# Do Money Managers Outperform their Respective Benchmark? Evidence from South African Unit Trust Industry

BY

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# Declaration

I declare that this thesis is my own work, that it has not been submitted before for any degree or examination in any other university, and that all sources I have used or quoted have been indicated and acknowledged by complete references.

Boikanyo Kenneth Malefo

September 2015

# Dedication

Dedicated to my mother, Miss Mamoruledi Malefo

# Acknowledgement

*"To God be the glory, great things He hath done"*

-Fanny Crosby

Though the following thesis is an individual work, I could never have reached the heights or explored the depths without the assistance, support and guidance of several individuals.

I would like to acknowledge my indebtedness and render my warmest thanks to my supervisor Professor Heng-Hsing Hsieh, who made the completion of this thesis possible. Your invaluable guidance, encouragement and a demand for high quality work have allowed me to push and believe in myself even more. I will forever treasure this experience.

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Lastly, to my beloved family and friends, your prayers and endless support are what sustained me throughout this endeavour. *Ke le leboga go menagane*.

# Abstract

Motivated by the growing attraction of the mutual fund industries across the world, this research seeks to explore the economic benefits contributed by the South African equity unit trust managers over the period from 1 January 2002 to 2 September 2012. The performance is examined over two sub-periods and the overall examination period, where the first sub-period captures the performance of the unit trusts before the 2007/2008 global financial crisis and the second sub-period captures the devastation in performance of the unit trusts after the crisis. Active fund managers are usually presumed to possess superior abilities in asset allocation, security selection and market timing that assist them to consistently generate abnormal returns on a risk-adjusted basis. This research attempts to test this claim by making a distinction in performance attribution between returns generated as a result of managerial skills and those generated as a result of random chance. The study emerges by first examining the risk-adjusted performance of the South African unit trust managers against the performance of a broad market index proxied by FTSE/JSE All Share Index (ALSI). Six different risk-adjusted performance measures are employed for this purpose. Regardless of the different applications of risk parameters employed by each performance measure, the results reveal that on average, most of the South African unit trust managers do not outperform the market on a consistent basis. The majority of the unit trust managers show good performance during the first sub-period, with subsequent inferiority in performance during the second sub-period.

The study further examines the performance of the South African unit trust managers relative to the pre-specified sector benchmarks constructed by following a set of performance attribution techniques proposed by Yu (2008) and Hsieh (2010). The objective of this test is to determine whether the equity unit trust managers are able to create value through their security selection skill in addition to their asset allocation decisions. Consistent with international evidence, the results reveal that returns generated by South African unit trusts are driven mainly by asset allocation activities and stock picking of asset managers do not add significant value. In addition, test results also indicate that South African equity unit trust managers are not good at managing risk as the majority of the unit trusts exhibit higher standard deviation compared to their benchmarks.

Furthermore, the study examines the economic value contribution of the South African equity unit trust managers through their market timing activities. In particular, the study attempts to determine whether or not unit trust managers possess the ability to correctly anticipate future market movements. To achieve this, two market timing performance models developed by Treynor-Mazuy (1966) and Henriksson-Merton (1981) are employed. The results reveal that, regardless of the changes in market conditions, South African equity unit trust mangers delivered significantly inferior timing performance in both sub-periods and the overall examination periods that actually destroyed fund values. The paper concludes by stating that investors are better off by investing in cost-effective passive investment vehicles such as exchange traded funds (ETF's).

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# 1

# Introduction

## 1.1 Research Background

The rationale of systematically pooling capital together into one investment vehicle, collected from a group of individual investors who share common investment objectives is known as mutual fund or unit trust investing. The existence of this collective investment schemes is based on the philosophy underlying the potential benefits of portfolio diversification process formally introduced by Markowitz (1952). According to this framework, investors can efficiently minimise their total portfolio risk by investing in a pool of major asset classes such as equity, fixed-income securities, cash equivalents and real assets. By choosing to invest in mutual funds, investors gain instant access to a more diversified pool of assets, which they would not otherwise have if they invest individually. Another benefit of mutual funds stems from the professional management of capital, claimed to be superiorly offered by managers to individual investors. This is based on the rationale that mutual fund managers possess skills and resources that aid them to identify good investment opportunities. Depending on the risk tolerance and objectives of investors, the structure of mutual funds allows investors to invest either passively or actively.

Passive investing involves a strategy rooted on the replication of the broad market index instead of seeking an outperformance of that index. Inherent to this strategy is the belief that the market is efficient and creates no exploitable investment opportunities for investors. In contrast, active investment strategies adhere to the belief that the markets are not always perfectly efficient. According to this strategy, with proper skills and research analysis, investors are able to successfully identify undervalued assets in the market and subsequently generate above-average returns. Therefore, relying on this expertise (skills), individual investors will purchase mutual funds with the hope to consistently realise superior risk-adjusted returns. Depending on the structure of active management, these skills include: (1) asset allocation ability, (2) security selection (that is, stock picking) ability and (3) market timing ability.

The asset allocation skill of a money manager entails the ability to spread capital across major classes in a mean-variance efficient manner. This is considered an initial and the most important step in the process of portfolio construction. While this process focuses on the allocation of weights across major asset classes, security selection, on the other hand, places emphasis on the manager's ability to pick up superior performers within each asset class. In addition to the use of fundamental analysis to identify undervalued assets, active managers also rely on technical analysis to identify the timing of their trading activities. The technique involves the evaluation of historical market data with the hope of forecasting future market trends. If active managers succeed in their quests, this will serve as a violation to the random walk hypothesis (RWH) of Kendall (1953) concurrently with the efficient market hypothesis (EMH) of Fama (1970). The RWH states that the changes in market price movements occur in a random manner. This implies that future price trends are entirely unpredictable. Consequently, the hypothesis disregards the application of technical analysis in generalising abnormal returns. This implication bears support to the framework underlying the EMH. According to the EMH, in a perfectly efficient capital market, opportunities associated with the consistent generation of abnormal returns do not exist. This is based on the assumption that capital markets are information efficient and asset prices always reflects all the available information timeously and accurately. Early empirical evidence has shown that on average, active managers are unable to consistently deliver abnormal returns (Jensen, 1968, Cumby and Glen, 1990, Sinclair, 1990, Elton, Gruber, Das and Hlavka, 1993).



Regardless of these conclusions, globally, the mutual fund industry has demonstrated a significant growth and plays a major role in financial markets. According to the investment company institute (ICI), the mutual fund industry exhibits an exponential increase in asset worth of about $ 16.41 trillion at the end of June 2005 to $ 27.86 trillion at the end of the first quarter of 2013 worldwide. This growth can be traced even on the evolution of the South African unit trust industry. The Sage Fund is the first unit trust to be launched in South Africa with its inception dating back to June 1965. The initial net worth of the fund was estimated to be R600 000 by the end of the year. The following year two more funds were launched accounting a net worth of approximately R3 million. However, over the period from 1965 to 1980, the growth of the industry was impacted by the 1969 market crash. Towards the end of 1980s, upon the improvement of market, 11 funds were established. Over the period from December 1990 to December 1995, the number of funds had grown from 36 funds to 88 funds. By the end of 2000, 334 funds with total asset value of R128 billion were established

(Lambrechts 2000, Pretorius and Wolmarans, 2006). Based on the statistics cited by the Association for Saving and Investment South Africa (Asisa) in 2012, by the end of 2004, the industry was worth R305 billion with 537 funds under management. By end of December 2010, the number of funds had grown by 406 more funds, totalling to 943 funds accounting for net wealth of R938 billion. By the end of December 2012, the South African unit trust industry not only exhibited a substantial growth in the number of funds, but recorded its first R1 trillion mark in worth of assets under management (AUM). The consistent large increases in the values and number of active funds suggest that active management is deemed as a preferred choice to passive investing.

## 1.2 Research Objectives

Motivated by the growing attraction of the mutual fund industries across the world, this research seeks to explore the economic benefits contributed by the South African unit trust managers based on their asset allocation, security selection and market timing abilities over the period from 1 January 2002 to 2 September 2012. This goal is achieved by addressing the following sets of objectives:

**1.** Evaluate the performances of South African unit trust managers relative to the performance of the broad market index.

**2.** Evaluate the performances of South African unit trust managers relative to the sector benchmarks constructed under the return decomposition method of Sharpe (1992). Using this approach, a combination of selected JSE tradable sector indices are used to replicate the performances of the unit trusts by estimating the funds' exposures to the risks inherent in the prominent sectors on the JSE.

**3.** Determine whether South African unit trust managers are able to allocate their capital amongst the prominent sectors on the JSE in a mean-variance efficient manner.



**4.** Examine whether South African unit trust managers are able to add meaningful value by performing security selection within the prominent sectors on the JSE.

**5.** Examine whether South African unit trust managers have meaningful market timing ability based on the regression results of the Treynor-Mazuy (1966) model and Henrikson-Merton (1981) model.

