selected for the sample to perform tests and analysis.

3.1.3 Returns on funds

The monthly returns for each fund were calculated using monthly NAV close values. The monthly returns are logarithmically computed and for the study 108 months, 31 July 2010 – 30 June 2019, are observed. The returns were calculated as followed:

$$R_p = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (19)$$

Where:

P_t = Price of fund at month t

P_{t-1} = Price of fund at month t-1

3.1.4 Risk-free rate

For this study, the South African 91-Day T-bills are used as the appropriate risk-free rate, as used by Tan Omer (2015) in his study. The 91-Day T-bills are sourced from the South African Reserve bank website. The data was collected for the sample period 31 July 2010 to 30 June 2019. The risk-free rate is used in the calculation of fund excess return as well as benchmark excess returns.

3.1.5 Benchmarks

An index will be used as a proxy for the market; thus, an appropriate index or performance benchmark must be selected when calculating the beta of the funds. This study includes funds invested in South African equities, Bonds and Money Market instruments; thus, a range of benchmarks will be selected for each fund class. Equity funds will use the FTSE/All Share index (ALSI) (21 funds), Shared weighted Index (SWIX) (7) and the FTSE/JSE Capped Index (CAPI) (6), totaling to 31 equity funds. Using total returns all is in line with a unit trust performance study conducted by Pardoe (2018), However, because this data was not unattainable, the close values were chosen. The other equity benchmarks were chosen based

on widespread use and to add extra insight to the analysis. Bond funds will use the FTSE/JSE All Bond Index (ALBI) and the Money Market funds will use the Short-Term Fixed Income Index (STeFI). The monthly benchmark returns for the various fund classes is used, in excess of the risk-free rate, in our regression analysis as well as in the Jensen's Alpha Method as a measure of the market portfolio proxy return measure. The benchmark return data was sourced from IRESS and collected for the sample period 31 July 2010 to 30 June 2019. For the purpose of measuring and illustrating fund performance, the use of benchmark indices is greatly important to fund managers as this is most times the only way for investors to judge or form an opinion on the funds' performance. However, benchmarks are mandate specific, hence why three equity benchmarks were chosen, to provide further insight to the analysis.

3.2 Methodology

This study evaluates funds and fund managers performance of South African Equity, Bond, Money market and Balanced funds while taking fees into consideration. A total of 66 funds are analysed. In order to evaluate performance, Jensen's Alpha , the Sharpe Ratio , the Sortino Ratio and Information Ratio are computed.

3.2.1 Jensen's Alpha Method

Jensen (1968) extended the work of Sharpe (1964), Litner (1965) and Treynor (1965), creating his own model of the Capital Asset Pricing Model (CAPM). CAPM states that the expected return on a portfolio or security should exceed the risk-free rate, by an amount proportional to Beta of that portfolio or security relative to a selected benchmark or market portfolio. CAPM is shown by the equation below:

$$E(R_j) = R_f + \beta_j [E(R_m) - R_f] \quad (20)$$

where:

$E(R_j)$ = Expected/mean return for fund j

R_f = The risk-free rate (91-Day T-Bill)

B_j = Measure of systematic risk for fund j

$E(R_m)$ = Expected/mean return on the benchmark

The original single factor CAPM model introduced by Sharpe, Litner and Treynor assumes a single period. Since Jensen redefined performance to ones forecasting ability, he extended the CAPM model from a single period to a multiperiod world, where investors can have heterogenous horizon periods and the trading of securities takes place continuously over time. Jensen's alpha is shown below:

$$R_{it} - R_{ft} = \alpha_i + \beta_i [ER_{mt} - R_{ft}] + \varepsilon_{it} \quad (21)$$

Where:

α_i = Jensen's fund specific alpha

R_{it} = Total return for fund i for month t

R_{ft} = Risk-free rate for month t (91-Day T-bill)

β_i = Beta for fund i

R_{mt} = Return for market for month t

ε_{it} = Regression error term/ residual

Jensen's alpha is used to determine the abnormal return of a security or portfolio over the theoretical expected return obtain from CAPM. A positive alpha would imply superior fund performance and a negative alpha would imply inferior fund performance. Jensen's alpha for

each fund is used in this paper to measure performance and selectivity skills of fund managers, similarly to previous studies covered in the literature.

3.2.2 Regression

Using the methodology above, a single factor regression was run to calculate Jensen's fund specific alpha and beta for all funds, from 31 July 2010 to 30 June 2019, as well as calculating the betas of the various benchmarks.

The first step in the method used, was to calculate the excess returns for fund returns and similarly benchmark returns. Using the 91-Day T-Bill as the selected risk-free rate, the returns were calculated in excess of the risk-free rate. The (91-Day T-Bill is a 12-month rate which is divided by 12 to approximate a monthly rate. The excess return equation can be seen below:

$$ExR_{it} = (R_{it} - R_{ft}) \quad (22)$$

Where:

ExR_{it} = The excess monthly return for month t for each fund i

R_{it} = Total return for fund i for month t

R_{ft} = Risk-free rate for month t

$$ExR_{mt} = (R_{mt} - R_{ft}) \quad (23)$$

Where:

ExR_{mt} = The excess monthly return for month t for benchmark, m

R_{mt} = Total return for the market portfolio for month t

R_{ft} = Risk-free rate for month t

Using the above equation, the excess monthly returns for the fund and benchmark were calculated. The excess returns will be used in the regression to calculate Jensen's alpha and the fund specific beta for each of the funds using equation 21. We will also run the same regression using net returns, which will be calculated by taking the return minus the average TER for that specific fund, as calculated below:

$$R^*_{it} = R_{it} - \overline{TER}_i \quad (24)$$

Thus, our excess monthly returns will be:

$$ExR^*_{it} = (R^*_{it} - R_{ft}) \quad (25)$$

Where:

ExR^*_{it} = The excess monthly return for month t for each fund i

R^*_{it} = Total return for fund i for month t

R_{ft} = Risk-free rate for month t

\overline{TER}_i = Average Total expense ratio for fund i

For each fund in the sample, their excess return was matched up with their respective benchmark. The excess monthly fund return, the independent variable, was regressed against the excess monthly benchmark returns. The regression was run for all 66 funds in the sample before and after adjusting for fees, to examine the effects that fees have on performance of South African fund. Jensen's alpha value, which is a fund specific performance measure, and

fund specific beta, a measure of risk relative to the market portfolio, was given in each of the regression outputs.

3.3 Performance Based Measures

3.3.1 The Information Ratio

The IR measures a portfolio's average return above that of a comparison or benchmark portfolio, divided by the standard deviation of excess returns (Reilly and Brown, 2012). The IR for portfolio i is calculated as follows:

$$IR_i = \frac{E(R_i) - E(R_b)}{\sigma_{ER}} = \frac{\overline{ER}}{\sigma_{ER}} \quad (26)$$

where:

$E(R_i)$ = the expected rate of return for portfolio i during the period

$E(R_b)$ = the expected return for the benchmark portfolio during the period

\overline{ER} = the average excess return for portfolio i

σ_{ER} = the standard deviation of excess return during the period

As previously mention, a reasonable IR level should range between 0,5 and 1, with 0,5 being "good" and 1 being exceptional (Grinold and Kahn, 2000). Thus, we can use the IR to gauge the skill of managers of mutual funds and see if the average fund manager can outperform the benchmark.

IR is not a useful tool in evaluating asset classes and making decisions on asset allocation to a particular asset class. Thus, investors should avoid using IR when making asset allocation decision, and therefore should not compare IRs of active equity managers and active fixed income managers.

Thus, IR will be used to evaluate skill and ability across fund managers within the same asset class and not across the different asset classes.

3.3.2 The Sharpe Ratio

The Sharpe ratio is used to measure the reward to total risk trade off, using the risk premium divided by the standard deviation of the returns for the fund. This is calculated using the equation below:

$$S_p = \frac{R_i - R_f}{\sigma_i} \quad (27)$$

S_p = Sharpe Ratio

R_i = Average rate of return for fund i

R_f = Average risk-free rate

σ_i = Standard deviation of excess return for fund i

The Sharpe ratio evaluates the performance of a fund given the level of total risk taken. After obtaining the Sharpe ratios for all funds, they will be ranked and compared to the Sharpe ratios of their respective benchmark. A higher Sharpe ratio indicates that the fund delivers a higher return per unit of risk relative to its peers. Due to the universality of the Sharpe ratio, it allows for easy comparison for investment strategies across asset classes. Therefore, this paper will use the Sharpe ratio to evaluate performance of all funds across fund classes.

3.3.3 The Sortino Ratio

The Sortino ratio is used to in a similar manner to the Sharpe ratio, However, using downside risk instead of standard deviation. The Sortino Ratio, S_t , is defined as:

$$S_t = \frac{[R_i - R_{target}]}{TSSD} \quad (28)$$

Where:

R_i = Average rate of return for portfolio i

R_{target} = The target rate of return (91-Day T-Bill)

TSSD = Target semi-standard deviation

$$TSSD = \sqrt{\frac{1}{N} \sum_{i=1}^N (\min(0, R_i - T))^2} \quad (29)$$

Where:

R_i = i^{th} return

N = Total number of returns

T = Target rate of return (91-Day T-Bill)

The Sortino ratios of funds will be calculated and ranked to compare performance of mutual funds within the same asset class for the purpose of analysis. A higher Sortino ratio indicates that the portfolio is operating efficiently by not taking on unnecessary risk that is not being rewarded in the form of higher returns. A low, or negative Sortino ratio, may indicate that an investor is not being rewarded for taking on additional risk. When looking at two similar investments, a rationale investor would prefer a higher Sortino ratio because this would imply the investment is earning more return per unit of bad risk that is taken on.

Chapter 4: Results

In chapter four, we will analyse the regression and performance ratio results, as well as summarise the findings of our paper. A descriptive statistical analysis of our sample will be presented to give an overall view of the data. Finally, the results of our regression and performance ratios will be reported, and an analysis will be conducted to explain and discuss performance results of South Africa mutual funds and the potential effects that fees have on performance over the period of 30 July 2010 to 30 June 2019. The fund codes for the different funds used in the analysis of this paper are found below.

Table 1: Equity Fund Codes

Fund Code	Fund Name	Benchmark
AGEF	Allan Gray Equity	ALSI
ASEF	Absa Select Equity	ALSI
AYEF	Aylett Equity Prescient	ALSI
CGMG	Community Growth Equity	ALSI
DIEF	Discovery Equity	ALSI
FEFA	Element Earth Equity SCI Fund	ALSI
FNBG	FNB Growth	ALSI
HLMK	Marriott Dividend Growth	ALSI
LIPA	STANLIB SA Equity	ALSI
MCEF	Cannon Equity H4 Fund	ALSI
MHGE	Harvard House BCI General Equity	ALSI
MOEF	Maestro Equity Prescient	ALSI
PSGG	PSG Equity	ALSI
PTIC	Personal Trust Income	ALSI
RCFFB	RECM Equity	ALSI
RVTU	Rezco Value Trend	ALSI
SGEA	Sanlam Investment Management General Equity	ALSI
SNVL	Denker SCI Equity Fund	ALSI
AHMF	Cadiz Equity	SWIX
LIWA	STANLIB Equity	SWIX
MNEF	N-e-FG BCI Equity	SWIX
MSTT	Sasfin BCI Equity	SWIX
MTLE	First Ave SCI Focused Qual Equity	SWIX
MVLT	Select Manager BCI Equity	SWIX
RMEC	Momentum Small Mid-Cap	SWIX
AFEA1	Afena Equity Prescient	CAPI
CNTF	CITADEL SA Equity H4	CAPI
CAOF	Coronation Top 20	CAPI
HUEF	Foord Equity	CAPI
VAGE	Huysamer Equity Prescient	CAPI
FEQF	Select BCI Equity	CAPI

Table 2: Bond Fund Codes

Bond Fund Codes 21

Fund Code	Fund Name	Benchmark
ABBA	Absa Bond	ALBI
ABFCA	Absa Fundisa	ALBI
ABSC	Absa Income Enhancer	ALBI
AGBD	Allan Gray Bond	ALBI
ASMBB1	Ashburton Multi-Manager Bond	ALBI
ASMPB1	Ashburton Multi-Manager Property	ALBI
CAUF	CITADEL SA Bond H4	ALBI
CBFCP	Coronation Bond	ALBI
CGMI	Community Growth Gilt	ALBI
LBBF	STANLIB Bond	ALBI
MHFI	Harvard House BCI Flexible Income	ALBI
MRCI	Marriott Core Income	ALBI
OMGI	Old Mutual Bond	ALBI
PBQF	Prescient Bond QuantPlus	ALBI
PHYB	Prudential High Yield Bond	ALBI
PPFI	PPS Flexible Income	ALBI
RMGF	Momentum Bond	ALBI
SBFFA	Standard Bank Fundisa	ALBI
SNGF	Sanlam Investment Management Bond Plus	ALBI
STFA	STANLIB Flexible Income	ALBI
VELG	Nedgroup Inv Core Bond	ALBI

Table 3: Money Market Fund Codes

Money Market Fund Codes 14

Fund Code	Fund Name	Benchmark
AHAY	Cadiz Absolute Yield	STEFI
ASSIFA	Ashburton Stable Income	STEFI
DDIF	Discovery Diversified Income	STEFI
GDBI	STANLIB Income	STEFI
GFIF	Bridge High Income	STEFI
INAB	Investec Absolute Balanced	STEFI
INAH	Investec High Income	STEFI
MIPP	Saffron SCI Opportunity Income	STEFI
NCPB	Nedgroup Inv Core Income	STEFI
PEICA	Prudential Enhanced Income	STEFI
RICA	Momentum Income Plus	STEFI
SAIFA1	Sanlam Investment Management Active Income	STEFI
SCPA	STANLIB Enhanced Yield	STEFI
STDI	STANLIB Extra Income	STEFI

4.1 Descriptive Statistics

Table 4 below summarises the descriptive statistics for South African mutual funds in our sample grouped by asset fund class and associated benchmark. The first column shows fund type for example Equity ALSI refers to Equity funds indexed to the JSE All share benchmark, and so forth. In the second column the average cumulative returns for the different fund categories are displayed. The third column displays the monthly average returns before fees. From the table we can see that Equity funds had higher average cumulative as well as average monthly returns than Bond and Money market funds over the sample period, with Equity funds indexed to the SWIX benchmark having the highest average cumulative and monthly return of 168.63 and 0.56% (6.74% per annum) respectively. This is in line with expectations as Equities are generally riskier, meaning higher returns can be expected. This can also be seen in column 4, showing us that Equity funds are indeed riskier compared to Bonds and Money market funds. Column R depicts the correlation between funds and their respective benchmarks. The average correlation for Equity funds is 0.52 to 0.54, representing a semi-strong positive correlation. First Ave SCI Focused Qual Equity fund (MTLE) has the highest correlation of 0.551. Bond funds on average have a positive correlation of 0.425 while Money market funds have almost no correlation to the STEFI benchmark. The skewness column shows the skew of Equity, Bond and Money market funds. All funds are negatively skewed, denoting a distribution with asymmetric tail extending toward more negative values. This means an investor may expect frequent small gains and a few large losses. All funds have a positive Kurtosis on average, implying the distribution has thick tails, which is typical in financial distributions.