This research comprise of eight chapters. Chapter 2 outlines an overview of the theoretical framework central to the research. This includes discussion on the development of the modern portfolio theory (MPT) introduced by Markowitz (1952) and the separation theory of Tobin (1958). The capital asset pricing model (CAPM) of Sharpe (1964), Linter (1965) and Mossin (1966) concurrently with the arbitrage pricing theory (APT) of Ross (1976) are also outlined in this chapter. The chapter further presents the behavioural finance framework, which serves as an alternative school of thought that contradicts the tenets of the EHM.

Chapter 3 presents significant international and South African literature on mutual fund performance and discusses empirical arguments on active versus passive investing.

An overview of the research problem statements is outlined in Chapter 4. This entails the review on sample selection, research methodologies, potential research biases and how they are mitigated in the research. Chapter 5 commences the first test of the research by examining the performances of South African unit trusts relative to the broad market index proxied by the FTSE/JSE All Share Index (ALSI). Using the return decomposition method of Sharpe (1992), the unit trust returns are separated into the sector-based benchmark return and the selection return. The benchmark return is the part of the fund return that is explained by the fund's exposures to the prominent sectors on the JSE. On the other hand, the unexplained portion of the fund return is termed the selection return that is attributed to the manager's security selection skill. Chapter 6 evaluates the performances of South African unit trusts relative to their respective sector-based benchmarks, and examines the statistical significance of their selection returns over the examination periods.

Chapter 7 investigate the value added by the South African unit trust managers through their abilities to anticipate future market movements based on the regression results of the Treynor-Mazuy (1966) model and Henrikson-Merton (1981) model. The summary of test results, their interpretations and conclusive remarks on the areas demanding further research are outlined in Chapter 8.

## 1.3 Potential Contribution

The outcome of this research contributes to the long standing debate of the mutual fund performance literature in a variety of ways namely:

**1.** Although South Africa has demonstrated a plethora of empirical literature in unit trust performance over the years, the majority of the presented evidence gives no indication of the sources of performances of the funds. With the exception of Oldfield and Page (1997), Yu (2008) and Hsieh, Hodnett and van Rensburg (2012), past analysis of the South African unit trust industry focused primarily on the overall performance of the funds without investigating the performance attributions of the funds. This research circumvents the problem by examining the performance attributions of the unit trusts. In essence, the returns generated by the funds in the sample are explicitly attributed to the manager's ability to allocate capital in a mean-variance efficient manner; select superior securities or time the market.

**2.** Oldfield and Page (1997:40) point out that "*the debate as to the appropriate method of examining the performance of unit trusts continues. For each method which is based on the theoretical model of security prices and returns there are researchers and practitioners who argue that the theoretical frame is deficient and hence the results of the tests are inconclusive*". Moreover, Koekebakker and Zakamouline (2009) point out that the choice of selecting a risk-adjusted performance measure plays a major role in the process of evaluating fund performance, since each performance measure exhibits its own sets of advantages and shortcomings. Based on these arguments, this research makes a contribution through the utilisation of a range of exhaustive risk-adjusted performance measures (outlined in Chapter 5), in order to ensure the robustness of the results attained. This runs counter to the past South African literature, where fund performances were evaluated on the basis of limited performance measures.

**3.** Another significant contribution of the research comes from the application of the return decomposition model of Sharpe (1992). While there exists an extensive literature on the application of this model internationally, in South Africa, the model is constrained to Yu (2008) and Hsieh et al., (2012). Yu (2008) investigates the economic value contribution of the South African unit trust managers by applying the style-based performance attribution model over the period from 2001 to 2006. The author incorporates the

following JSE sector indices namely: Financial index (FINI), Resource index (RESI) and the Industrial index (INDI) as indices to track the investment styles and performances of South African unit trusts. Hsieh, Hodnett and van Rensburg (2012) also employ the style decomposition approach to investigate the performances of South African global equity funds over the period from 01 January 1996 to 31 December 2008. This research seeks to expand on the work of the above mentioned authors by measuring the unit trust performances using sector-based benchmarks together with fixed-income indices over a more recent examination period. The incorporation of fixed-income indices as explanatory variables has the advantage to investigate the managers' allocation into cash to hedge against the negative impact during global financial crisis.

# 2

# Theoretical Framework

## 2.1 Introduction

This chapter undertakes to provide an overview of the theoretical foundation of the research. This includes a review of the efficient market hypothesis (EMH), the random walk hypothesis (RWH) and the optimum portfolio construction according to the concept of the modern portfolio theory (MPT). The evolution of the capital asset pricing model (CAPM), the capital market line (CML) and the arbitrage pricing theory (APT) are also discussed in this chapter. The concept of investors' decision making process from a view point of the expected utility hypothesis (EUH) is discussed, followed by the decision making process exhibited by investors from the perspective of behavioural finance.

Declared a theory underpinning all avenues of finance, the EMH postulates that market participants are rational and asset prices are always reflective of their intrinsic values. Under the assumptions of efficient capital markets, the Markowitz's (1952) MPT and the Tobin's (1958) separation theorem, describe the rationale underlying the asset allocation process of risk adverse investors. According to the assumptions of MPT, investors are wealth maximisers, risk averse and exhibit a collective expectation with regard to the mean-variance trade-off. The assumptions of investors' risk aversion and wealth maximisation are based on the framework posed by the EUH.

Developed independently by Sharpe (1964), Lintner (1965) and Mossin (1966), the CAPM aids in the pricing of assets in efficient capital markets. The model is based on the assertion that since unsystematic risk can be diversified away, investors should only be compensated for assuming systematic risks that are non-diversifiable. On the other hand, Ross (1976) proposed an alternative multifactor asset pricing model under the framework of arbitrage pricing theory (APT) to circumvent the limitations underlying the CAPM as a single factor model. The multifactor APT model decomposes the overall market risk into component systematic risks to explain the return variations of assets.

Behavioural finance on the other hand, is a body of research that offers a different view from that provided by the principles of capital market theories. While capital market theories argue that investors and markets operate in a rational manner, advocates of behavioural finance argues that investors exhibit cognitive and psychological biases when making investment decisions. Therefore, the impacts of these biases can affect what is declared a "rational behaviour" by capital market theories. In effect, the rationality of investors' asset pricing and their respective decision making processes will be compromised in reality. Moreover, under the behavioural finance framework, prospect theory of Kahneman and Tversky (1979) is developed as a major theory directly disputing with the normative laws of the expected utility hypothesis. According to prospect theory, under risky and uncertain prospects, investors' decision making processes are greatly impacted by cognitive psychological biases. As a result, market participants are likely to make errors when making investment decisions.

## 2.2 Efficient Market Hypothesis

An efficient capital markets refers to a market where asset prices fully incorporate all the available information instantaneously and accurately, and hence asset prices are true reflections of their intrinsic values. The implication following an efficient market is that, an attempt by investors to achieve higher returns in a consistent manner without assuming higher risk is impossible. Furthermore, the instantaneous and continuous adjustment of asset prices implies that investors cannot generate any abnormal returns by exploiting market inefficiencies associated with market adjustment errors. The concept of market efficiency is associated with the framework of the random walk hypothesis (RWH), formally introduced by Kendall (1953). Based on the empirical findings, Kendall (1953) postulates that changes in assets price movements exhibit no systematic patterns that are vulnerable to any predictable biases. As a result, the theory declares that, the future asset price movements should exhibit an equal probability distribution. In effect, based on this theory, the likelihood of asset prices rising should be equal to the likelihood of them falling.

Upon the validation of the RWH, Fama (1965, 1970) develops a framework under the efficient market hypothesis (EMH) that describes the degree of market efficiency based on the following classifications: weak form efficiency, semi-strong form efficiency and the strong from efficiency. Each form depends on the information assumed to be impounded in the asset prices and any opportunities associated with the consistent market outperformance are eliminated based on this information. Under the weak form EMH, the sequence of historical prices and volume data offers no information that can be utilised by investors to generate abnormal returns. As such, the attempt to time the market by chartists and technical analysts on the basis of examining historical market price movements is rendered fruitless.

The semi-strong form EMH not only constitutes the absorption of historical prices and volume data into asset prices, but also incorporates any information that is available publically such as stock splits, published financial statements, company reports from financial analysts, etc. As a result, any possibilities associated with the generation of abnormal returns based on public information are coined pointless as they have already been traded upon and reflected in asset prices. This implies that, techniques such as fundamental analysis that attempts to outperform the market from the examination of firms' performances, economic conditions and other related information are considered fruitless when the market is

efficient of a semi-strong form. Finally, the strong form EMH postulates that asset prices reflect all information. Therefore, the implication following this form is that abnormal returns cannot be earned in a consistent manner, including the use of inside information. This is because insider trading would have been prohibited to promote fair trading in a perfectly efficient capital market.

## 2.3 Expected Utility Hypothesis

Pioneered by Bernoulli (1738) and formally developed by Von Neuman and Morgenstern (1944), the expected utility hypothesis (EUH) attempts to explain the decision making process of investors under risky and uncertain prospects. The assentation of this hypothesis is that investors will demonstrate a degree of rationality when making investment choices. This is based on the rationality that investors analyse the outcome of making a gain/loss on an investment, with their preferred course of action being an alternative that will maximise their total expected utility. Under this framework, investors are not subject to psychological biases and emotions when making investment decisions. The hypothesis can be demonstrated mathematically as indicated by Equation 2.1 (Kahmeneman and Tversky, 1979: 263).

$$E(U(x_1, P_1; \dots\dots\dots; x_n, P_n)) = P_1U(x_1) + \cdots + P_nU(x_n) \quad (2.1)$$

where:

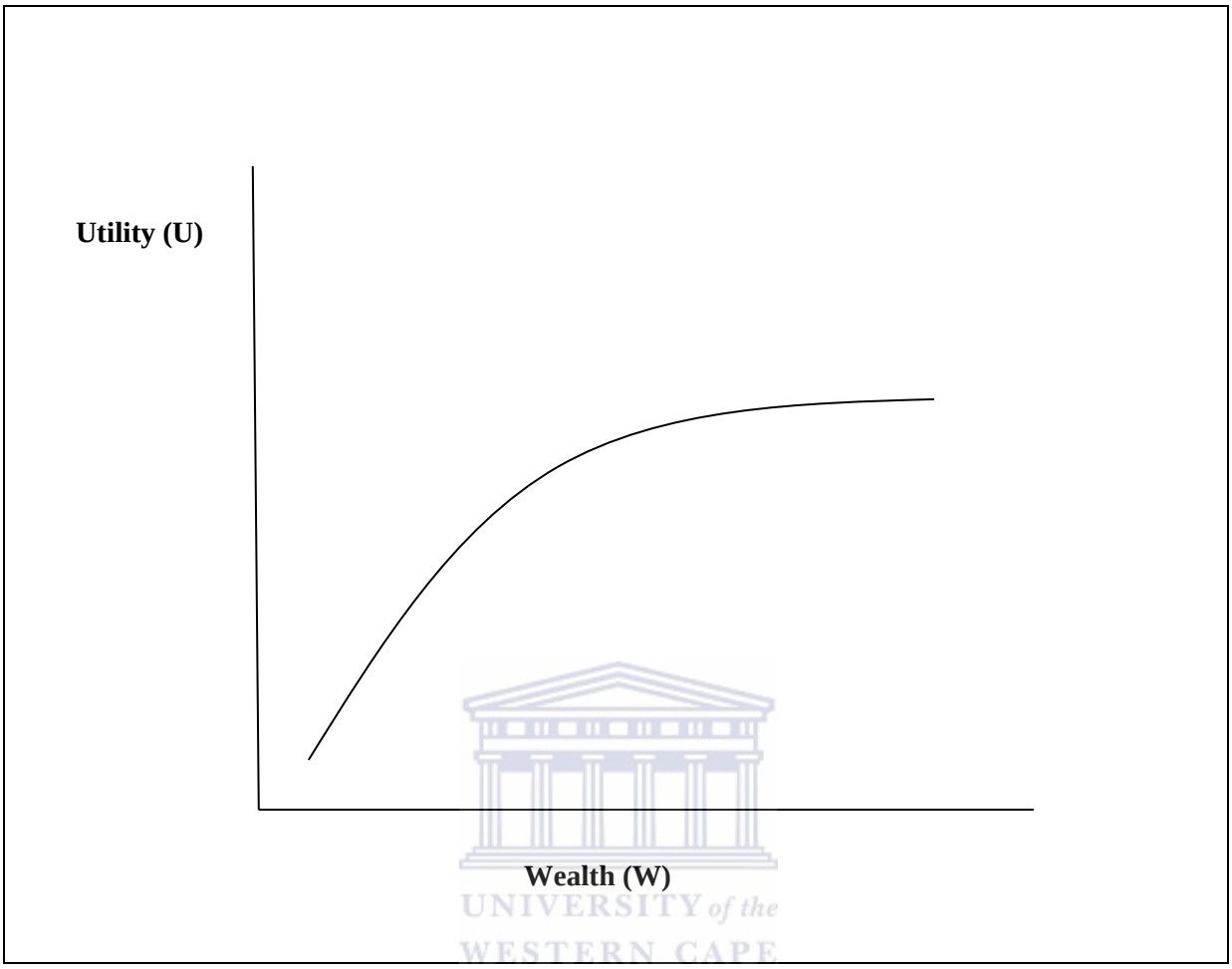
$P_1 + P_2 + \cdots P_n = 1$ denote the probability of occurrence of the possible asset positions of investments; and

$x_1, x_2 \dots\dots x_n$ is a possible asset positions of investments.



Moreover, the expected utility hypothesis framework explains the concept of risk aversion as equivalent to the graphical representation depicted by Figure 2.1. Intuitively, risk averse behaviour exhibited by investors can be defined as the nature of investors to choose an alternative that is less risky given comparable returns (Friedman and Savage, 1948). The function (refer to Figure 2.1) depicts a direct proportionality between utility and wealth of an investor. That is, an increase in utility calls for an increase in wealth of an investor. However, the function proves to be increasing at a decreasing rate and assumes a concave shape graph in the process. This indicates that investors' marginal utility diminishes with every increase in wealth. The implication following this curve is that investors will disregard an investment alternative that does not offer justifiable compensation for the risk assumed.

**Figure 2.1 Marginal utility function and investors' risk aversion**






***Source: Modified from Friedman and Savage (1948:290)***

## 2.4 Modern Portfolio Theory

Modern portfolio theory (MPT) pioneered by Markowitz (1952), was the first theory developed that integrated the concept of risk in portfolio management based on the assumption of market efficiency. The theory attempts to explain the portfolio construction process from the perspectives of rational and wealth maximising investors. It is based on the premise of trade-off between risk and return from a viewpoint of diversification. According to MPT, diversification is an efficient way to reduce risk associated with the portfolio without unduly compromising the overall returns of that portfolio. Markowitz (1952) postulates that the maxim to properly diversify entails spreading investments across a wide range of different asset classes that have distinctive economic characteristics and low covariance. In effect, by holding assets with returns that are less than perfectly positively correlated, investors effectively diversify away the firm-specific risk. The mean-variance trade-off of a portfolio consisting of asset *A* and asset *B* can be represented by Equation 2.2 and Equation 2.3 respectively.

$$E(R_p) = W_A E(R_A) + W_B E(R_B) = W_A E(R_A) + (1 + W_B) E(R_B) \quad (2.2)$$

$$\sigma_P = (W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2 W_A W_B \sigma_A \sigma_B \rho_{A,B})^{1/2} \quad (2.3)$$



where:

$E(Rp)$ is the expected return of portfolio *P*;

$W_A$ and $W_B$ are the weights of asset *A* and asset *B* in portfolio *P*;

$\sigma_A$ and $\sigma_B$ are the standard deviations of asset *A* and *B* in portfolio *P;* and