Table 4: Summary Descriptive Statistics

Descriptive Statistics									
Fund Type	Cumalative Period Return	Monthly Return	Monthly Excess Return	Standard Deviation	R	Skewness	Kurtosis	Beta	N
Equity ALSI	155.28	0.45%	-0.07%	2.80%	0.52994	-0.34228	2.67794	0.609074**	18
Equity SWIX	169.01	0.56%	0.04%	3.06%	0.52051	-0.39857	2.70065	0.68450**	7
Equity CAPI	153.95	0.49%	-0.03%	3.50%	0.54420	-0.33616	2.63887	0.79495**	6
Bond ALBI	103.58	0.06%	-0.46%	1.34%	0.42476	-0.41559	3.38265	0.41926**	21
Money Market SteFI	103.81	0.07%	-0.47%	0.47%	0.00266	-0.61074	1.86580	-0.35739	14

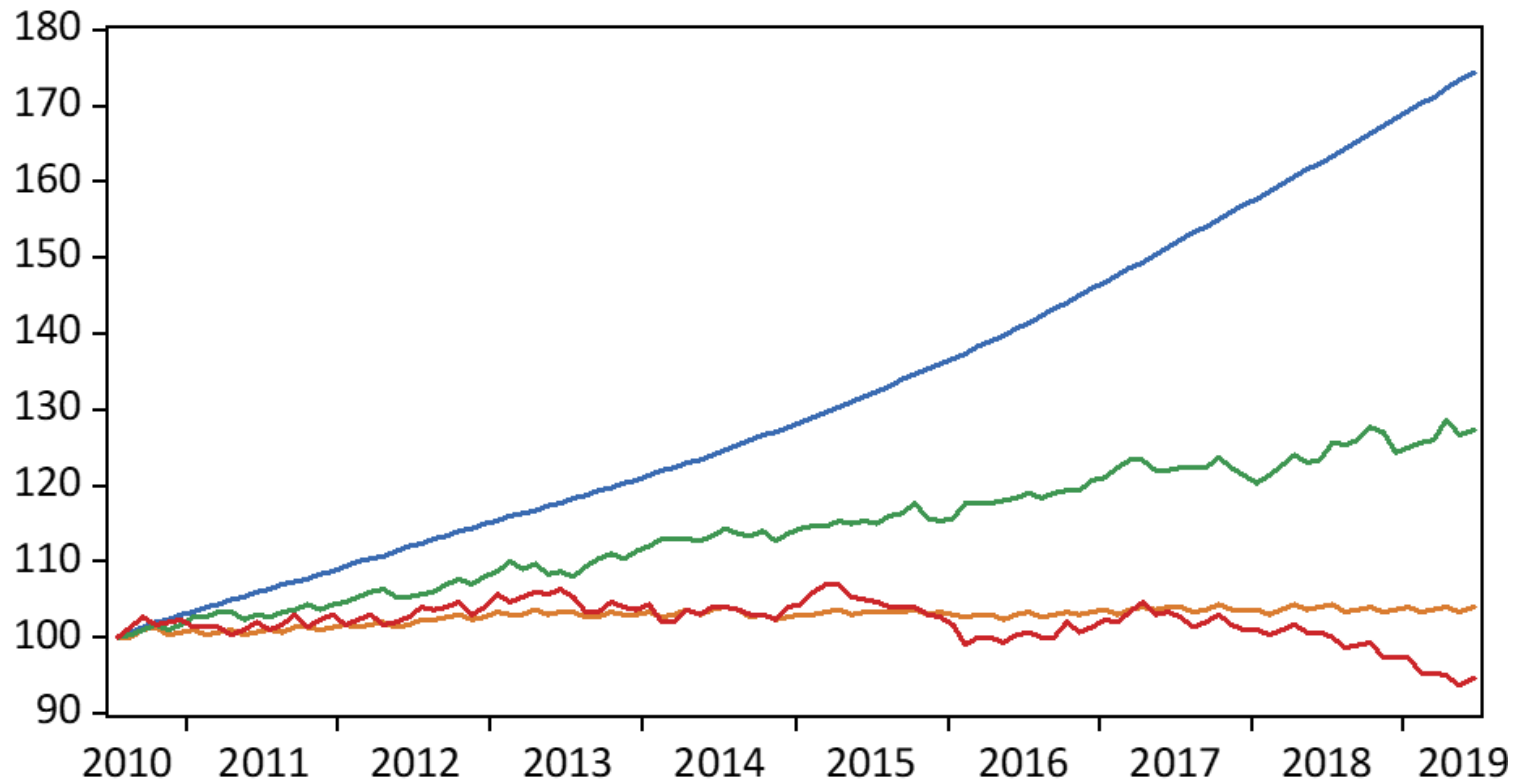
Significant levels: * inidcates 10%. **indicates 5%, ***indicates 1%

Table 5: Benchmark Descriptive Statistics

Descriptive Statistics					
Benchmark	Cumalative Period Return	Monthly Return	Standard Deviation	Skewness	Kurtosis
ALSI	260.48	0.92%	3.36%	0.1503	2.4660
SWIX	266.80	0.92%	3.24%	0.0539	2.6513
CAPI	259.74	0.91%	3.27%	0.1792	2.4595
ALBI	205.75	0.70%	2.07%	-0.2739	4.0960
SteFI	174.10	0.52%	0.07%	-0.0516	1.6364
CPI	158.09	0.43%	0.37%	0.7289	0.2819
91-Day T-bill	175.37	0.52%	0.07%	0.1903	3.3250

Significant levels: * inidcates 10%. **indicates 5%, ***indicates 1%

Figure 5: Cumulative Benchmark Returns



Source: (Profile Group PTY, 2019)



Similarly, *Table 5* shows the descriptive statistics related to the different benchmarks as well as the 91-Day T-bill. Much like Equity funds, the Equity benchmarks had the highest average cumulative and monthly return of 266.80 and 0.92% (11.02% per annum) respectively. Interestingly, none of the average fund returns or cumulative returns are higher than their respective benchmark, which means we could expect to see underperformance. Excess monthly return is the monthly return in excess of the risk-free rate, and only Equity funds related to the SWIX benchmarks have a positive average excess monthly return. Equity benchmarks have the highest standard deviation with Money market funds having the lowest. The Equity benchmarks exhibit a positive skew while the ALBI and STEFI benchmark have a negative skew. All the benchmarks have positive kurtosis, implying fat tailed events. Looking at the average Betas from our sample in *Table 4*, we can see that all funds in our sample had a market risk position lower than their respective benchmark, with the highest average Beta belonging to Equity CAPI indexed funds with a Beta of 0,79. All average Betas were significant at the 1% level except for the Money Market funds.

Figure 5 shows the cumulative returns for the different benchmarks used in this paper. As we can see, The SWIX benchmark had the highest cumulative return over the sample period, followed by the other equity benchmarks, ALBI and STEFI with the lowest return. The CPI cumulative return is shown for the purpose of extra insight and analysis. All benchmarks had a higher cumulative return than CPI, which means all benchmarks has a positive real return over the sample period. The SWIX indexed funds were the only category of funds to have an average cumulative return greater than CPI which would imply a positive real return.

4.1.1 Equity ALSI Descriptive Statistics

Table 6: Equity ALSI Descriptive Statistics

Equity ALSI Descriptive Statistics						
Fund Name	Cumulative Period Return	Average Excess Monthly Return	Monthly STD	Skewness	R	Beta
AGEF	195.64	0.17%	3.16%	-0.38439	0.53193	0.69**
ASEF	165.21	0.04%	3.44%	-0.42280	0.57094	0.78**
AYEF	212.27	0.24%	2.71%	-0.25812	0.42768	0.53**
CGMG	135.98	-0.10%	3.86%	-0.67906	0.46493	0.79**
DIEF	132.35	-0.17%	3.22%	-0.06131	0.39782	0.61**
FEFA	100.15	-0.40%	3.31%	-0.23493	0.33593	0.58**
FNBG	146.75	-0.07%	3.46%	-0.28440	0.53663	0.76**
HLMK	175.81	0.07%	3.06%	-0.02287	0.34657	0.54**
LIPA	147.81	-0.05%	3.72%	-0.32519	0.31661	0.55**
MCEF	90.91	-0.55%	3.27%	-0.50927	0.31661	0.55**
MHGE	173.74	0.09%	3.63%	-0.49332	0.51603	0.78**
MOEF	148.44	-0.07%	3.54%	-0.42043	0.48927	0.74**
PSGG	241.08	0.35%	3.61%	-0.13804	0.32678	0.62**
PTIC	104.18	-0.47%	0.77%	-0.57988	0.04255	-0.05**
RCFFB	81.73	-0.64%	3.49%	-0.31713	0.17709	0.44**
RVTU	221.04	0.26%	2.26%	-0.05630	0.30703	0.37**
SGEA	177.34	0.13%	3.59%	-0.49178	0.54940	0.80**
SNVL	144.60	-0.09%	3.39%	-0.46669	0.42906	0.66**
Equity ALSI Average	155.28	-0.07%	2.80%	-0.34228	0.52994	0.61**

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Figure 6: ALSI Cumulative Returns

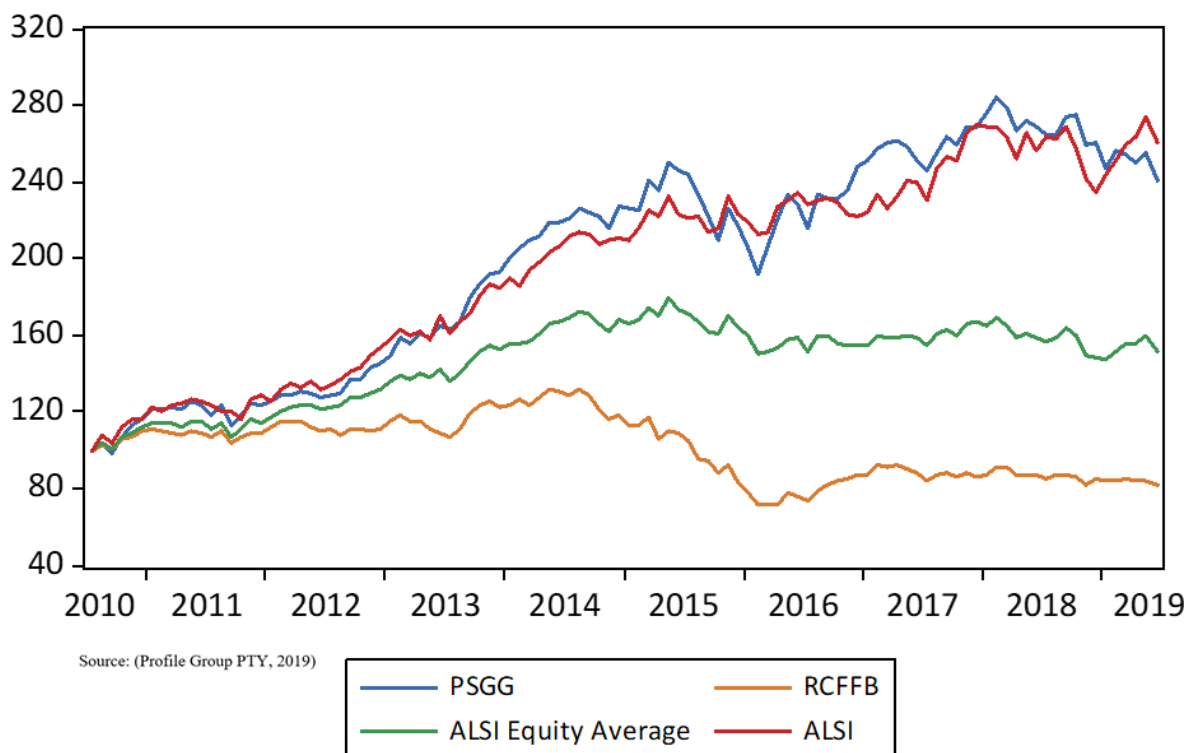


Table 6 displays the descriptive statistics for all ALSI indexed equity funds. The first column shows the cumulative return for the sample period of 30 July 2010 to 30 June 2019. PSGG had the highest cumulative return of 241 implying that the fund returned 141.08% for the 9-year sample period. This means that if you invested R100 000 at the start of the sample period, you would've had R241 080 at the end of the sample period. PTIC had the lowest return of 81.73 implying that the fund lost money and the average cumulative return of the group was 155.28, which is a 55.28% return over the entire sample period. We can see in column 2 that only 8 out of the 18 equity funds had a positive average excess monthly return but overall, the average excess monthly return was negative.

Figure 6 shows the best performer, worst performer, average and benchmark. The top performer, PSGG, had moments of outperformance throughout the period but over the entire sample period only slightly underperformed the benchmark. Most of the underperformance came in the first 33 months (2010-2013) but after went through an extended bull run. Evident on the graph, the top performer was significantly above the average and the lowest performer was significantly below the average. Graphically we can see that majority of equity funds underperformed the benchmark, which can also be seen in *Table 6*. In the graph we can see that after 48 months or from 2014 onwards, equities on average experienced low growth. This coincides with the end of the commodity super cycle which was also accompanied by slowed GDP, money and credit growth as well increased interest rates and a weaker rand. *Table 6* also shows that 10 out of 18 funds returned lower than the average cumulative return, with none of the funds outperforming the benchmark over the sample period.