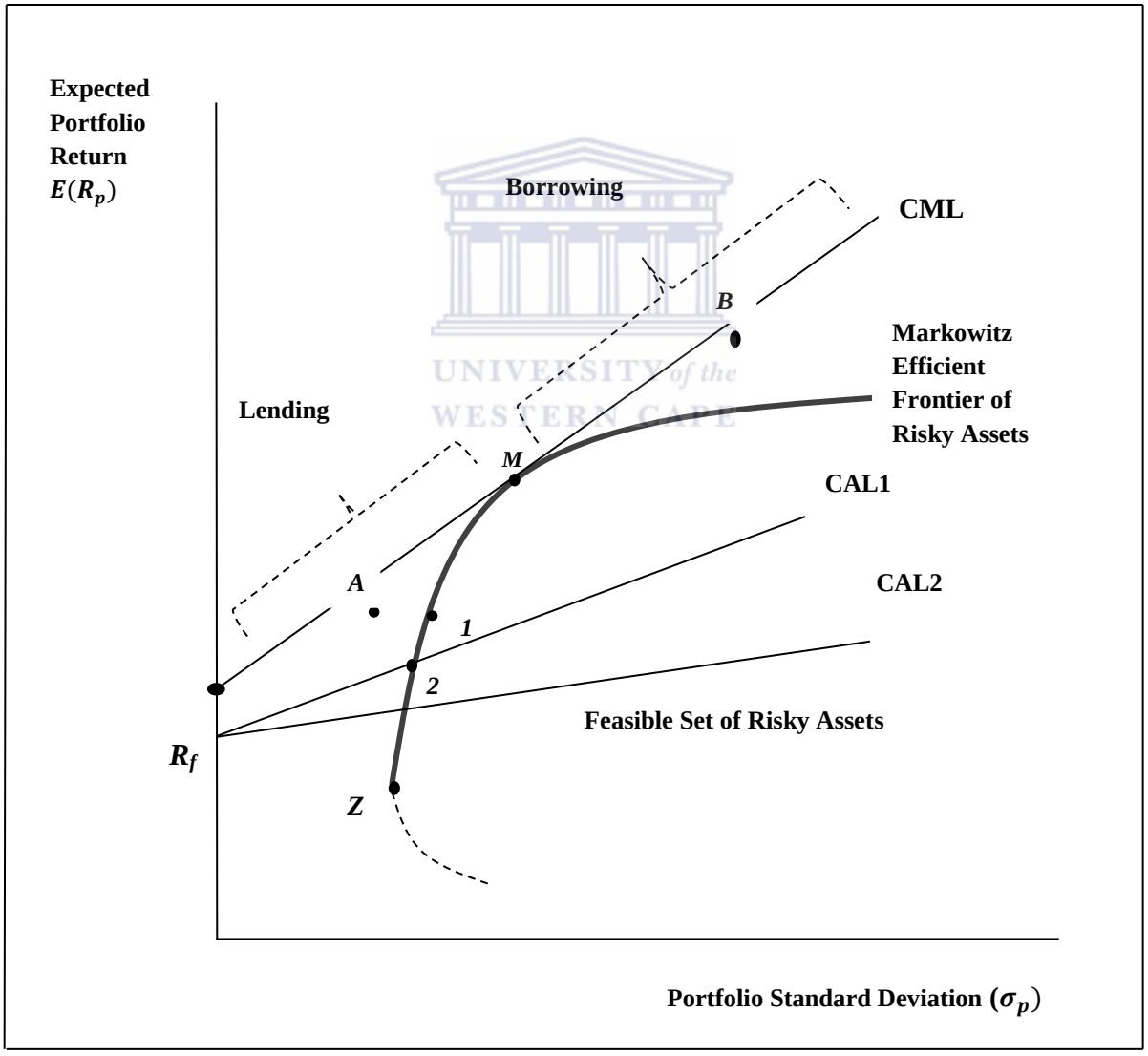
$\rho_{A,B}$ is the correlation coefficient between returns of asset *A* and asset *B* in portfolio *P*.

Although $E(R_p)$ is the weighted average of the returns on asset A and asset B, $\sigma_P$ is less than the weighted average of its constituent standard deviations $\sigma_A$ and $\sigma_B$ for as long as $E(R_A)$ and $E(R_B)$ are less than perfectly positively correlated. Therefore, as depicted by Equation 2.2, a decrease in the correlation coefficient between individual asset A and asset B will result in a subsequent decrease in portfolio risk. Therefore, as long as the correlation

coefficient between constituents' assets is less than perfectly positively correlated, the potential benefits to assets' diversification prevail.

Building on the concept of diversification, Markowitz (1952) introduces an efficient frontier of risky assets on the basis of mean and variance trade-off. The primary objective following this framework is to create an optimal portfolio of risky assets that generates the maximum possible expected return for a given level of risk, or the minimum possible risk for a given level of return. Figure 2.2 demonstrates the hyperbola shaped curve of the Markowitz efficient frontier comprised of risky assets.

**Figure 2.2 Markowitz's efficient frontier of risky assets**






***Source: Figure is extracted from Hsieh and Hsieh (2012:852)***

The area below the curve indicates a set of all individual risky assets attainable to investors. All assets that are plotted on the curve stretching from *Z* through *M* represent an efficient set of opportunities desirable to all the risk-averse investors, since they offer the highest expected return for a given level of risk in the feasible set of risky assets. All assets plotted below point *Z* are perceived inefficient since they offer minimum returns for a given level of risk born.

Tobin (1958) advanced on Markowitz's (1952) framework by integrating the risk-free asset in the portfolio construction process. According to Tobin (1958), investors can attain the optimal portfolio of all assets (both risky and risk-free) by combining the risk-free asset and the optimal risky portfolio on the efficient frontier. The introduction of such a combination impacts the Markowitz efficient frontier in that it offers opportunity sets whose mean-variance profile dominates all the risky assets in the efficient frontier (refer to Figure 2.2). The outcome of such a combination can be represented mathematically as a straight line termed the Capital Market Line (CML) depicted by Equation 2.4:

$$E(R_P) = R_f + \frac{\sigma_P}{\sigma_M}\,(R_m - R_f) \tag{2.4}$$

where:

$E(R_p)$ is the expected return of a portfolio *p*;

$R_f$ is the risk free rate of return;

$\sigma_P$ and $\sigma_M$ are the total risk of portfolio *P* and market portfolio *M*; and

$(R_M - R_f)$ is the market risk premium.

Figure 2.2 illustrates the CML emanating from the risk free asset $R_f$, passing through the tangency point *M* of the efficient frontier. Any point on the CML represents a portfolio comprised of portfolio *M* and the risk-free asset. Portfolio *M* represents the market portfolio, which is the most desirable optimal risky portfolio for investors to combine with the risk-free asset as it provides the maximum expected return for a given level of risk and the lowest level of risk for a given the level of expected return. Thus, any portfolio plotted on the CML dominates all other capital allocation combinations between the risk-free asset and risky portfolios other than the market portfolio. In essence, an investor holding a portfolio comprised of the risk-free asset and risky assets that lie below the CML as indicated by CAL

1 and CAL 2 respectively will be holding a portfolio that is inefficient. This is because, given the same level of risk, the CML offers higher expected returns that dominate any other set of opportunities presented.

Following the identification of the market portfolio, the choice of allocating assets between the risk-free asset and the market portfolio is of significance according to Tobin (1958). This, however, depends on the objectives and the attitude of individual investors towards risk. Reconsider Figure 2.2, in the case where an investor who has a higher tolerance towards risk might attempt to earn higher returns by borrowing at a risk-free rate and invest all of the capital including the borrowed one in the market portfolio (see point B in Figure 2.2). By contrast, investors who are relatively more risk-averse might lend a portion of their capital at a risk-free rate by buying some risk-free assets with the remaining portion of wealth invested in the market portfolio (see point A in Figure 2.2). As such, rational investors with different degrees of risk tolerance will utilise the theorem (separation theorem) as a form of guideline to make asset allocation decisions in an efficient capital market.

## 2.5 Capital Asset Pricing Model

The capital asset pricing model (CAPM) is a mean-variance single factor equilibrium model, developed by Sharpe (1964), Lintner (1965) and Mossin (1966) independently. The model was devised as an enhancement to the framework of Markowitz's (1952) modern portfolio theory and Tobin's (1958) separation theorem. Rooted on the hypothesis that none market risk can be diversified away, the CAPM asserts that investors should only be compensated for assuming non-diversifiable risk (market risk). In effect, the CAPM implies that assets should be priced relative to the market risk instead of the total risk. Moreover, this model can also be employed as a form of a benchmark index in portfolio evaluation processes (Jensen, 1968).

The CAPM depicts a linear association between the returns of individual assets and the returns of the market based on the assumptions that (1) asset returns are normally distributed, with two parameters, mean and variance; (2) all investors are risk-averse and they will always choose an efficient portfolio that will maximise their expected returns given a level of risk; (3) all investors exhibit the same one-period investment horizon; (4) all investors have the same homogeneous expectations of risk and returns and that investment decisions are based on both parameters (mean and variance); (5) capital markets are frictionless and market participants are extremely competitive in their quest, and hence market participants are price takers; and (6) investors can borrow and lend wealth at a risk-free rate unlimitedly (Harrington, 1983).



The reasons underlying the development of these assumptions are based on the premise/attempt to avoid the complexities associated with the real world conditions of financial markets. Relaxing these assumptions may lead to the "dismemberment" of the model itself and generally affects its validity. The mathematical representation of the CAPM (see Equation 2.5), specifies that the expected return of any risky asset or portfolio is determined by summing the risk-free rate and the product of systematic risk (beta) and the market risk premium.