4.1.2 Equity SWIX Descriptive Statistics

Table 7: Equity SWIX Descriptive

Equity Swix Descriptive Statistics						
Fund Name	Cumalative Period Return	Average Excess Monthly Return	Monthly STD	Skewness	R	Beta
AHMF	161.72	0.01%	3.32%	-0.41972	0.32154	0.58**
LIWA	218.85	0.30%	3.26%	-0.50114	0.47576	0.70**
MNEF	168.89	0.07%	3.88%	-0.15920	0.45869	0.81**
MSTT	210.36	0.26%	3.34%	-0.53883	0.45603	0.70**
MTLE	146.66	-0.05%	3.73%	-0.38720	0.55097	0.86**
MVLT	145.56	-0.08%	3.18%	-0.29673	0.43165	0.65**
RMEC	131.01	-0.19%	3.46%	-0.20028	0.21502	0.50**
Equity SWIX Average	169.01	0.04%	3.06%	-0.39857	0.52051	0.68**

Significant levels: * inidcates 10%. **indicates 5%,***indicates 1%

Figure 7: SWIX Cumulative Returns

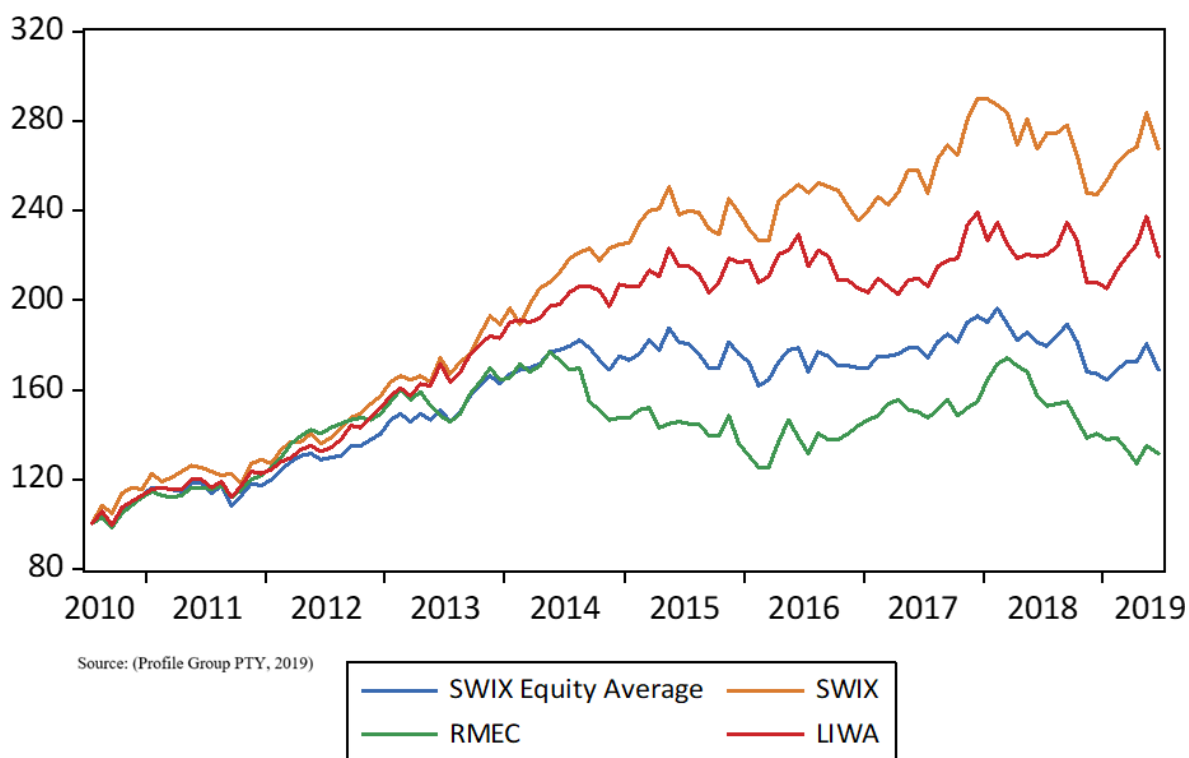


Table 7 above shows that on average, SWIX indexed equity funds had an overall higher cumulative return for the period compared to ALSI indexed equity funds. This also aligns with the fact that the SWIX benchmark performed better than the ALSI benchmark over the sample period. LIWA had the highest cumulative return, and although the SWIX benchmark had the highest cumulative return, LIWA still underperformed the benchmark as well as the top ALSI indexed performing fund. We can also see that more than half of the funds had a positive excess monthly return, which resulted in an overall positive average excess monthly return. Graphically, we can see that the top performer, benchmark, worst performer, and average are

all aligned. Unlike the ALSI top performer, LIWA largely underperformed the benchmark and similarly to equity ALSI indexed funds none of the SWIX indexed equity funds were able to outperform their benchmark.

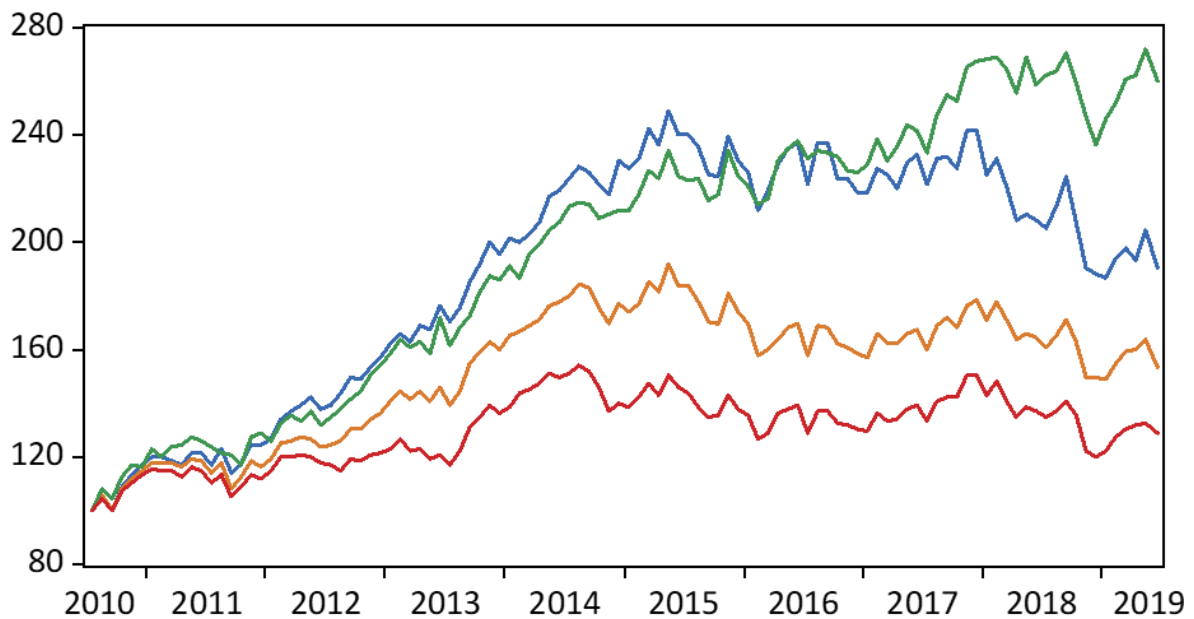
4.1.3 Equity CAPI Descriptive Statistics

Table 8: Equity CAPI Descriptive Statistics

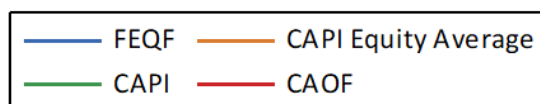
Equity CAPI Descriptive Statistics						
Fund Name	Cumulative Period Return	Average Excess Monthly Return	Monthly STD	Skewness	R	Beta
AFEA1	140.01	-0.09%	3.62%	-0.28904	0.50330	0.79**
CNTF	128.38	0.02%	4.20%	-0.21310	0.47933	0.89**
CAOF	154.82	-0.23%	3.34%	-0.34250	0.48359	0.71**
FEQF	190.26	-0.15%	3.66%	-0.36542	0.49380	0.79**
VAGE	132.12	0.09%	3.35%	-0.22269	0.51790	0.74**
HUEF	178.09	0.17%	3.72%	-0.39352	0.53815	0.84**
Equity CAPI Average	153.95	-0.03%	3.50%	-0.33616	0.54420	0.79**

Significant levels: * indicates 10%, ** indicates 5%, *** indicates 1%

Figure 8: CAPI Cumulative Returns



Source: (Profile Group PTY, 2019)



The top performer for the CAPI indexed funds, FEQF, had the lowest return relative to the other equity top performers. The CAPI also had the lowest average performance as well the lowest return out of the three equity benchmarks. Graphically, we can see for the first half of the sample period FEQF mostly outperformed the benchmark but struggled to maintain this outperformance in the last few years, which resulted in a large over underperformance over the sample period. It can also be seen that although CAOF was the worst performer, the fund's cumulative return was aligned with the group average.

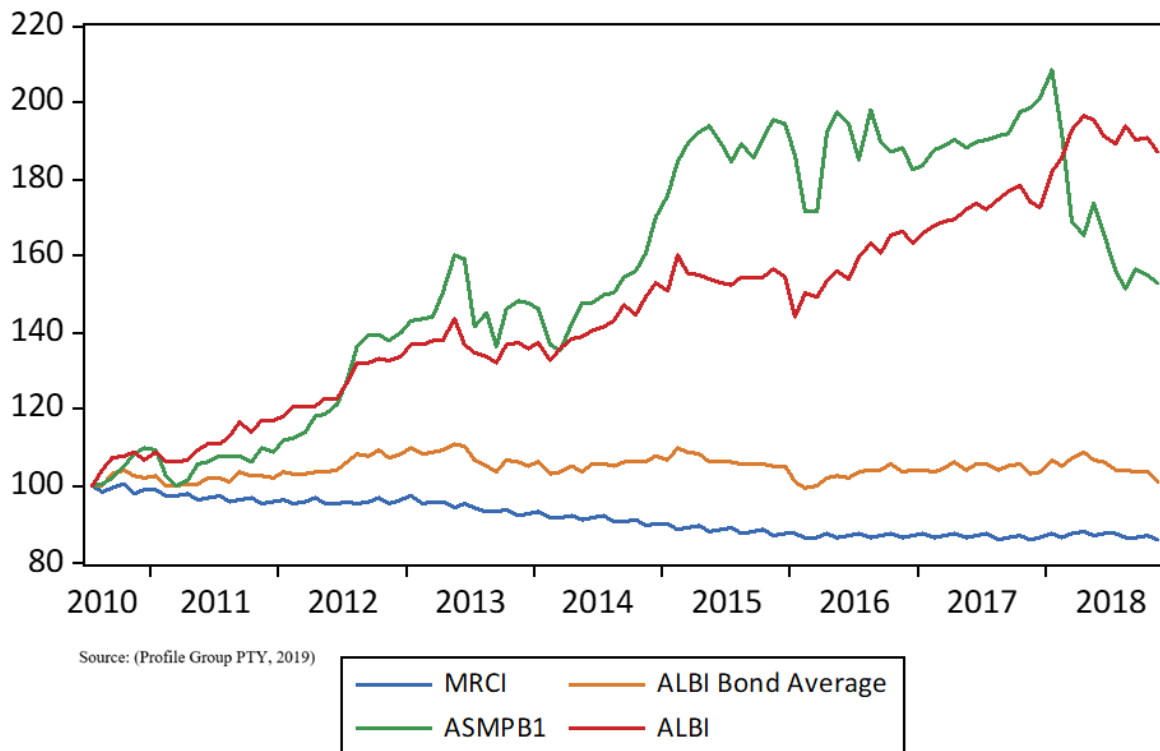
4.1.4 Bond Descriptive Statistics

Table 9: Bond Descriptive Statistics

Bond Descriptive Statistics							
Fund Name	Cumulative Period Return	Average Excess Monthly Return	Monthly STD	Skewness	R	Beta	
ABBA	105.94	-0.44%	1.85%	-0.15970	0.47468	0.61**	
ABFCA	100.50	-0.50%	1.20%	-1.79533	0.02623	-0.09*	
ABSC	101.07	-0.50%	0.62%	-0.97665	0.02337	0.045	
AGBD	106.35	-0.44%	1.60%	-0.26283	0.43790	0.51**	
ASMBB1	101.44	-0.48%	1.99%	-0.89344	0.32557	0.55**	
ASMPB1	140.95	-0.09%	3.67%	-0.51658	0.08717	0.52**	
CAUF	101.08	-0.48%	2.00%	-0.75190	0.36453	0.58**	
CBFCP	110.31	-0.39%	2.38%	-0.42375	0.38901	0.71**	
CGMI	101.84	-0.46%	2.45%	-0.40376	0.37168	0.72**	
LBBF	104.24	-0.45%	2.01%	-0.23945	0.48334	0.67**	
MHFI	112.09	-0.41%	1.06%	-0.66031	0.09693	0.16**	
MRCI	87.08	-0.64%	0.96%	-0.63633	0.01011	-0.05	
OMGI	99.94	-0.49%	2.08%	-0.47784	0.37918	0.61**	
PBQF	99.32	-0.49%	2.15%	-0.54810	0.37297	0.63**	
PHYB	97.96	-0.51%	2.02%	-0.21113	0.53164	0.71**	
PPFI	103.81	-0.47%	0.78%	-0.58657	0.00073	0.01	
RMGF	101.94	-0.47%	1.98%	-0.27253	0.51111	0.68**	
SBFFA	100.48	-0.50%	1.23%	-1.81886	0.02296	-0.09	
SNGF	102.07	-0.46%	2.15%	-0.40136	0.40948	0.66**	
STFA	98.35	-0.52%	0.91%	-0.44043	0.02877	0.07*	
VELG	98.44	-0.51%	1.76%	-0.21498	0.46425	0.58**	
Bond Portfolio Average **	103.58	-0.46%	1.34%	-0.41559	0.42476	0.42**	

Significant levels: * indicates 10%, ** indicates 5%, *** indicates 1%

Figure 9: ALBI Cumulative Returns



Bond funds had an overall lower cumulative return for the sample period compared to equity funds, which is in line with expectations as equities are riskier than bonds. Majority of bond funds underperformed the average and all bond funds, much like equities, underperformed their benchmark. Looking at *Table 9*, we can see that six out of twenty-two bond funds had a cumulative return less than 100 implying that these funds lost money over the sample period. In Figure 9 we can see that the top performer, ASMPB1, outperformed the benchmark for an extended period from 2012 to 2017 but after 2017, the fund largely underperformed the ALBI resulting in an overall underperformance. The average cumulative return hovers just over the base of 100, implying that most bond funds only increased the original investment by a few percent over the sample period. Although the average bond fund didn't lose money in nominal terms, they lost money in terms of real terms. This is evident in the fact that the average bond cumulative return of 103.58 is much less than the cumulative CPI return for the period of 158.09. The lowest performer, MRCI, had a cumulative return of 87.08 which means the fund would've lost about 13% of the original investment over the sample period.

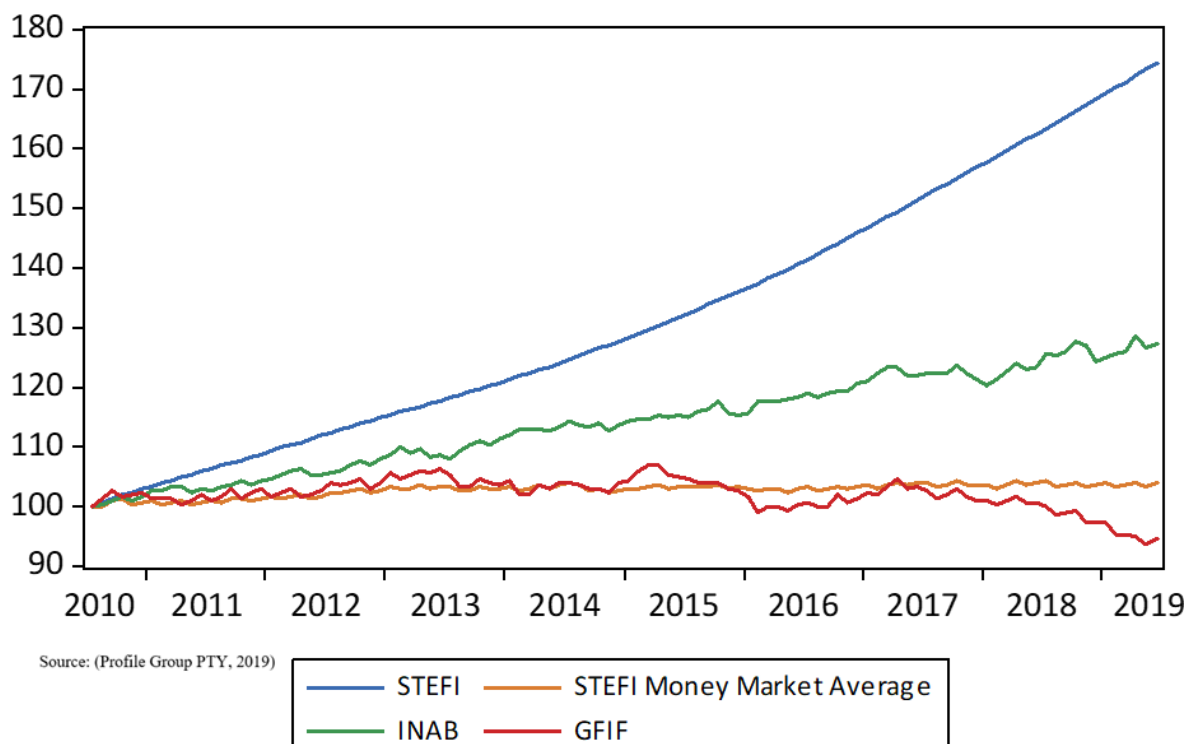
4.1.5 Money Market Descriptive Statistics

Table 10: Money Market Descriptive Statistics

Money Market Descriptive Statistics							
Fund Name	Cumulative Period Return	Average Excess Monthly Return	Monthly STD	Skewness	R	Beta	
AHAY	100.05	-0.49%	1.48%	-1.63889	0.00078	-0.5962810	
ASSIFA	99.60	-0.52%	0.07%	-0.46399	0.00297	0.0574060	
DDIF	108.39	-0.43%	0.42%	-0.17424	0.00063	-0.1511610	
GDBI	99.40	-0.51%	0.87%	-0.70230	0.00051	-0.2828470	
GFIF	94.54	-0.56%	0.99%	-0.27040	0.00572	-1.0804020	
INAB	127.17	-0.29%	0.72%	-0.51512	0.00063	-0.2591000	
INAH	98.49	-0.52%	0.45%	-1.69448	0.00043	0.1347110	
MIPP	111.19	-0.40%	0.83%	-0.48608	0.00000	-0.0176000	
NCPB	98.27	-0.53%	0.32%	-1.59137	0.00001	-0.0053160	
PEICA	112.33	-0.39%	0.77%	-0.58309	0.00933	-1.0681670	
RICA	104.05	-0.46%	0.89%	-0.97228	0.00405	-0.8133190	
SAIFA1	103.64	-0.47%	0.76%	-0.67618	0.00241	-0.5383560	
SCPA	99.76	-0.51%	0.09%	-1.49076	0.00714	0.1118620	
STDI	96.41	-0.54%	0.67%	-0.98253	0.00266	-0.4948400	
MM Portfolio Average	103.81	-0.47%	0.47%	-0.61074	0.00266	-0.3573864	

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Figure 10: STEFI Cumulative Returns



Similarly to Bond funds, Money market funds had an overall lower cumulative return compared to equity funds over the sample period as well as the returns being in line with bond funds returns. This would make sense as both bond funds and money market funds hold fixed income instruments, however, because bonds are riskier, we would expect bonds to have a higher average return which evidently is not the case. However, the top performer for money market funds, performed substantially lower than the top performer of bond funds which is in line with expectations. Half of the money market funds in the sample lost money over the sample period as their cumulative return for the sample period is less than 100.

When looking at Figure 10, we see that much like bond funds, the average cumulative return is a little over 100, again implying a loss in terms of real terms. The lowest performer, GFIF, is closely aligned to the money market fund average as can be seen in *Table 10* with money market funds having the lowest standard deviation of returns across all fund categories. This is as expected since money market funds are the least risky compared to equity and bond funds.

Equity funds had the highest return across all categories of funds as well as having the lowest return which can be expected as they are the riskiest out of all the fund categories. Equity funds were aligned with their benchmarks as the SWIX benchmark returned the highest followed by ALSI and then CAPI which translated into SWIX indexed equity funds highest average cumulative return followed by ALSI and CAPI indexed equity funds. Although it was expected that bonds have a higher average return than money market funds due it being riskier, this was not evident as money market funds had a higher average cumulative return. Over the sample period, about 6% of equity funds lost money compared to 29% of bond funds and 50% of money market funds. Although there is evident of funds outperforming their benchmark over certain periods, not a single fund in the sample outperformed their respective benchmark over the sample period. These results are consistent with the literature as Malkiel (1995), Blake and Timmermann (1998), Manjenzi (2008), Mbiola (2013), Tan (2015), Malefo, Hsieh and Hodnett (2016) and Pardoe (2018) all failed to find strong evidence of outperformance in their respective studies.

4.2 Performance and Fees

This study uses Jensen's alpha as a risk-adjusted performance measure to ascertain whether funds outperform or underperform their respective benchmark as well as the selectivity skills of asset managers. *Table 11* displays our Jensen's Alpha measure before fees, obtained from our regression while *Table 12* displays comparative results of Jensen's alpha, however, net of fees. Referring to *Table 11* below, it is evident that for the entire sample period from 31 July 2010 to 30 June 2019, all funds on average across fund class type underperformed their respective benchmarks, indicated by a negative alpha value. All Jensen's alphas, besides Equity SWIX, are significant at the 10% level. This implies that in our sample, Equity, Bond, and Money market funds do not significantly outperform their respective benchmarks. Comparing to *Table 9's* Jensen's alphas after fees, we see that fees exacerbates and further deteriorates the underperformance, with all alphas significant at the 1% level. This implies that Equity, Bond and Money market funds on average do not outperform their respective benchmarks after fees has been deducted. Thus, we reject our null hypothesis and conclude that Equity, Bond, and Money market funds do not significantly outperform their respective benchmarks on average.

Table 11: Jensen's Alpha (before fees)

Jensen's Alpha (before fees)			
Fund Type Mean	Jensen's Alpha	t stat	P-value
Equity ALSI*	-0.36%	-1.90000	0.0601
Equity SWIX	-0.28%	-1.35191	0.1793
Equity CAPI*	-0.40%	-1.73500	0.0855
Bond ALBI***	-0.54%	-5.50457	0.0000
Money Market SteFI***	-0.47%	-10.47700	0.0000

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 12: Jensen's Alpha (After fees)

Jensen's Alpha (after fees)			
Fund Type Mean	Jensen's Alpha	t stat	P-value
Equity ALSI*	-0.88%	-4.69919	0.000
Equity SWIX	-0.87%	-4.21004	0.000
Equity CAPI*	-0.96%	-4.15265	0.000
Bond ALBI***	-0.86%	-8.71676	0.000
Money Market SteFI***	-0.79%	-17.36229	0.000

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 13 and 14 show the three highest average annual fund returns and the three highest average total expense ratios over the sample period respectively. The top 3 highest fund returns all belong to equity funds with PSG equity fund (PSGG) having the highest annual return of 10,44%. In Table 13, it shows that the highest total expense ratio belongs to the Allan Gray equity fund (AGEF) of 2,37% per annum. Allan Gray equity fund has the highest TER. One would expect them to have one of the highest average annual returns since more resources are being allocated to research and decision making. The fund has an annual average return of 8,28% over the sample period, which relatively good over a 10-year period. However, if we subtract the average TER, then the net average annual return of 5,91%. That means if an investor had to invest R100 000 at the start of the sample period, and we compound the fees subtracted, they would've lost out on about R23,500 of the original investment by the end of the investment period. By lowering their fees by just 1%, the amount lost out on from fees is reduced to almost half. As previously mentioned, 10x suggest that paying 2% more in fees can mean about 40% less for retirement, as costs compound over time much like returns. Thus, we can see that the amount of fees charged over a long period can have a substantial impact on the amount of money an investor receives at the end of the investment period.

Table 13: Top 3 highest returns

Top 3	Asset Class	Highest Return
PSGG	Equity	10.44%
LIWA	Equity	9.72%
RVTU	Equity	9.36%

Table 14: Top 3 highest TER

Top 3	Asset Class	Highest TER
AGEF	Equity	2.37%
AFEA1	Equity	2.34%
AHMF	Equity	2.13%

Table 15 below shows the average expense ratios for the different fund types, as well as the maximum and minimum TER in that category of funds. Equities have the highest TER on average of 1,57% per annum and the lowest TER for actively managed funds belonging Bond funds, with an average TER of 0,95% per annum. The lowest TER across all funds belongs to

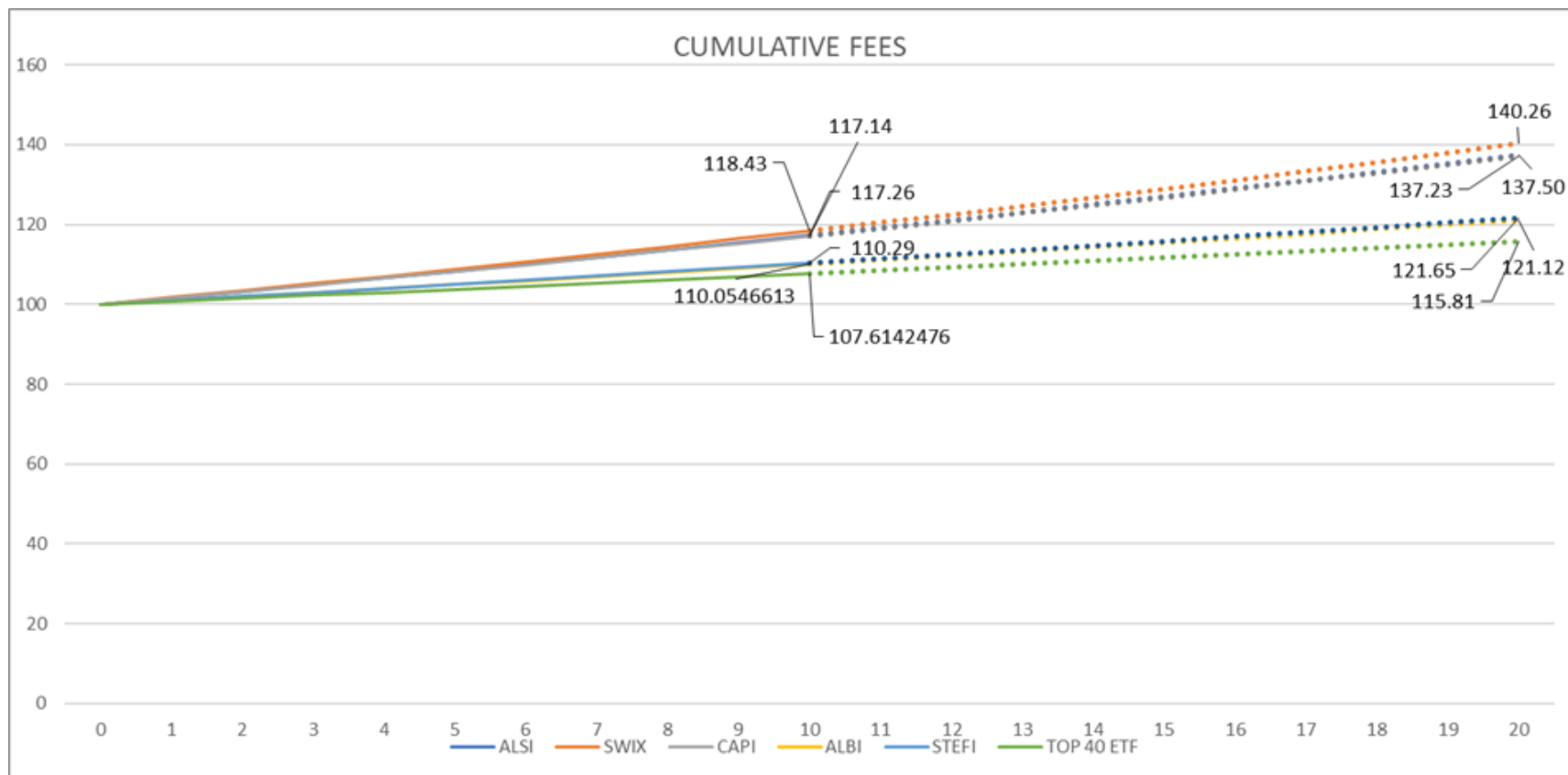
a bond fund with a TER of 0,42% per annum. The Top 40 ETF TER was added for comparison as ETF have the lowest fees, due to them being an index tracking fund. It is evident that the Top 40 ETF has the lowest TER compared to the actively managed funds, with its lowest TER being 0,17%. In *Table 5*, the average monthly benchmark returns are higher than the average monthly fund returns indexed to the same benchmark. Considering that ETF's have lower fees than actively managed funds, an argument can be made to invest in ETF's which passively track a benchmark since the benchmark returns are higher on average than the equivalent fund which indexes it.