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f) \quad (2.5)$$

where:

$E(R_i)$ is the expected return of capital asset *i*;

$R_f$ is a risk-free rate; and

$E(R_m)$ is the expected market return.

$$\beta_i = \frac{Cov\,(R_i, R_m)}{Var(R_m)} \quad (2.6)$$

Computed as depicted in Equation 2.6, $\beta_i$ measures the sensitivity of expected excess returns of asset *i* relative to the movements in the market risk premium $(E(R_m) - R_f)$.

where:

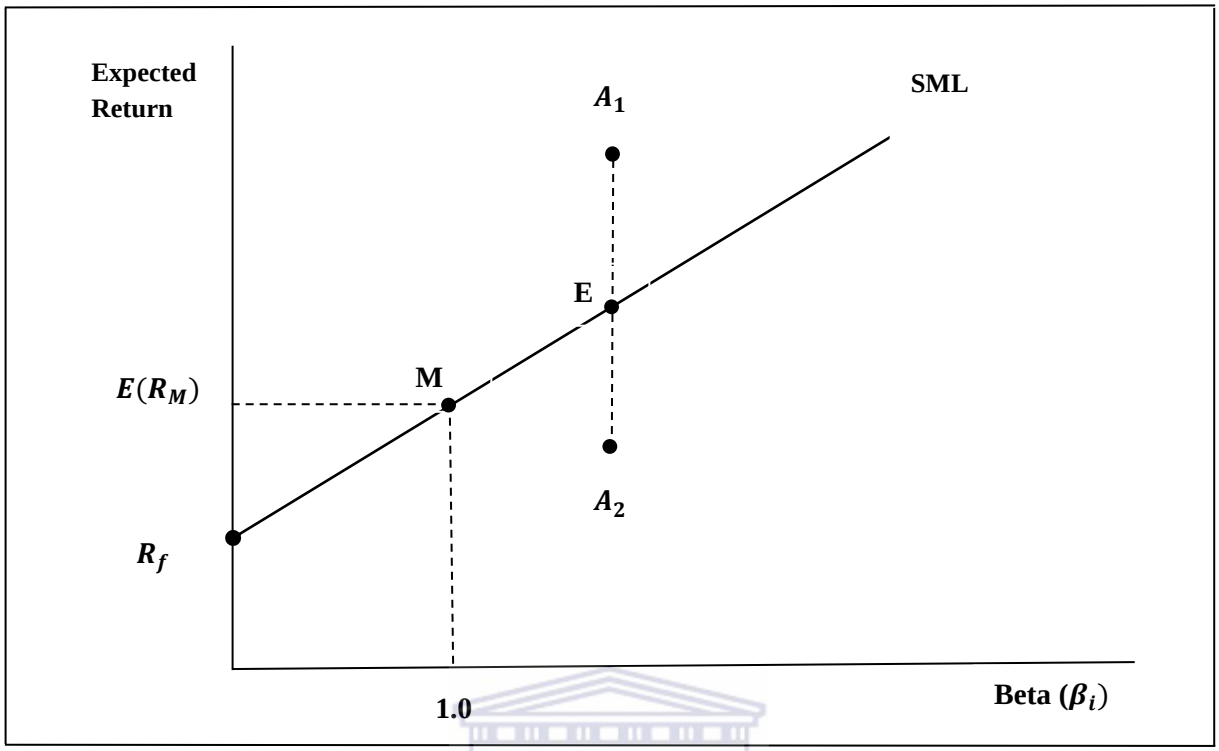
$Cov\,(R_i, R_m)$ is the covariance of asset *i*'s return and the market return; and

$Var(R_m)$ is the variance of the market return.



Therefore, according to the CAPM assumptions and implications, $\beta_i$ is the only risk factor that explains the variation of expected returns of an asset, since any other risk can be diversified away. The outcome of Equation 2.5 can be graphically depicted as indicated by Figure 2.3. The regression line between the expected return of an asset and the systematic risk is illustrated by a line dubbed the security market line (SML). The model suggests that at market equilibrium all assets must be priced such that they lie on the SML and generate justifiable returns given their level of systematic risk.

**Figure 2.3 Security market line (SML)**






Based on this framework, assets/portfolios that lie above the SML will be considered as undervalued, since they generate higher expected returns than what is expected based on their respective exposure to the market risk. In contrast, assets/portfolios that lie below the SML will be regarded as overvalued as they yield lower expected returns than their required returns given their exposure to market risk. This concept can be presented graphically as indicated by Figure 2.3. Consider two assets $A_1$ and $A_2$, where $A_1$ represents an undervalued asset and $A_2$ an overvalued asset. Following this presentation, the homogeneous market participants will "flock" to buy the undervalued asset and systematically sell the overvalued one, since asset $A_1$ yields higher return relative to asset $A_2$ given the same level of risk. The collective trading activities of these market participants will in turn, bid the price of the undervalued asset up and subsequently drive the price of the overvalued asset down. As a consequence, this arbitrage trading mechanism will cause prices to reach a state of market equilibrium demonstrated by *E* in Figure 2.3.

## 2.6 Critiques of the Capital Asset Pricing Model

The capital asset pricing model (CAPM) has prevailed for decades both theoretically and practically as a centre piece of asset pricing mainly due to its simplicity and because "*it offers powerful and intuitively pleasing predictions about how to measure risk and the relation between expected return and risk*" (Fama and French, 2004: 25). Despite its attractiveness, because the model rests on a number of unrealistic assumptions and restrictions, the debate over its validity and testability has caused some friction in the academic circle. For example, the assumption that returns are normally distributed was observed to be a parallel reflection of the real world conditions (Mandelbrot, 1963 and Fama, 1965). Moreover, Blume and Friend (1973) criticised the model's ability to price all financial assets as it is generally assumed theoretically. Blume and Friend's (1973) argument is based on the rational that the CAPM prevails in pricing stocks but, fails significantly in valuing bonds.

Apart from the critiques posed on the unrealistic assumptions of the CAPM, Roll (1977) questioned the testability of the model itself. According to Roll (1977), since the model employs the market index as proxy for the portfolio and because it is impossible to know the true composition of the market portfolio, the implication is that the model is untestable. This is based on the insight that, for the market to be properly defined it has to constitute all assets in the universe including non-traded financial assets such as human capital, real estate etc. In essence, tests performed to validate the CAPM, adapt or substitute index for a true market portfolio, which are subject to misspecification errors. It is for these reasons that Roll (1977) argues that unambiguous tests of the CAPM will be impossible. Furthermore, Roll (1977) highlights that, even if the CAPM is theoretically testable in principle, tests that were performed in prior empirical studies were in fact nothing more than tests of the mean-variance efficiency of the market portfolio, not the CAPM itself. The justification of CAPM to adapt parameter beta as the only measure of risk, also caused controversy in the academic circle. Roll (1977, 1978) criticises the notion that beta is regarded as the only factor that impacts and explains the asset return variation. The well-documented empirical framework records the existence of anomalies, which contradicts this notion of beta as the only explanatory factor of asset returns.

## 2.7 Arbitrage Pricing Theory

Developed by Ross (1976) as an alternative model to the CAPM, arbitrage pricing theory (APT) incorporates other risk factors to circumvent the shortcomings of the CAPM. The model is based on the philosophy that there exists a variety of other economic factors (e.g. inflation, real interest rate, etc.) that can potentially influence the return variations of the assets. According to Ross (1976), the primary source of these factors can be attributed to the macroeconomic factors which are innate within the market and impact all market securities, with the second source associated with the non-systematic risk affecting specific assets. Consequently**,** as opposed to the CAPM, the resulting risk exposure profile of the arbitrage pricing model does not rely on the market portfolio as the only origin of risk. Instead, the model acknowledges the existence of the impact of other variables in explaining asset returns.

The development of APT is entrenched on the less restrictive and more practical assumptions following CAPM. Harrington (1983) and Bodie, Kane and Marcus (2008) define these assumptions as (1) capital markets are perfectly competitive and there exists no market frictions such as transection costs or limitations on short selling; (2) all investors are risk averse and wealth maximisers; (3) there exists sufficient securities to diversify away firm-specific risk; and (4) in a well-functioning market, opportunities of arbitrage do not persist. Similar to the single factor model, the APT also assumes linear relationship in trade-off between mean and variance, (defined mathematically as indicated by Equation 2.7), in which it "*relates the expected return of an asset to the return from risk-free asset and series of other common factors that systematically enhance or detract from that expected return*" (Harrington, 1983:189).

$$E(R_i) = R_f + \beta_{i1}\big(E(RF_1) - R_f\big) + \cdots + \beta_{in}(E(RF_n) - R_f)) + \varepsilon_i \qquad (2.7)$$

where:

$E(R_i)$ is the expected return on asset *i;*

$R_f$ is a risk free rate; and

$E(RF_n) - R_f)$ is the expected risk premium on risk factor $F_n$ .

The parameter $\beta_{i,n}$, quantifies the sensitivity of asset *i*'s return to movements in a pre-specified risk factor *Fn*, which is defined as the covariance of asset's returns with variations in the pre-specified factor and $\varepsilon_i$ denotes a normally distributed random error, with the correlation following $\varepsilon_i$ and $\varepsilon_j$ equal to zero.