Table 15: Average Total Expense Ratios

Fund Type	Average TER	Maximum	Minimum
Equity ALSI	1.60%	2.37%	0.58%
Equity SWIX	1.71%	2.13%	1.45%
Equity CAPI	1.59%	2.34%	1.47%
Bond ALBI	0.96%	1.49%	0.42%
Money Market SteFI	0.98%	1.43%	0.55%
Top 40 ETF	0.74%	1.24%	0.17%

By taking the average fees per fund category and compounding those fees over the sample period, it is seen how much of possible fund returns were lost due to compounded fees over the sample period. To get a better insight of how this effect could have an impact on performance returns, the average fees were extrapolated a further 10 years and the results can be seen in figure 11 below:

Figure 11: Cumulative Fees



Over a 10-year sample period, the SWIX index would have lost out of 18.43% of its original investment due to fees compounding over the 10-year period, which is the most across all fund categories. Investors who invested in Bond and Money market funds would've only lost about 10% of their original investment due to compounded fees. Extrapolated a further 10 years, can mean about 40% of your original investment being spent on fees if you were invested in a SWIX indexed equity fund. As demonstrated previously, a difference of 2% in fees, assuming a 6% return per annum after inflation, based on a R100k invested can result in a difference of R330 000 at retirement. In order for funds to warrant active fees, a fund has to consistently outperform its respective benchmark to justify the fees that they're charging. If a fund is not consistently outperforming its respective benchmark and considering that ETFs have substantially lower fees, it would make sense to invest in a passive fund which is matching the benchmark return coupled with a lower fee.

All funds across all fund categories had a statistically significant negative alpha on average before and after fees. Thus, funds across all categories in the sample could not significantly outperform their respective benchmark before and after accounting for fees. This also implies that fund managers could not display any selectivity skills. The top three highest returns belonged to equity funds as well as the top three highest total expense ratios. Equity SWIX indexed funds had the highest TER out of all the fund categories on average. It was also demonstrated that paying high fees over a prolonged period could erode performance as the compounding effect is exacerbated with time. A difference of 1% or 2% of fees could mean much less of your potential investment return at retirement. Given the results, funds in the sample weren't able to justify the fees that they charged considering that no funds outperformed their benchmark before and after fees. This contradicts the outdated studies of Friend, Blume and Crockett (1970), Williamson (1972) and Crenshaw (1997) who all found that mutual fund managers were able to justify the expense they charged.

4.3 Correlation

In order to investigate the effects fees, have on returns, *Table 16* below presents pairwise correlations for our average fund returns and average total expense ratios across the different fund classes.

Table 16: Pairwise Correlation Table

	Equity Average	Equity TER	Bond Average	Bond TER	Money Market Average	MM TER
Equity Average	1					
Equity TER	0.118568171	1				
Bond Average	0.091876104	-0.033080767	1			
Bond TER	0.341964004	0.314714558	0.028549848	1		
Money Market Average	0.063109914	0.0700493	0.569887067	0.079499036	1	
MM TER	0.264904904	-0.219794158	-0.100337264	0.018272237	-0.264510213	1

In theory we can expect funds with higher returns to have higher TER, as a higher TER implies more resources are allocated to research and decision making and should result in higher returns. Since Equities have the highest average TER and highest fund returns, we would expect a positive relationship. However, from *Table 16* we can see that Equities have a weak positive correlation of 0,12 with average Equity TER. This implies that there is little or no correlation between fund returns and the amount of fees charged. This relationship of 0,12 is insignificant at the 10% level. Bond returns have almost no correlation to total expense ratios, also insignificant at the 10% level. Money market returns show a negative correlation of -0,26, implying that the higher fee charged for Money market funds results in lower fund returns on average. However, the correlation has a p-value of 0,12, thus being insignificant at the 10% level. Interestingly, Bond returns have a strong positive correlation with Money market returns of 0,57 and significant at the 5% level. This can be explained by the fact that both funds hold fixed income instruments, and bond funds holding money market instruments due to having a wider mandate.

The results show that TER's are not significant in explaining risk adjusted returns and fund performance across the different fund types in our sample. These results are consistent with the market notion, that in general, portfolio managers use their available resources successfully to offset their fund expenses through acting on net market information. In a study conducted by Ippolito (1989), he stated that since risk adjusted returns are measured net of expenses, fund managers who use their resources efficiently should be able to generate high enough returns to

offset expenses and we should expect fund expense ratios to not be significantly different from zero. Dellva and Olson (1998) investigated the relationship between fees and risk adjusted performance and found that funds with superior performance had lower expense ratios on average. This contradicts the findings of Griffith (2009) and similarly the findings of this paper, as no relationship between mutual fund performance and expense ratios could be found.

4.4 Performance Based ratios

Performance ratios were calculated to evaluate past performances of funds across the different fund asset classes. Three different ratios were used namely Sharpe, Information and Sortino and the results are presented and discussed below.

4.4.1 Sharpe Ratio

The Sharpe ratio evaluates the performance of a fund given the level of total risk taken. A higher Sharpe ratio, the more the investor is getting per unit of risk, while a lower Sharpe ratio means the investor is carrying more risk to earn additional returns. Due to many of the funds experiencing negative returns, the Sharpe ratios were modified in order to rank them accordingly. The average Sharpe ratio of each fund type and benchmark as well as the individual fund Sharpe ratios are given in the tables below:

Table 17: Fund Average Sharpe Ratios

Fund Sharpe Ratios					
Fund Type	9-year excess annual return (2010-2019)	Standard Deviation (Annual)	Standard SR	Modified SR	Rank
Equity SWIX	0.00539	0.10616	0.05072	0.0060339212	1
Money Market SteFI***	-0.05922	0.01621	-3.42433	-0.0000000412	2
Bond ALBI***	-0.05390	0.04635	-1.16286	-0.0015150602	3
Equity CAPI*	-0.00378	0.12138	-0.03115	-0.0035403180	4
Equity ALSI*	-0.00832	0.09699	-0.08582	-0.0068133751	5

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 18: Benchmark Sharpe Ratios

Sharpe Ratios					
Benchmark	9-year excess annual return (2010-2019)	Standard Deviation (Annual)	Standard SR	Modified SR	Rank
SWIX	0.05851	0.11190	0.52292	0.1839297932	1
CAPI	0.05722	0.11264	0.50801	0.1735020308	2
ALSI	0.05795	0.11592	0.49986	0.1701389807	3
ALBI	0.02366	0.07205	0.32843	0.0561407308	4
STEFI	0.00035	0.00240	0.14517	0.0008364701	5

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 19: Equity ALSI Fund Sharpe Ratios

ALSI Fund Sharpe Ratios							
Equity Fund Name	9-year annual excess return (2010-2019)	Standard Deviation	Standard SR	Standard SR rank	Modified SR	Modified SR rank	
RVTU	0.031470091	0.078160609	0.402633647	1	0.087825029	1	
PSGG	0.042843226	0.124902327	0.343013836	2	0.087452248	2	
AYEF	0.029394272	0.094041992	0.312565389	3	0.061541315	3	
AGEF	0.020909168	0.109539854	0.190881827	4	0.031890767	4	
SGEA	0.015578088	0.12441592	0.125209765	5	0.020222951	5	
MHGE	0.010365811	0.125748359	0.082432975	6	0.012297986	6	
HLMK*	0.00836738	0.106163619	0.078815891	7	0.00998523	7	
ASEF	0.005345492	0.119135161	0.044869135	8	0.005880916	8	
LIPA*	-0.005748319	0.128933561	-0.044583571	9	-0.005246598	10	
MOEF*	-0.00804614	0.122597855	-0.065630347	10	-0.007010748	11	
FNBG*	-0.008099612	0.119946476	-0.067526883	11	-0.007018933	12	
CGMG*	-0.011929003	0.13387374	-0.089106369	12	-0.009972112	14	
SNVL**	-0.010654856	0.117291995	-0.09084044	13	-0.008769999	13	
DIEF**	-0.020712311	0.111440566	-0.185859706	14	-0.013775656	15	
FEFA**	-0.047308124	0.114673637	-0.412545767	15	-0.019360716	17	
MCEF**	-0.063879196	0.113118474	-0.564710554	16	-0.018658634	16	
RCFFB**	-0.073914893	0.120922552	-0.611258133	17	-0.020319222	18	
PTIC**	-0.054870192	0.026625195	-2.060837169	18	-3.11976E-05	9	

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 20: Equity SWIX Fund Sharpe Ratios

SWIX Fund Sharpe Ratios						
Equity Fund Name	9-year excess return	Standard Deviation	Standard SR	Standard SR rank	Modified SR	Modified SR rank
LIWA	0.036212474	0.11281091	0.321001527	1	0.07295498	1
MSTT	0.0319572	0.115824207	0.275911239	2	0.057926463	2
MNEF	0.008240622	0.134424111	0.061303153	3	0.009319381	3
AHMF	0.001503192	0.114957916	0.013076016	4	0.001546318	4
MTLE	-0.005928615	0.12917757	-0.045895081	5	-0.005397108	5
MVLT	-0.010087063	0.110282349	-0.091465797	6	-0.008244926	6
RMEC	-0.022909463	0.119807081	-0.191219611	7	-0.015268722	7

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 21: Equity CAPI Fund Sharpe Ratios

CAPI Fund Sharpe Ratios						
Equity Fund Name	9-year excess return (2010-2019)	Standard Deviation	Standard SR	Standard SR rank	Modified SR	Modified SR rank
FEQF	0.020712074	0.128871854	0.160718367	1	0.028789726	1
VAGE	0.011219146	0.115898075	0.096801829	2	0.013821619	2
CNTF	0.001902989	0.145468441	0.013081798	3	0.001951591	3
AFEA1	-0.01078447	0.125337523	-0.08604343	4	-0.009019753	4
HUEF	-0.018143135	0.126927458	-0.142940977	5	-0.01350746	5
CAOF	-0.026834938	0.115714376	-0.231906687	6	-0.016273983	6

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 22: Bond Fund Sharpe Ratios

ALBI Fund Sharpe Ratios							
Bond Fund Name	9-year annual excess return (2010-2019)	Standard Deviation	Standard SR	Standard SR rank	Modified SR	Modified SR rank	
ASMPB1	-0.011291382	0.12730028	-0.088698796	1	-0.009404734	19	
CBFCP*	-0.04574914	0.082457594	-0.554820219	2	-0.011457393	21	
CGMI**	-0.053777833	0.084810331	-0.634095312	3	-0.011249616	20	
SNGF**	-0.054251319	0.074358884	-0.729587586	4	-0.008146082	18	
LBBF**	-0.052578669	0.069492809	-0.756605899	5	-0.00699221	15	
PBQF**	-0.057664088	0.074648938	-0.772470308	6	-0.007768723	17	
OMGI**	-0.056690578	0.071933896	-0.788092699	7	-0.007123093	16	
ABBA**	-0.051042637	0.063939081	-0.798301072	8	-0.005682967	10	
RMGF**	-0.054857645	0.068497813	-0.800867096	9	-0.006408685	12	
CAUF**	-0.055848569	0.069289046	-0.80602306	10	-0.006494728	14	
ASMBB1**	-0.055687223	0.069070769	-0.806234301	11	-0.00645587	13	
PHYB**	-0.058986619	0.070126073	-0.841151034	12	-0.006309048	11	
AGBD**	-0.0510691	0.05531768	-0.923196705	13	-0.003528372	8	
VELG**	-0.059011558	0.061080358	-0.966129859	14	-0.003962419	9	
MHFI**	-0.047796946	0.036858128	-1.296781699	15	-0.000661465	5	
SBFFA**	-0.058176556	0.042594729	-1.365815856	16	-0.000781089	7	
ABFCA**	-0.05826368	0.041566199	-1.401708134	17	-0.000674955	6	
STFA**	-0.060482768	0.031370064	-1.928040945	18	-7.63575E-05	4	
PPFI**	-0.055358818	0.026997445	-2.050520623	19	-3.36188E-05	2	
MRCI**	-0.073838565	0.033370808	-2.212669379	20	-3.99008E-05	3	
ABSC**	-0.058303913	0.021547839	-2.705789325	21	-0.0000018	1	

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 23: Money Market Fund Sharpe Ratios

STEFI Fund Sharpe Ratios

Money Market Fund Name	9-year average excess return (2010-2019)	Standard Deviation	Standard SR	Standard SR rank	Modified SR	Modified SR rank
AHAY**	-0.057562588	0.051232743	-1.123550774	1	-0.002042921	14
INAB**	-0.034493915	0.024850728	-1.388044469	2	-0.000204363	13
MIPP**	-0.047187618	0.028685407	-1.645004325	3	-0.000136985	12
PEICA**	-0.046292023	0.026552584	-1.74340934	4	-8.28093E-05	9
RICA**	-0.054371149	0.030694787	-1.771347977	5	-0.000113614	11
GFIF**	-0.065151536	0.034294156	-1.899785364	6	-0.000107438	10
GDBI**	-0.059217669	0.030069977	-1.969328726	7	-5.96204E-05	8
SAIFA1**	-0.054849417	0.026347325	-2.081783116	8	-2.82806E-05	7
STDI**	-0.063351505	0.023054503	-2.74790157	9	-2.00803E-06	6
DDIF**	-0.050870444	0.014428911	-3.525591312	10	-1.64693E-08	5
INAH**	-0.061168369	0.015568184	-3.929062663	11	-4.82744E-09	4
NCPB**	-0.061561488	0.011087171	-5.552497474	12	-8.57396E-13	3
SCPA**	-0.060054973	0.003176923	-18.90350447	13	-3.61177E-49	2
ASSIFA**	-0.060714786	0.002530416	-23.99399787	14	0.000000000	1

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Swix Equity funds had the highest Sharpe ratios which can be expected as they also had the highest gross return, Excess annual return as well as the highest Jensen's Alpha across all fund types. This implies that Swix Equity funds have the highest risk-adjusted performance compared to the other fund classes, however, it is the only fund class type that is insignificant at the 10% level. Although having the highest excess annual return, Swix Equity funds also had the second highest standard deviation, which means these funds took on a lot of risk to earn higher returns. Money market STEFI funds had the lowest excess annual return on average but because these funds took on the least amount of risk, it resulted in them having the second highest Sharpe ratio on average.

In *Table 21*, the SWIX benchmark has the highest Sharpe ratio, implying it has the highest risk-adjusted returns given the level of total risk. The STEFI benchmark has the lowest excess return as well as the lowest standard deviation, resulting in the lowest Sharpe ratio. All funds except for CAPI indexed Equity funds, exhibited less risk compared to their respective benchmarks on average. All the fund average Sharpe ratios are substantially less than the Sharpe ratios of their respective benchmarks. Since Sharpe ratios are used to evaluate performance, we can see from the tables above that none of the funds across the different asset classes are able to outperform their respective benchmark on average. Investors are getting less return per unit of risk compared to their respective benchmark.

Assigning a score to each fund, we can rank each fund in each fund category. Since a lot of funds exhibit negative returns, a modified Sharpe ratio was used to rank the funds. A higher rank represents superior performance, while a lower rank implies that the manager was not compensated for taking risks. Rezco Value Trend (RVTU) fund has the highest rank for the ALSI indexed Equity funds with a modified Sharpe ratio of 0,088. Stanlib Equity fund (LIWA) ranked the highest out of the SWIX indexed Equity funds with a modified Sharpe ratio of 0,073, while Select BCI equity fund (FEQF) ranked the highest out of the CAPI indexed Equity funds with a modified Sharpe ratio of 0,029. The highest-ranking modified Sharpe ratio for ALBI indexed Bond funds is the Absa Income Enhancer (ABSC) of -0.0000018, while the highest-ranking modified Sharpe ratio for STEFI indexed Money market funds is Ashburton Stable Income fund (ASSIFA) with a modified Sharpe ratio of 0.00. Only the ABSC and ASSIFA

Sharpe ratios are significant at the 10% level. Only 15 out of 66 funds had positive Sharpe Ratios and of those 15 only 4 had a Sharpe ratio of greater than 0.3.

SWIX equity funds had the highest Sharpe ratios while CAPI equity funds took on the most risk on average. Similarly, the SWIX benchmark had the highest Sharpe ratio out of all the benchmarks. Almost 80% of funds in the sample had a negative Sharpe ratio with 94% having a Sharpe ratio less than 0.3. Due to all the benchmark Sharpe ratios being higher than the average fund Sharpe ratios, implies that none of the funds were able to outperform their respective benchmark on a risk-adjusted level on average.

4.4.2 Information Ratio

The Information ratio (IR) is used to gauge the skill of managers of mutual funds and to evaluate performance. The IR identifies how much of a fund has exceeded a benchmark and a higher IR indicates a desired level of consistency while a lower IR indicates the opposite. The IR is not useful in evaluating funds in different asset classes, thus funds in different asset classes should not be compared. Therefore, Information ratios will be looked at on a standalone basis and the results of the average IR values and individual fund IRs are displayed in the Tables below.

Table 24: Fund Average Information Ratios

Fund Information Ratios						
Fund Type	Mean	9-year excess annual return (2010-2019)	Annual Tracking error	Standard IR	Modified IR	Rank
Money Market SteFI*		-0.05636	0.01651	-3.41278	-0.000000047	1
Bond ALBI***		-0.07590	0.05381	-1.40558	-0.001244075	2
Equity ALSI*		-0.06293	0.08047	-0.78197	-0.008771278	3
Equity SWIX		-0.05042	0.08155	-0.61832	-0.010704179	4
Equity CAPI*		-0.05796	0.08514	-0.68081	-0.010833473	5

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 25: Equity ALSI Fund Information Ratio

Equity ALSI Fund Information Ratios						
Equity Fund Name	9-year excess annual return (2010-2019)	Annual Tracking error	Standard IR	Standard IR rank	Modified IR	Modified IR rank
PSGG	-0.014341634	0.111736155	-0.128352675	1	-0.010825096	3
RVTU	-0.025141501	0.097499522	-0.25786281	2	-0.013794073	14
AYEF	-0.027112631	0.089572749	-0.302688392	3	-0.013061934	11
AGEF	-0.035169634	0.083154354	-0.422943991	4	-0.012283997	6
SGEA	-0.040231595	0.086815571	-0.463414507	5	-0.012962775	9
HLMK	-0.047078115	0.101087461	-0.465716669	6	-0.016191609	16
MHGE	-0.045180639	0.091147492	-0.495687135	7	-0.013781967	13
ASEF*	-0.049947316	0.082223304	-0.607459365	8	-0.010950039	4
LIPA*	-0.060480265	0.093196299	-0.64895565	9	-0.012965794	10
CGMG**	-0.066348256	0.100978562	-0.657052891	10	-0.014708061	15
SNVL**	-0.065138584	0.096866182	-0.672459501	11	-0.013554396	12
MOEF**	-0.062661853	0.092664015	-0.676226404	12	-0.012542995	7
FNBG**	-0.06271262	0.086334934	-0.726387535	13	-0.01058313	2
DIEF**	-0.074686925	0.097780532	-0.763822037	14	-0.012646697	8
PTIC**	-0.107112511	0.124178458	-0.862569187	15	-0.017717091	18
FEFA**	-0.099934381	0.105729246	-0.945191467	16	-0.011950677	5
RCFFB**	-0.125189169	0.127524354	-0.981688318	17	-0.016578223	17
MCEF**	-0.115663787	0.107130919	-1.079648975	18	-0.010371604	1

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 26: Equity SWIX Information Ratio

Equity SWIX Fund Information Ratios						
Equity Fund Name	9-year excess return (2010-2019)	Standard Deviation	Standard IR	Standard IR rank	Modified IR	Modified IR rank
LIWA	-0.021166979	0.088506277	-0.239157942	1	-0.011852757	2
MSTT	-0.025205712	0.091824679	-0.274498231	2	-0.013086791	4
MNEF	-0.047714067	0.101075604	-0.47206314	3	-0.016172482	5
AHMF	-0.054107844	0.105582982	-0.512467476	4	-0.017095581	6
RMEC*	-0.077273708	0.120173602	-0.643017326	5	-0.019784863	7
MTLE**	-0.061160362	0.088029532	-0.694770951	6	-0.011303905	1
MVLT**	-0.065106479	0.092021828	-0.707511261	7	-0.012038304	3

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 27: Equity CAPI Fund Information Ratio

Equity CAPI Fund Information Ratios						
Equity Fund Name	9-year excess return (2010-2019)	Standard Deviation	Standard IR	Standard IR rank	Modified IR	Modified IR rank
FEQF	-0.034692634	0.089430992	-0.387926297	1	-0.0136	5
VAGE	-0.043711952	0.085617026	-0.510552094	3	-0.01246	4
CNTF	-0.052562966	0.10564139	-0.497560342	2	-0.01718	6
AFEA1**	-0.064616391	0.091461876	-0.706484422	4	-0.01193	3
HUEF**	-0.071607015	0.09329856	-0.767503971	5	-0.0116	2
CAOF**	-0.079863813	0.089160085	-0.895735045	6	-0.00916	1

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 28: Bond Fund Information Ratio

Bond Fund Information Ratios							
Bond Fund Name	9-year excess annual return (2010-2019)	Annual Tracking error	Standard IR	Standard IR rank	Modified IR	Modified IR rank	
ASMPB1	-0.034213441	0.126415046	-0.270643745	1	-0.019548085	21	
SBFFA**	-0.080099263	0.089085553	-0.899127418	2	-0.009106919	20	
ABFCA**	-0.080184526	0.08882336	-0.90274142	3	-0.009013273	19	
MHFI**	-0.06994124	0.069975771	-0.999506527	4	-0.00490062	16	
CBFCP**	-0.067937128	0.067672887	-1.003904684	5	-0.004549409	15	
PPFI**	-0.077341698	0.076258345	-1.014206351	6	-0.005686204	18	
CGMI**	-0.07579447	0.070238281	-1.079104851	7	-0.004314891	14	
ABSC**	-0.0802239	0.071981397	-1.114508787	8	-0.004272339	13	
MRCI**	-0.095426531	0.082394448	-1.158167015	9	-0.005297829	17	
ASMBB1**	-0.077663091	0.065445429	-1.186684733	10	-0.00305518	12	
SNGF**	-0.076257846	0.062160613	-1.226787225	11	-0.002524553	8	
STFA**	-0.076479902	-0.076479902	-1.227287143	12	-0.002536161	9	
PBQF**	-0.07959774	0.064765098	-1.229022141	13	-0.002754308	11	
CAUF**	-0.077820992	0.062961293	-1.236013244	14	-0.002551149	10	
OMGI**	-0.07864502	0.063110614	-1.246145705	15	-0.00251434	7	
AGBD**	-0.073143561	0.054558219	-1.340651557	16	-0.00148165	5	
LBBF**	-0.074620906	0.055305706	-1.349244255	17	-0.001501586	6	
ABBA**	-0.073117662	0.054145355	-1.350395839	18	-0.001425045	4	
RMGF**	-0.076851226	0.053166817	-1.445473519	19	-0.0011056	3	
VELG**	-0.08091643	0.054084784	-1.496103411	20	-0.001029404	2	
PHYB**	-0.080892023	0.05235427	-1.54508932	21	-0.000848345	1	

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 29: Money Market Fund Information Ratio

Money Market Fund Information Ratios

Money Market Fund Name	9-year excess annual return (2010-2019)	Annual Tracking error	Standard IR	Standard IR rank	Modified IR	Modified IR rank
AHAY**	-0.058436551	0.051187497	-1.141617686	1	-0.001963556	14
INAB**	-0.035387469	0.024966672	-1.41738829	2	-0.00018936	13
MIPP**	-0.048070397	0.028876412	-1.66469425	3	-0.000131569	12
PEICA**	-0.047175562	0.026849072	-1.757064919	4	-8.18924E-05	9
RICA**	-0.055247825	0.031104823	-1.776181955	5	-0.000116226	11
GFIF**	-0.066019046	0.034324994	-1.923352021	6	-0.000100724	10
GDBI**	-0.060090226	0.030180622	-1.991020145	7	-5.64823E-05	8
SAIFA1**	-0.055725686	0.026610923	-2.094090702	8	-2.80536E-05	7
STDI**	-0.064220546	0.023566921	-2.725029173	9	-2.35587E-06	6
DDIF**	-0.051750095	0.014444584	-3.582664168	10	-1.32054E-08	5
INAH**	-0.062039266	0.015928692	-3.894812443	11	-6.17299E-09	4
NCPB**	-0.062432052	0.011886815	-5.252210384	12	-4.84447E-12	3
SCPA**	-0.060926817	0.003480739	-17.50398967	13	-5.67872E-45	2
ASSIFA**	-0.061043702	0.003391709	-17.99791742	14	-2.17931E-46	1

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Of all the fund categories, none of them were able to outperform their respective benchmark on an absolute basis over the sample period. The excess returns for all funds were negative on average, as seen in *Table 4* and *5*, where the benchmark returns are higher on average than the fund returns. STEFI funds had the highest IR on average, although this does not imply that these managers had the most skill. All average IR values are less than 0,5 and all except SWIX indexed Equity funds are significant at the 10% level. This indicates that managers across all fund categories struggled to consistently outperform their respective benchmarks.

The tracking error in *Table 24*, shows how closely a portfolio follows the index which it is benchmarked to and can be viewed as an indicator of how actively a fund is managed and its corresponding risk level. CAPI indexed Equity funds are the most actively managed funds on average. These funds have the highest tracking error but also the lowest annual excess return on average, resulting in the lowest IR value across the fund categories.

Similarly, to the Sharpe ratios, a score was assigned to rank each fund, with a higher rank representing superior performance and a lower rank indicating that the manager was not compensated for deviating from the benchmark. Out of the funds indexed to Equity benchmarks, Cannon Equity H4 Fund (MCEF) ranked the highest for ALSI indexed funds, First Ave SCI Focused Qual Equity (MTLE) ranked the highest for SWIX indexed funds and Coronation Top 20 (CAOF) ranked the highest for CAPI indexed funds. Prudential High Yield Bond Fund (PHYB) ranked the highest for ALBI indexed bond funds, while Ashburton Stable Income Fund (ASSIFA) ranked the highest for STEFI indexed Money market funds. All funds in the sample were negative, had an IR value less than 0,5 and significant at the 5% level. Therefore, none of the managers in the sample were able to exhibit skill in consistently outperforming their benchmarks.

STEFI funds had the highest Information ratio on average across all the fund categories while the CAPI indexed equity funds had the lowest. Although the SWIX indexed equity funds had the highest gross return, the SWIX benchmark had the highest benchmark return resulting in a

very low relative IR value. Across all fund categories, fund managers failed to show any skill in outperforming their respective benchmarks on a consistent basis.