Moreover, the APT is governed by the underlying philosophy of law of one price, stating that if two assets exhibiting the same characteristics in all economically relevant respect, then they should offer or sell at the same price (Bodie et al., 2008). The violation of this law will spawn investors to benefit from opportunities associated with arbitrage trading activities. In effect, investors will exhibit the ability to construct a zero investment portfolio with a guaranteed profit (Bodie et al., 2008). For example, reconsider $A_1$ and $A_2$ in Figure 2.3, investors will undertake to sell short the overvalued assets and simultaneously use the wealth attained to purchase the undervalued asset. As a result based on the assumption of a perfectly competitive market, the demand and supply on these assets will bid the prices up and down respectively, causing mispriced assets to reach a state of equilibrium (Fuller, 1981). It is worth highlighting that arbitrage opportunities only occur in the case of market irrationality according to the implication of the efficient market hypothesis. However, in the case where the market is efficient, prices are rational and possess the power to rule out any opportunities associated with arbitrage trading (Fama, 1965).

## 2.8 Critiques of the Arbitrage Pricing Theory

The major shortcoming of the arbitrage pricing theory (APT) is its inability to provide guidance in identifying the relevant risk factors. This is based on the insight that, because the model adapts numeral factors, the number and form underlying these factors are prone to differ across economies over time. Despite the informal framework in identifying these factors, there exists a number of priori guidelines deduced with an attempt to identify potential factors of APT. According to Berry, Burmeister and McElroy (1988) in order to validate the legitimacy of risk factors, they should satisfy the following properties: (1) the factors must be unpredictable to the market at the beginning of every period – that is, risk factors should be completely immune to being forecastable from both its past value and public available information; (2) every factor of the model must possess a pervasive influence on asset return; and (3) all suitable factors must exhibit non-zero prices. In essence, van Ransburg (1997:63) asserts that "*factors should adequately explain asset returns, they should pass the statistical tests necessary to qualify as legitimate APT factors and the actual asset returns should exhibit plausible sensitivities to the realisations of these factors*"

According to Roll and Ross (1984), the most important factors suggested by their study were observed to be (1) the unexpected occurrence of inflection; (2) the unexpected changes in risk premiums; (3) the variation in anticipated level of industrial production; and (4) the unexpected movements in the term structure of interest. Although there exists many plausible economic factors, Roll and Ross (1984) argue that their significant influence on portfolio return will only be felt through the impact of the above mentioned factors. It should be noted that, despite Roll and Ross (1984)'s argument, because the model employs different sets of factors that differ from study to study, different and unique inferences are observed from study to study. As a result, it becomes impossible to reach one universal conclusion with regard to establishing factors that are declared the most common or important.

## 2.9 Behavioural Finance

Behavioural finance is a body of research that attempts to explain the impact of human psychological biases and their actions when making investment decisions. This paradigm relies on the series of experimental procedures conducted on the basis of cognitive biases, investors' individual beliefs and their preferences in their quest to make investment decisions. While EMH, MPT and EUH argue that investors are rational and considers all information at their disposal when making decisions, advocates of behavioural finance hold that, in addition to the mean-variance trade-off suggested by MPT, human decisions are subject to emotions rather than logic. Therefore, at any given time the collective activities of market participants will cause the market not to be fully efficient. As such, behavioural finance serves as a possible explanatory model to the existence of market anomalies unexplained by the capital market theories. Moreover, the existence of psychological biases suggested by behavioural finance indicate that, investors' homogenous decision of attaining the same optimal risky portfolio as argued by Tobin's (1958) separation theorem will in fact be different. While the theory embodies different components and subcomponents, prospect theory proposed by Kahneman and Tversky (1979) is considered a major contributor in the development of this paradigm.



### 2.9.1 Prospect Theory

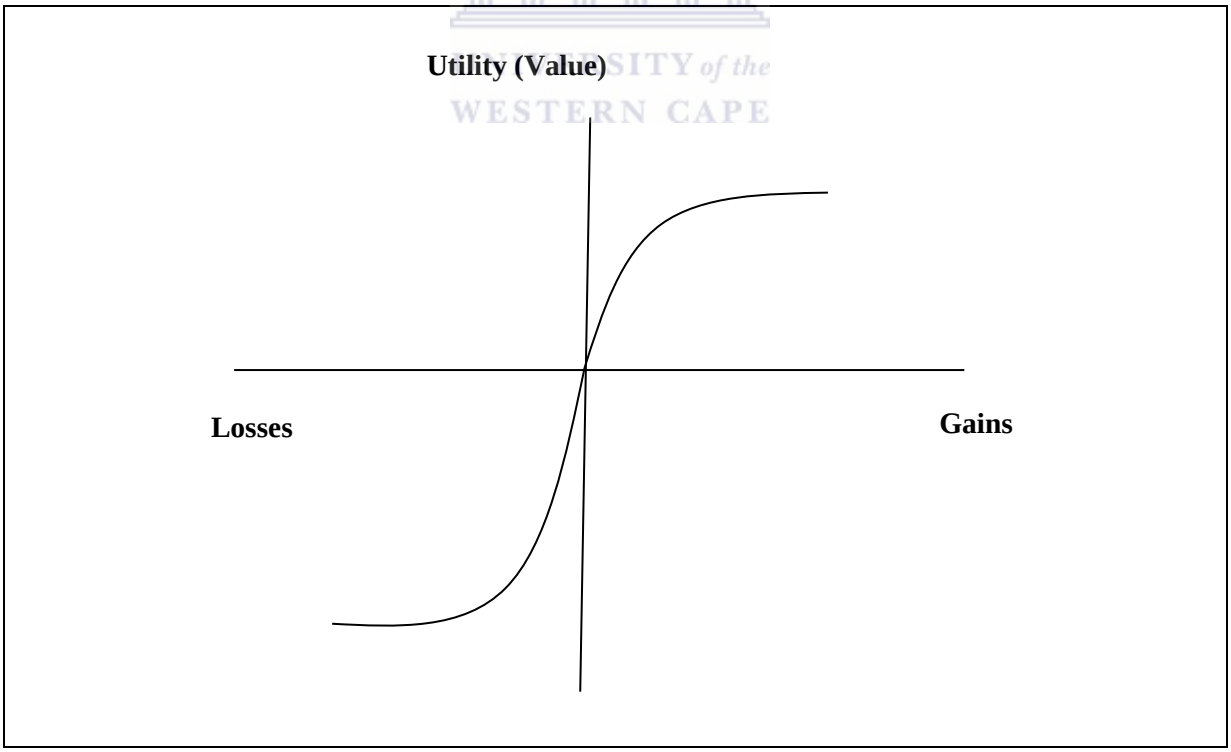
Prospect theory attempts to explain the decision making process of investors under risky and uncertain prospects by incorporating the cognitive psychological influences in addition to risk aversion. Based on the series of empirical studies conducted by Kahneman and Tvesky (1979), the outcome yielded evidence that violates the rational calculation axiom posed by the EUH (discussed in section 2.3). According to this theory, investors exhibit what is dubbed the certainty effect - the tendency of investors to place more weight on outcomes that are certain than those that are based on chance of occurrence. The theory revealed that the majority of investors always choose an alternative that yields guaranteed outcomes than those that are merely probable. The implication of this theory following investors' risk aversion is that, investors become more risk averse in a case of guaranteed gains than in a case of high probability of making a loss.

In addition to the certainty effect, prospect theory introduces the concept of loss aversion, which recognises that investors turn to value the impact of potential loss relative to the

respective gain of equivalent value. In essence, the impact of losing R100 is felt more strongly than the impact of gaining R100. According to Ritter (2003), loss aversion can even be traced from the relationship between trading volume and the bearish/bullish periods. Ritter (2003) highlights that, the significant increase in trading volume during a bullish phase and a considerable decrease during a bearish phase serves as an indication that investors are generally not willing to realise losses relative to gains. This phenomenon can be explained graphically by the proposed S shaped asymmetric value function of Kahneman and Tvesky (1979) depicted by Figure 2.4. The function presents investors' positive utility developed as a consequence of gains and negative utility as a result of loss. Complimentary to the marginal diminishing utility function of the EUH, the positive utility of the function demonstrates a diminishing marginal utility following investors' gains. However, the function assumes a convex shape and a steeper slope on the negative utility following losses. The slope's steepness at a reference point demonstrates the emotional pain felt by investors following a loss.



**Figure 2.4 Asymmetric value function according to prospect theory**




The disposition effect is another behavioural tendency that impacts the decision making process of investors. Suggested by Shefring and Statman (1985), the concept is based on the

assertion that investors tend to sell winning assets sooner and hold on to loosing assets much longer. In effect, investors hold on to assets that have depreciated in value with the hope that they appreciate in the future. Consequently, investors are subject to suffer either a continuous depreciation in value of asset or selling too early while the value of the assets appreciates. This can also be attributed to a psychological bias called the regret aversion, which also compliments the loss aversion effect. Based on this framework, investors have the tendency to avoid finalising a loss on a "losing" asset in an effort to avoid regrets should the value of that asset appreciate in future.