4.4.3 The Sortino Ratio

The Sortino ratios evaluates performance similar to the Sharpe ratio, however, instead of using standard deviation (Total risk) it looks at target semi standard deviation (Downside risk). A higher Sortino ratio indicates that the portfolio is operating efficiently by not taking on unnecessary risk that is not being rewarded in the form of higher returns. When looking at two similar investments, a rationale investor would prefer a higher Sortino ratio because this would imply the investment is earning more return per unit of bad risk that is taken on. The Tables below show the results for the Sortino ratios for the fund type averages ,their respective benchmarks which they are indexed to as well as the individual fund Sortino Ratio.

Table 30: Fund Average Sortino Ratios

Fund Sortino Ratios						
Fund Type Mean	9-year excess annual return (2010-2019)	Targeted Semi-Standard Deviation	Standard STR	Modified STR	Rank	
Equity SWIX	0.00539	0.06944	0.07755	0.006622481	1	
Money Market SteFI*	-0.05922	0.02726	-2.17232	-0.000023655	2	
Equity CAPI*	-0.00378	0.07774	-0.01406	-0.000299193	3	
Bond ALBI***	-0.05390	0.03484	-1.54707	-0.000299302	4	
Equity ALSI*	-0.00832	0.06314	-0.13182	-0.005783356	5	

Significant levels: * inidcates 10%.**indicates 5%,***indicates 1%

Table 31: Benchmark Sortino Ratios

Benchmark Sortino Ratios						
Benchmark	9-year excess annual return (2010-2019)	Targeted Semi-Standard Deviation	Standard STR	Modified STR	Rank	
SWIX	0.05851	0.06331	0.92417	0.7496703250	1	
CAPI	0.05722	0.06208	0.92170	0.7414435221	2	
ALSI	0.05795	0.06375	0.90901	0.7076010231	3	
ALBI	0.02366	0.05064	0.46727	0.0953760666	4	
STEFI	0.00035	0.00240	0.14517	0.0008364701	5	

Significant levels: * inidcates 10%.**indicates 5%,***indicates 1%

Table 32: Equity ALSI Fund Sharpe Ratio

Equity ALSI Fund Sortino Ratios

Equity Fund Name	9-year annual excess return (2010-2019)	Targeted Semi-Standard Deviation	Standard STR	Standard STR rank	Modified STR	Modified STR rank
RVTU**	0.031470091	0.046920937	0.670704653	1	0.244916785	1
PSGG**	0.042843226	0.075146302	0.570130867	2	0.187396698	2
AYEF*	0.029394272	0.059072244	0.497598706	3	0.120121488	3
AGEF	0.020909168	0.072700988	0.287604997	4	0.044438914	4
SGEA	0.015578088	0.087111849	0.178828578	5	0.024102308	5
HLMK	0.00836738	0.063863279	0.131020208	6	0.011998466	7
MHGE	0.010365811	0.085272997	0.121560304	7	0.013982157	6
ASEF	0.005345492	0.075231068	0.07105431	8	0.00642428	8
LIPA	-0.005748319	0.082169442	-0.06995689	9	-0.004826334	10
MOEF	-0.00804614	0.084805962	-0.094877053	10	-0.00636678	12
FNBG	-0.008099612	0.077655606	-0.104301698	11	-0.006204508	11
CGMG	-0.011929003	0.098133338	-0.121559128	12	-0.008996017	15
SNVL	-0.010654856	0.080715606	-0.132004912	13	-0.007642943	13
DIEF	-0.020712311	0.069673664	-0.297276038	14	-0.009382111	17
FEFA**	-0.047308124	0.078062978	-0.606025094	15	-0.010086249	18
MCEF**	-0.063879196	0.081368969	-0.785055987	16	-0.008912686	14
RCFFB**	-0.073914893	0.086506097	-0.854447208	17	-0.009130498	16
PTIC**	-0.054870192	0.023153841	-2.369809449	18	-7.3081E-06	9

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 33: Equity SWIX Fund Sortino Ratio

Equity SWIX Fund Sortino Ratios

Equity Fund Name	9-year excess annual	Targeted Semi-Standard Deviation	Standard STR	Standard STR rank	Modified	Modified STR rank
LIWA	0.036212474	0.081799376	0.459477982	1	0.116372	1
MSTT	0.0319572	0.081969482	0.390677802	2	0.084983	2
MNEF	0.008240622	0.086939211	0.100532804	3	0.010597	3
AHMF	0.001503192	0.078812208	0.01956395	4	0.001581	4
MTLE	-0.005928615	0.071773101	-0.068192648	5	-0.00502	5
MVLT	-0.010087063	0.077116101	-0.140540994	6	-0.00697	6
RMEC	-0.022909463	0.076834769	-0.297077563	7	-0.0107	7

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 34: Equity CAPI Fund Sortino Ratio

Equity CAPI Fund Sortino Ratios

Equity Fund Name	9-year excess annual return (2010-2019)	Targeted Semi-Standard Deviation	Standard STR	Standard STR rank	Modified STR	Modified STR rank
FEQF	0.020712074	0.082605242	0.250735586	1	0.038705	1
VAGE	0.011219146	0.074991289	0.149605986	2	0.01653	2
CNTF	0.001902989	0.091511756	0.020795019	3	0.002	3
AFEA1	-0.01078447	0.083602342	-0.128997227	4	-0.00783	4
HUEF	-0.018143135	0.083519203	-0.217233094	5	-0.01058	5
CAOF	-0.026834938	0.077504575	-0.346236818	6	-0.01107	6

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 35: Bond Fund Sharpe Ratios

Bond Fund Sortino Ratios

Bond Fund Name	9-year annual excess return (2010-2019)	Targeted Semi-Standard Deviation	Standard STR	Standard STR rank	Modified STR	Modified STR rank
ASMPB1	-0.011291382	0.100230424	-0.032690001	1	-0.008713757	21
CBFCP**	-0.04574914	0.062492527	-0.21589677	2	-0.006009527	20
CGMI**	-0.053777833	0.063952609	-0.248944569	3	-0.005326574	19
CAUF**	-0.055848569	0.058047333	-0.285114333	4	-0.003610944	18
PBQF**	-0.057664088	0.058895347	-0.29039745	5	-0.003603288	17
ASMBB1**	-0.055687223	0.055415553	-0.297769012	6	-0.003042482	16
SNGF**	-0.054251319	0.052347026	-0.306884209	7	-0.002550926	15
LBBF**	-0.052578669	0.049225483	-0.316029489	8	-0.002108206	13
ABBA**	-0.051042637	0.046857672	-0.322063151	9	-0.001819693	11
OMGI**	-0.056690578	0.052121683	-0.322446353	10	-0.002280685	14
SBFFA**	-0.058176556	0.051033289	-0.338197131	11	-0.001957656	12
RMGF**	-0.054857645	0.047712869	-0.340552627	12	-0.001659605	10
PHYB**	-0.058986619	0.048962114	-0.357551187	13	-0.001557312	9
ABFCA**	-0.05826368	0.048270702	-0.35810302	14	-0.001501683	8
AGBD**	-0.0510691	0.040070287	-0.376816486	15	-0.000846198	7
VELG**	-0.059011558	0.043128476	-0.406090724	16	-0.000799688	6
MHFI**	-0.047796946	0.029560565	-0.477312309	17	-0.000160943	5
PPFI**	-0.055358818	0.02397906	-0.683977424	18	-1.00651E-05	2
STFA**	-0.060482768	0.026138381	-0.68724417	19	-1.31614E-05	3
MRCI**	-0.073838565	0.031263423	-0.706023201	20	-2.05983E-05	4
ABSC**	-0.058303913	0.018793991	-0.920408862	21	-2.5778E-07	1

Significant levels: * indicates 10%. ** indicates 5%, *** indicates 1%

Table 36: STEFI Fund Sortino Ratio

STEFI Fund Sortino Ratios

Money Market Fund N 9-year excess return (2010-2019)	Targeted Semi-Standard Deviation	Standard STR	Standard STR rank	Modified STR	Modified STR rank	
AHAY**	-0.057562588	0.059492447	-0.967561274	1	-0.003752814	14
INAB**	-0.034493915	0.020156454	-1.711308713	2	-4.32585E-05	13
RICA**	-0.054371149	0.026345632	-2.063763308	3	-2.99285E-05	12
MIPP**	-0.047187618	0.022542909	-2.093235515	4	-1.6838E-05	10
PEICA**	-0.046292023	0.021860588	-2.117601891	5	-1.41114E-05	9
GDBI**	-0.059217669	0.027260093	-2.172320904	6	-2.36545E-05	11
SAIFA1**	-0.054849417	0.024265501	-2.260386747	7	-1.22637E-05	8
GFIF**	-0.065151536	0.024919036	-2.614528762	8	-4.18417E-06	7
STDI**	-0.063351505	0.022802708	-2.778244796	9	-1.73717E-06	6
INAH**	-0.061168369	0.014191704	-4.31014976	10	-6.63008E-10	5
DDIF**	-0.050870444	0.0117262	-4.338186703	11	-2.1385E-10	4
NCPB**	-0.061561488	0.010096172	-6.097507743	12	-4.16523E-14	3
SCPA**	-0.060054973	0.002674063	-22.45832212	13	-9.9344E-60	2
ASSIFA**	-0.060714786	0.002530416	-23.99399787	14	-2.98872E-64	1

Significant levels: * indicates 10%. ** indicates 5%. *** indicates 1%

SWIX indexed Equity funds have the highest Sortino ratios on average. This indicates that SWIX indexed Equity funds have the highest risk-adjusted performance compared to the other fund classes and are earning more return per unit of bad risk. Similar to the Sharpe ratios and Information ratios, SWIX indexed funds are the only fund category that is insignificant at the 10% level. If you compare the Sortino ratios in *Table 30* with the Sharpe ratios in *Table 17*, you can see that the excess returns are the same, but the TSSD (Target semi standard deviation) is less than the standard deviation on average, as the Sortino ratio only focuses on downside risk. For STEFI indexed Money market funds, we can see that the downside risk is higher than the total risk. This results in the Sortino ratio being less than the Sharpe ratio, as funds in this category are taking on more bad risk compared to total risk on average. CAPI indexed Equity funds have the highest TSSD, implying that these funds take on the most “bad” risk across all fund categories on average.

Table 31 shows similar results to the benchmark Sharpe ratios in *Table 18*. The SWIX benchmark has the highest risk-adjusted returns given the level of bad risk taken on. The STEFI benchmark has the lowest TSSD as well as the lowest excess return, resulting in having the lowest Sortino ratio. None of the fund average Sortino ratios are higher than their respective benchmark Sortino ratios. These results imply that none of the funds across the different fund asset classes can outperform their respective benchmarks. Investors are getting less return per unit of downside risk compared to their respective benchmark.

Much like the previous two performance-based ratios, a score is assigned to each fund and is ranked within its category. Due to negative returns, a modified Sortino ratio is used to rank the funds. A higher rank represents that a portfolio is operating efficiently by not taking on unnecessary risk, while a low or negative Sortino ratio suggests that the investor is not being rewarded for taking on additional risk. Rezco Value Trend Fund (RVTU) is ranked the highest for ALSI indexed Equity funds, Stanlib Equity Fund (LIWA) is ranked the highest for SWIX indexed funds and Select BCI Equity fund (FEQF) is ranked the highest for CAPI indexed Equity funds. Again, ABSA Income Enhancer fund (ABSC) and Ashburton Stable Income fund (ASSIFA) ranked the highest for ALBI indexed bond funds and STEFI indexed Money market funds respectively. Similarly to the Sharpe ratios, almost 80% of funds have a negative

Sortino ratios, however, about 9% of funds had a Sortino ratio greater than 0.3. Only RVTU, ABSC and ASSIFA had Sortino ratios that were significant at the 10% level.

SWIX indexed equity funds had the highest risk-adjusted performance compared to the other fund categories and these funds are generating more return per unit of the given risk, and in turn have a greater chance of avoiding large losses. Similarly, the SWIX benchmark had the highest Sortino ratio out of the benchmarks. We saw that none of the funds in the sample had a Sortino ratio greater than their respective benchmark. These results show that fund managers across the different fund type categories are underperforming and investors are getting less return per unit of downside risk relative to their respective benchmark.

In *Table 4* and *Table 5* we saw that SWIX indexed equity funds had the highest gross return, excess annual return, and Jensen's alpha. This translated into the SWIX indexed equity funds having the highest Sharpe ratio and Sortino ratio as they had the highest performance adjusted for total and downside risk, although not significant at the 10% level. Similarly, the SWIX benchmark had the highest Sharpe ratio and Sortino ratio relative to the other benchmarks. CAPI indexed funds had the highest standard deviation and downside risk which means that these funds took on a lot of risk just to earn additional returns and the funds aren't operating efficiently on average due to not being rewarded for the extra unnecessary risk that they took on. All funds had a negative IR and a Sharpe and Sortino ratio less than their respective benchmark. This implies that managers couldn't outperform their respective benchmark on a total risk-adjusted basis, consistent basis and took on unnecessary risk which was not rewarded in the form of higher returns.

Chapter 6: Conclusion

6.1 Conclusion

This study evaluates the performance and the effects of fees on performance of South African Equity, Bond and Money market funds between June 2010 and July 2019. We evaluate the performance across the different fund categories and the effects that fees have on overall performance. The recent trend in the U.S. saw investors migrating from active funds to passive funds due to the lack of alpha coupled with high fees. Therefore, it would be of interest to both investment managers and investors to know the effects of fees surrounding performance and whether active funds in South Africa warrant the high fees charged. A total of 66 mutual funds categorised across Equity, Bond and Money market were investigated based on four different mutual fund performance measures. The four risk-adjusted performance measures used to evaluate mutual funds were Jensen's alpha, Sharpe ratio, Information ratio and Sortino ratio. To examine the effects of fees, Jensen's alpha was calculated before and after adjusting for fees as well as utilising a pairwise correlation table to investigate any potential relationships.

The results in this paper found that Equity funds had the highest gross, excess, and compounded returns as well as the highest risk over the sample period which is in line with expectations. All funds were aligned with their benchmark as the best performing (SWIX Equity funds) and worst performing (Money Market funds) category of funds also had the best (SWIX) and worst (STEFI) performing benchmarks respectively. All funds across all fund categories had a statistically significant negative alpha on average before and after adjusting for fees. Equity funds had the highest gross returns as well as the highest total expense ratios, while ETFs had the lowest total expense ratios on average. It was demonstrated that a difference of 1% or 2% of fees could mean significantly less of your potential investment return at retirement due to the compounding effect of fees which is exacerbated over long time periods. A pairwise correlation table was used to investigate the relationship between total expense ratios and performance. Although Equity funds had the highest gross returns and highest total expense ratio, the results found that no significant relationship between fees charged and fund performance exists across all fund categories. The risk-adjusted performance ratios gave some insight into South African mutual fund performance. SWIX indexed Equity funds and the SWIX benchmark had the highest performance adjusted for total and downside risk. CAPI

indexed funds had the highest total and downside risk across all fund categories. All funds had an IR of less than 0.5, Sharpe and Sortino ratio less than their respective benchmark. This implies that managers couldn't outperform their respective benchmark on a total risk-adjusted basis, consistent basis and took on unnecessary risk which was not rewarded in the form of higher returns.

The results in this paper indicated that during the sample period, South African Equity, Bond, and Money Market mutual funds in the sample could not outperform their respective benchmark on average before and after adjusting for fees. The poor performance across all the mutual funds could be attributed to poor economic growth through the latter half of the sample period. Therefore, South African collective investment schemes in the sample failed to outperform the market on average. The lack of outperformance in active funds in the sample imply that these funds couldn't warrant the relatively high active fees charged. Investment managers in South Africa should rethink the way they structure fees as the high fees are accompanied by poor performance. All funds across the fund categories returned significantly lower than their respective benchmarks. Investors should consider migrating to ETFs or passive alternatives as they mimic the outperforming benchmark return at a substantially lower fee. This paper concludes that passive investing style is more appropriate in South Africa as active managers were unable to justify the high active fees that they charged.

6.2 Limitations and Considerations

The following section aims to mention some limitations of the study and areas for further discussion and insight.

The study only examines 66 funds across three fund categories due to limited data during the sample period. A bigger sample selection or more recent sample period could add better insight and possibly result in different outcomes. Although none of the funds could outperform their respective benchmark over the sample period, there was some evidence of outperformance over certain time periods. A lot of underperformances came during the latter half of the sample period due to weak economic growth. It could be useful to examine this study over a 20-year period

or even smaller five-year sample periods similar to Mibiola (2013), to account for these different periods of economic growth. Due to limited data, balanced funds were excluded from the sample selection. Further insight could be added by adding a selection of balanced funds to the sample. Total expense ratios were used as a proxy for measuring fees as it was the only metric available. A more accurate proxy would be to use Effective Annual Cost (EAC) as it is currently the best industry measure, at the time of writing, to help compare and understand fees.

For future studies it would be useful to consider an analysis of economic shocks throughout the sample period such as mining strikes and Nenege, as this would provide further insight to the performance results of funds in the sample period. When reviewing results, it is also important to consider mean reversion. A fund in our sample with a negative alpha might become positive in a subsequent period as a function of mean reversion. A deeper analysis of fees and its effects surrounding performance would provide a better insight to the results of this paper, as literature suggests that there are more aspects of fees that could be explored.

6.3 Appendix

Table 37: Excluded Funds Descriptive Statistics (July 31 2014 - June 30 2019)

Fund Code	Fund Name	Cumulative Return	Average monthly return	STD
ABAF	Absa Absolute - A	107.27	0.13%	1.15%
ABBF	Absa Balanced - A	105.15	0.11%	1.89%
ABPA1	Aeon Balanced Prescient - A1	115.03	0.28%	1.95%
AEAA1	Aeon Smart Multi-Factor Equity Prescient - A1	106.84	0.22%	3.22%
AGBD	Allan Gray Bond - A	110.81	0.24%	1.62%
AHBM	Nedgroup Inv Flexible Income - A	105.18	0.10%	0.84%
AHGV	Nedgroup Inv Global Equity Feeder - A	181.76	1.11%	4.41%
BAEFC	Rudiarius BCI Africa Equity - C	91.41	-0.07%	4.72%
BOEB	Nedgroup Inv Global Flexible Feeder - A	161.21	0.87%	3.99%
BOGA	Nedgroup Inv Global Flexible Feeder - A	161.27	0.88%	4.00%
BOVA	Nedgroup Inv Value - A	98.43	0.03%	2.87%
CNSB	Coronation Bond - A	114.09	0.35%	2.27%
FGBF	Foord Balanced - A	192.14	1.13%	2.07%
FIFA1	Flagship IP Flexible Value - A1	179.52	1.08%	2.50%
FLWF	Flagship IP Worldwide Flexible - A	188.55	1.10%	3.50%
ISEICA	AF Investments Enhanced Income - A	100.57	0.03%	0.84%
ISSGF	AF Inv Strategic Gbl Balanced Feeder - A	157.36	0.82%	4.03%
KAIE	Kagiso Islamic Equity - A	172.82	0.92%	2.44%
KEAF	Kagiso Equity Alpha - A	189.24	1.10%	2.59%
KSGFA	Kruger Ci Intl Flexible Feeder - A	189.68	1.12%	3.66%
LFCA1	Long Beach Flexible Prescient Fund - A1	182.69	1.08%	3.24%
MBIB1	Momentum Diversified Income - B1	103.30	0.07%	0.88%
MCEFA	Mazi Asset Management Prime Equity - A	112.44	0.27%	3.33%
MCPFA	Mazi Asset Management Prime Property - A	95.93	-0.02%	3.38%
MCPRA1	Mergence CPI + 4% Prime - A1	105.75	0.14%	1.41%
MDBFA	Melville Douglas STANLIB Bond - A	99.47	0.04%	2.15%
MDDS	Melville Douglas STANLIB Dynamic Strategy - A	116.04	0.31%	2.07%
MDHFA	Melville Douglas High Alpha - A	119.19	0.39%	2.90%
MEME	Momentum Equity - A	116.24	0.33%	2.88%
METP	Northstar SCI Managed - A1	108.13	0.16%	1.94%
MGMF	Mi-PLAN IP Global Macro - B5	191.41	1.21%	4.37%
MICA	Old Mutual Real Income - A	103.77	0.08%	0.83%
MILB	Momentum Inflation Linked Bond - A	98.60	-0.01%	1.44%
MIPEI	Mi-PLAN IP Enhanced Income - A1	103.02	0.07%	0.95%
MISP	Mi-PLAN IP Global Property Fdr - B5	158.42	0.77%	4.15%
MMMA	Northstar SCI Managed - A1	108.19	0.17%	1.95%
MNEF	N-e-FG BCI Equity - A	94.95	0.01%	3.70%
MNFF	N-e-FG BCI Flexible - A	102.79	0.12%	3.01%
MRQPA1	Mergence Equity Prime - A1	111.24	0.23%	2.63%
MTLE	First Ave SCI Focused Qual Equity - A	194.12	1.22%	2.85%
NBFR	Nedgroup Inv Core Bond - R	96.04	-0.02%	1.97%
NDEA	Nedgroup Inv Entrepreneur - A	110.65	0.18%	2.54%
NEBA	Nedgroup Inv Bravata Worldwide Flexible - A	139.75	0.60%	2.66%
NFABA	NFB Ci Managed - A	118.49	0.33%	1.73%
NFACA	NFB Ci Stable Fund - A	115.25	0.26%	0.98%
NFEMOM	NewFunds Equity Momentum	129.08	0.67%	4.53%
NFGOVI	NewFunds GOVI	149.98	0.67%	2.15%
NFILBI	NewFunds ILBI	117.82	0.29%	1.50%
NICCB	Nedgroup Investments Core Guarded - B	109.23	0.17%	1.12%
NIDCB	Nedgroup Investments Core Diversified - B	112.67	0.25%	2.09%
NIGCFA	Nedgroup Inv Global Cautious Feeder - A	154.03	0.76%	3.98%
NISCD	Nedgroup Inv Stable - A1	112.41	0.24%	1.56%
NMIF	Northstar SCI Income - A1	105.18	0.10%	0.74%

OBOFD	Oasis Bond - D	97.47	-0.01%	1.50%
OBUTD	Oasis Balanced - D	108.25	0.16%	1.87%
OCEFD	Oasis Crescent Equity - D	107.46	0.15%	2.77%
OCIFD	Oasis Crescent International Feeder - D	144.50	0.71%	4.18%
OCINFA	Oasis Crescent Income - A	109.89	0.15%	0.51%
OMAA	Old Mutual Managed Alpha Equity - A	101.35	0.14%	3.21%
OMCFA	Old Mutual Mid & Small Cap - A	84.56	-0.25%	2.90%
OMFFA	Old Mutual Flexible - A	122.13	0.38%	2.37%
OMGA	Old Mutual Global Equity - A	177.98	1.08%	4.43%
OMGFA	Old Mutual Gold - A	95.03	0.99%	11.18%
OMGRF	Old Mutual FTSE RAFI All World Index Feeder - A	150.68	0.80%	4.24%
OMIFA	Old Mutual Investors - A	99.10	0.08%	3.14%
OMIPA	Old Mutual Interest Plus - A	101.08	0.02%	0.09%
OMMFA	Old Mutual Mining and Resources - A	104.38	0.42%	6.42%
OMSGA	Old Mutual Stable Growth - A	112.44	0.21%	1.13%
OMTI	Old Mutual Income - A	101.30	0.04%	0.88%
OMUMFA	Old Mutual Global Currency Feeder - A	129.16	0.48%	4.16%
PBEB2	Mi-PLAN IP Beta Equity - B2	103.00	0.14%	2.99%
PEIB5	Mi-PLAN IP Inf + 5 - B5	111.77	0.21%	1.51%
PEPB5	Mi-PLAN IP Inf + 7 - B5	115.98	0.28%	1.77%
PGCA1	Prescient Global Positive Return Feeder - A1	102.32	0.16%	4.22%
PGGA1	Prescient Global Equity Feeder - A1	148.50	0.80%	4.71%
PIPB5	Mi-PLAN IP Infl + 3 - B5	113.38	0.23%	1.08%
PIPF	Prescient Income Provider - A1	112.13	0.19%	0.32%
PIPF	Prescient Income Provider - A1	112.13	0.19%	0.32%
PKID	PSG Wealth Global Moderate Feeder - D	143.93	0.68%	3.72%
PKID	PSG Wealth Global Moderate Feeder - D	143.93	0.68%	3.72%
PLPA1	Prescient Living Planet - A1	115.95	0.31%	2.23%
PMFD	PSG Wealth Global Flexible Feeder Fund - D	156.55	0.81%	3.70%
PPEC	PPS Enhanced Yield - A	100.42	0.01%	0.09%
PPQF	Prescient Positive Return QuantPlus - A1	92.69	-0.05%	1.77%
PPSE	PPS Equity - A	97.01	0.05%	3.17%
PRGFA	Prescient RECM Global Feeder - A	116.92	0.37%	4.14%
PRGFB	Prescient RECM Global Feeder - B	113.92	0.32%	4.17%
PRGFC	Prescient RECM Global Feeder - C	115.45	0.34%	4.15%
PRGFD	Prescient RECM Global Feeder - D	117.47	0.37%	4.13%
PRIA2	Prescient SA Income Provider - A2	101.53	0.03%	0.15%
PSFB5	Mi-PLAN IP Sarasin Equisar Fdr - B5	163.59	0.94%	4.23%
PSGI	PSG Wealth Global Moderate Feeder - A	139.17	0.63%	3.94%
PSIA1	Prescient SA Income Provider - A1	101.56	0.03%	0.15%
RIBA	Momentum International Balanced Feeder - A	153.94	0.78%	3.86%
RICA	Momentum Income Plus - A	101.25	0.04%	0.91%
RMBI	Momentum Intl Equity Feeder - A	161.89	0.89%	4.25%
RMCF	Momentum Industrial - A	102.13	0.17%	3.99%
RMEC	Momentum Small Mid-Cap - A	82.75	-0.25%	3.45%
RMFA	Momentum Optimal Yield - A	118.38	0.29%	0.65%
RMFS	Momentum Financials - A	123.99	0.46%	3.75%
RMIH	Momentum Intl Conservative Feeder - A	138.11	0.58%	3.60%
RMII	Momentum Intl Income - A	111.29	0.22%	4.19%
RMIS	Momentum Enhanced Yield - A	99.95	0.00%	0.07%
SAGR	Momentum Resources - A	92.19	0.10%	5.73%
SAMA1	Sasfin BCI Prudential - A1	115.36	0.30%	2.23%
SBFCA	Sygnia Skeleton Balanced 40 - A	114.33	0.26%	1.52%
SCSCD	Sygnia CPI + 6% - D	117.04	0.33%	2.30%
SGCCD	Sygnia CPI + 2% - D	113.83	0.24%	1.29%

SMSFCA	Sasfin BCI Stable - A	109.58	0.16%	1.38%
SNFT	Sanlam Investment Management Resources - A	102.90	0.40%	6.08%
SSBCA	Sygnia Skeleton Balanced 70 - A	115.49	0.31%	2.32%
SSBSA	Sygnia Skeleton Balanced 60 - A	116.77	0.32%	2.00%
SSCA	Sanlam Investment Management Small Cap - A	90.82	-0.13%	2.32%
STCA1	Sanlam Investment Management Top Choice Equity - A1	107.96	0.29%	3.68%
SYCCB	Sygnia CPI + 4% - B	115.87	0.30%	1.99%
SYCCD	Sygnia CPI + 4% - D	115.99	0.30%	1.97%
SYCFA	Sygnia CPI + 4% - A	115.91	0.30%	1.98%
SYCSA	Sygnia CPI + 6% - A	117.04	0.33%	2.31%
SYCTA	Sygnia CPI + 2% - A	113.06	0.23%	1.34%
SYDIA	Sygnia DIVI Index - A	109.37	0.27%	3.97%
SYGCB	Sygnia CPI + 2% - B	112.99	0.23%	1.40%
SYSCB	Sygnia CPI + 6% - B	117.00	0.33%	2.31%
TRBCA	Nedgroup Inv Balanced - A	120.75	0.36%	2.16%
UALA	Nedgroup Inv Financials - A	140.92	0.65%	3.63%
UALS	Nedgroup Inv Financials - R	140.93	0.65%	3.64%

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