### 2.9.2 Heuristic biases

In addition to the recognition of prospect theory and its implications, heuristic biases are also considered major contributors to the behavioural finance framework. Heuristic biases refer to the mental shortcut employed by investors in order to simplify their decision making process when faced with complex and uncertain conditions (Tvesky and Kahneman, 1974). By employing these decision making strategies, investors are able to examine minimal information and still make efficient decisions at a shorter time frame. However, while the adaption of this principle is not necessarily disregarded on an investment circle but, because it is rooted on the trial and error domain, systematic cognitive biases following this principle are bound to surface.



Moreover, Tvesky and Kahneman (1974) highlights that investors are more likely to make judgments or decisions on an investment based on their personal beliefs or based on the outcome of recent events and they dubbed this biasness the representativeness. For example, consider a case where investors have generated superior returns on a particular stock in recent past. Such investors might make future investment decisions on the basis of this past performance. Subsequently, investors are more likely to make errors by ignoring significant information needed to execute a transaction/trade and are likely to suffer significant losses. Another biasness observed among investors is their tendencies to make decisions based on the majority (herding bias behaviour). In the financial markets, investors can make a trade and alter their decisions on a particular asset from replicating the actions of the majority (Avery and Zemsky, 1998). The manifestation of this behaviour is largely attributable to the rationale that the majority of investors can hardly be wrong about a particular investment. Complimentary to the arguments of Ritter (2003), Economou, Kostakis and Philipass (2010)

postulate that the herding behaviour appear to prevail more during bearish periods than it would during bullish periods.

Investors' overconfidence and biased self-attribution are the other elements of heuristic biases that investors exhibit when making decisions. According to Alpet and Raiffa (1982) investors exhibit a tendency to overestimate the precision of their own abilities and knowledge, especially when operating in fields of self-declared expertise. As a result, investors' asset allocation and selection abilities might be compromised, as decisions would have been made on principles that depart from that of normative laws. In the short run, the persistence of these two biases may lead to the overreaction effect, which subsequently will bring about the effect of momentum anomaly. Momentum effect refers to the rationale that assets that have performed well (poor) continue to exhibit the same performance in the future. Moreover, these biases are more instrumental in how investors decide on a volume of investment or trade they are willing to undertake. For example, if an investor's performance exhibits some superiority in a particular market or an investor was right about the prediction of a certain asset, given similar situations, that investor might choose to make an investment choice on the basis of self-attribution or because he is overconfident. Indicated by the vast empirical evidence in prior literature, the high optimism of investors causes them to trade excessively and is more likely to suffer significant losses (Odean, 1998; Benos, 1998; Gervais and Odean, 2001).

## 2.10 Conclusion

Based on the assumptions of the efficient market hypothesis (EMH), the market always incorporates all the available information and asset prices adjustment to new information are always rapid. Complimentary to this framework, is the random walk hypothesis (RWH) which postulates that asset prices evolves in a random fashion. As such, past assets price movements are not indicative of future movements. The implication is that, provided that the market is efficient, no investor should be able to generate abnormal risk-adjusted returns in a consistent manner.

Modern portfolio theory (MPT) of Markowitz (1952) introduces the framework of portfolio optimisation by rational investors based on the mean and variance trade-off. Furthermore, the theory introduces the concept of portfolio risk reduction through the diversification process. While investors can select portfolios plotted on the efficient frontier of risky assets under MPT, Tobin (1958) asserts that investors can construct portfolios by separating their respective investments between the risk-free asset and the market portfolio according to their individual tolerance of risk. Built on the foundation of MPT, Sharpe (1964), Lintner (1965) and Mossin (1966) independently developed a single factor capital asset pricing model (CAPM). The model asserts that investors should only be compensated for assuming systematic risk, since any other risk can be diversified away. Roll (1977) criticised the testability of the CAPM based on the fact that the true market portfolio is unobservable. Developed to overcome the limitations of the CAPM, Ross (1976) proposes an alternative multi-index factor model under the framework of the arbitrage pricing theory (APT).

The expected utility hypothesis (EUH) explains the rational behaviour exhibited by investors under risky and uncertain conditions. Based on the EUH, investors are rational because they evaluate all the probabilistic outcomes of individual prospects that always maximise their total expected utility. However, According to behavioural finance, investors are affected by a stream of psychological and cognitive biases in making investment decisions. As a result, investors collectively and individually exhibit some irrationality in the market, which partly explains the presence of some anomalies that are not explained by capital market theories. Under prospect theory, Kahneman and Tvesky (1979) indicated that investors' risk aversion increase at a decreasing rate on the positive utility domain and at the negative domain investors show a decreasing dis-utility, which violate the axioms underlying the EUH that relies on the presence of risk aversion in the positive utility domain.

# 3

# A Review of Prior Literature

## 3.1 Introduction

Since their inception, mutual funds have increasingly grown to become investors' preferred alternative form of investing on a long-term basis. A big part of the answer to explaining the growing popularity lies in the investment opportunities offered by funds (as discussed in Chapter 1). However, despite this popularity, the majority of the academic opinion departs from supporting the assertion that actively managed funds can potentially outperform their passive benchmarks. Their arguments are mainly centred on the implications following the Random Walk Theory (RWT) of Kendall (1953) jointly with the Efficient Market Hypothesis (EMH) developed by Fama (1965, 1970). According to the two theories, market prices of assets fully reflect all available information in an unbiased fashion, implying that past price behaviour cannot be used by fund managers as a mechanism to predict future price movements with the intention to earn abnormal returns. Based on the framework of the EMH and RWT, active money managers can only generate higher returns by assuming higher active risk.



This chapter first provide international empirical evidence documenting mutual fund performance relative to their respective benchmarks in Section 3.2; followed by studies that conduct performance attribution analysis to examine whether active fund managers are able to add economic value through their security selection and market timing abilities in Section 3.3; and relevant South African evidence in Section 3.4. Section 3.5 summarises empirical findings and concludes the chapter.

## 3.2 Mutual Fund Performance: International Evidence

Regarded an early contributor to the empirical literature underlying the framework of mutual fund performance evaluation, Sharpe (1966) developed a fund performance measure called the reward-to-variability ratio (commonly known as the Sharpe ratio). The author conducted a study to evaluate the performance of 34 open-end mutual funds over the examination period from 1954 to 1963. The author examines the performance of funds on the basis of their Sharpe ratio rankings and compares them to the relative performance of the benchmark proxy given by Dow Jones Industrial Average (DJIA) index. The results reveal that most funds generated Sharpe ratios that are significantly less than those of the benchmark, with the ratios ranging from 0.43 to 0.78. In addition, with regard to the performance of the funds, the results document that 23 of the 34 funds earned returns that are less than those of the benchmark. These results discourage the practise (by managers) of attempting to identify undervalued assets in the capital markets. Instead, fund managers should pay more attention in evaluating fund risk and ensuring efficient portfolio diversification processes. On the other hand, Jensen (1968) examines the performance of 115 U.S. open-end mutual funds over the period from 1945 to 1964 based on the required rates of return indicated by the CAPM. This measure is commonly known as Jensen's alpha. The study employs the S&P500 index as the market proxy. The results show that 76 of the 115 funds underperform the CAPM benchmark. Furthermore, 67 funds earned gross returns that are inferior to those generated by the S&P 500 index. The author concludes that on average, mutual fund managers are unable to predict assets price movements well enough to outperform the passive indexing strategy.

Re-examining the results obtained from the studies carried out by both Sharpe (1966) and Jensen (1968), Carlson (1970) reports results that contradict both those obtained by the two authors. According to Carlson (1970), the validity of testing whether active management strategies outperforms the passive strategies relies mainly on the choice of the time period of examination in conjunction with the selection of the appropriate market proxy. Three benchmark proxies namely, the New York Stock Exchange (NYSE) index, the S&P 500 index and the DJIA index are selected as benchmark proxies. After examining the sample of 82 U.S. mutual funds, the author finds that the performance of funds generated varies from benchmark to benchmark. The results reveal that most funds exhibit an outperformance of the DJIA index over the enter examination period. However, relative to the NYSE and the S&P 500 indices, the results provide evidence of underperformance by of the funds in terms of

their gross return performance. Based on these outcomes, Carlson (1970) points out that the conclusion reached in previous studies regarding fund underperformance might be subject to time period and market proxy bias. On the other hand, Mains (1977) questions the inference reached in Jensen's (1968) study based on the methodology used together with the levels of the market risk considered. The author points out that the results of the Jensen's (1968) study might have been exposed to measurement errors. According to Mains (1977), an assumption that measures of market risk are stationary throughout the examination period as assumed in Jensen's (1968) study imposes some degree of impact on the overall performance of funds. In addition, Mains (1977) states that the other shortcoming following the Jensen (1968) study is that the performance measure used understated the funds' returns. To evaluate the performance of funds, the author uses the same sample employed by Jensen (1968) over the period from 1955 to 1964. The results of the study document evidence of market outperformance by the majority of the funds under examination.

Lehman and Model (1987) study the performance of 130 U.S. mutual funds over the period from January 1968 to December 1982. Similar to Jensen (1968), Lehman and Model (1987) employ the CAPM in conjunction with the model derived from the Arbitrage Pricing Theory (APT) to examine the performance of funds with emphasis placed on determining the sensitivity of fund performance measures in relation to their respective chosen benchmarks. "*If the choice of a benchmark were an unimportant one, different benchmarks should have yielded similar results - the overwhelming fact is that they did not*" Lehman and Model (1987:37). Additionally, the authors assert that because of the potential sensitivity associated with the choice of benchmarks relative to the performance of funds, inference reached on previous literature might be subject to this bias. Upon examining the performance of funds over the examination period, the authors find that the performance measures employed in the study exhibit some degree of sensitivity to the chosen benchmark indices. In addition, Lehman and Model (1987) document evidence of abnormal performance exhibited by most of the funds under examination.

Grinblatt and Titman (1989) investigate the existence of abnormal performance amongst fund managers over the period from 1975 to 1984. The study employs the Jensen's alpha calculated based on four sets of benchmark proxies namely, the equally-weighted portfolio of all of the NYSE and the American Stock Exchange (AMEX) securities, the CRSP value weighted index, the 10 factor portfolio and the 8 factor portfolio decomposed based on size, dividend yield and the historical returns. Unlike previous studies, the study employs a sample

that does not exhibit survivorship bias. According to the authors, this is particularly important as it aids in gauging the potential bias in studies that employ a sample comprising of only the surviving funds. Grinblatt and Titman (1989) find evidence of outperformance regardless of the respective category each fund belongs to. Grinblatt and Titman (1989) attribute the results to the fact that the sample consists of mostly growth funds which deliver outstanding performance in the period under review. Ippolito (1989) evaluates the performance of 143 funds over the period from 1965 to 1984. The benchmarks proxies employed include the S&P 500 index, the NYSE index and the Salomon Brothers long-term bond market index. In addition, the author examines the efficiency of the mutual funds industry by evaluating the impact of turnover to the overall performance of the funds. The results indicate that fund performance is not strongly and positively correlated to turnover. In support of the findings documented by Mains (1977), the study results of Grinblatt and Titman (1989) further reveal that on average, upon accounting for the expenses but before charges, the funds generated superior returns to their benchmarks.

Alternative to the hypotheses tested in many of the previous studies, Cumby and Glen (1990) examine the performance of 15 U.S.-based internationally diversified funds over a period from 1982 to 1988. The Morgan Stanley World Index and an equally-weighted portfolio of Eurocurrency deposits are employed as benchmarks. In addition to the evaluation of the mutual fund performance over the enter examination period, the author evaluate the fund performance during the October 1987 market crash. The results reveal that most funds exhibit greater drawdowns in the market crash. However, upon the removal of October 1987 in the sample, the results document that 12 of the 15 funds record superior performance relative to their benchmarks.

Elton, Gruber, Das and Hlavka (1993) employ data set used in the Ippoloto's (1989) study to examine the performance of funds over the period from 1964 to 1984. According to the authors, the results of superior fund performance in the Ippoloto's (1989) study might be primarily due to the difference in performance between non-S&P 500 assets and S&P 500 assets. To gauge this difference the study includes a sample that comprises the mutual funds holding non-S&P 500 assets. To guarantee a broad representation of the mutual fund industry, the authors include a sample of common stocks that compose the S&P's index together with a sample of mutual funds that invests primarily in bonds market. Elton et al., (1993) find that when the performance of the non-S&P assets are taken into consideration in

the sample employed by Ippoloto (1989), the results support evidence of underperformance of mutual funds compared to their benchmarks.

Different from previous hypothesis tested on the performance of mutual funds, Shakla and Singh (1994) investigate whether fund managers' advanced professional education has an effect on the performance of the funds they manage. The sample is examined on the basis of two groups divided as: group of funds with managers holding Chartered Financial Analysts (CFA) credentials and a group of non-CFA holders. The study results reveal that funds that are managed by CFA holders outperform those of non-CFA holders. In addition, the results reveal that funds with non-CFA managers appear to be riskier and less diversified. However, the majority of managers from both groups demonstrate inferior performance relative to their respective benchmarks.

Malkiel (1995) on the other hand, examines the effect of management expenses and survivorship bias on the overall performance of mutual funds. The study is conducted over the period from 1971 to 1991 using a database consisting of 279 equity mutual funds. The author finds the impact of the survivorship bias to be substantial in evaluating the performance of funds. According to the author, the exclusion of non-surviving funds in the sample significantly overstates the returns generate by the funds, creating an impression of persistent superior performance. In addition, Malkiel (1995) finds that, before expenses and relative to the Wilshire 500 index, sample funds on average, exhibit an average alpha of +0.18%. After accounting for the expenses, sample funds exhibit an average alpha of -0.93%. When performance is measure relative to the S&P 500 index, sample funds exhibit an average alpha of -2.03% for the gross return and -3.5% for the net return. Based on these results, Malkiel (1995) concludes that investing in low cost passive indices presents a better alternative for individual investors as actively managed funds tend to underperform the market in the long run.

Blake and Timmermann (1998) examine the performance of U.K. mutual funds over the period from February 972 to June 1995. In order to measure the variability in performance of funds across a lager scope, the authors uses a sample that is selected in accordance to their respective sectors (international equities, bonds, property and commodities). The authors find that the U.K. equity funds underformer the market by approximately 1.8% basis points per year. The results further reveal that most dying funds document negative excess returns of approximately -30 basis points during their dying period irrespective of the sector they

belong to. In addition, the results document evidence of survivorship bias which is estimated to be approximately 0.065% on a monthly basis. Blake and Timmermann (1998) find this bias to be significantly higher among mutual funds that invest predominately in international markets.

Quigley and Sinquefield (2000) investigate the performance of 752 U.K. open-end mutual funds over the period from 1978 to 1997. Similar to the study of Blake and Timmermann (1998), the study examines a sample that consists of both the surviving and none surviving funds. The authors group sample funds based upon their investment objectives (growth stocks, growth and income, small company-stocks and equity income) and evaluate their performance based on the the Fama and French (1993) 3-factor model. The results reveal that most of the fund managers fail to generate statistically significant alpha over the examination period. Drew and Stanford (2003), on the other hand, uses a wider class of 13 models to evaluate the performance of U.K. mutual funds over the period from January 1993 to December 2003. The authors examine the performance on the basis of two objectives namely, whether the fund produces superior returns consistently; and whether each of the employed models possesses the ability to document the significant superior performance of the funds. The authors find that some performance measures exhibit some limitation in their ability to capture the superior performance of funds due to the high standard errors they generate. Drew and Stanford (2003) conclude that on average, most fund managers fail to even generate returns that are enough to compensate for the management expenses involved.



Gallagher and Martin (2005) investigate the performance of Australian equity funds and examine the effect of fund size on the risk-adjusted performance. The authors employ a database of monthly returns of 387 funds over the period from 1991 to 2002. The risk-adjusted performance of the funds is examined by employing both the single factor and the 3-factor models employed by Elton et al. (1993). After examining the risk-adjusted performance of funds, Gallagher and Martin (2005) find no evidence supporting the assertion that performance of funds decline with fund size. However, the authors find that large equity funds significantly underperform small equity funds. In terms of the overall performance, the authors find evidence indicating that most fund managers were successfully able to generate risk-adjusted abnormal returns.

Ferreira, Miguel and Ramas (2006) perform a cross-country study to examine the performance of funds over the period from 1999 to 2005. In addition, the authors examine

whether or not country characteristics such as economic and financial development influence the performance of funds. The study employs a sample comprising of 10,568 open-end funds classified across domestic funds, foreign funds and global funds. The findings document positive relationship fund performance and the country's level of development. Funds in developed countries are observed to perform better than those in less developed countries. However, the impact of financial development on fund performance is observed to be strong among countries that exhibit high trading activities. In terms of the overall performance of the funds, Ferreira *et al* (2006) document no evidence indicating that actively fund managers are able to earn superior risk-adjusted returns on a consistent basis.

Sherman (2012) examines the effect of fund management location, asset allocation and market timing ability of fund managers. A monthly return data of 4,545 funds extracted from Morning Star are examined over the period from January 1970 to June 2010. The author employs two timing techniques to evaluate whether or not fund managers from the U.S., U.K. and Canada are able to time particular asset classes. This includes a multifactor model that uses return data to measure absolute and timing abilities of managers and the model that uses actual asset allocation data. The author finds that, with regard to the influence of fund location on fund returns, managers that are based in the U.S. exhibit superior performance to mangers who are based in U.K. and Canada. However, with regard to the overall performance of the funds, the results reveal that fund managers are unable to generate abnormal returns regardless of their locations. In addition, the authors document no evidence supporting the existence of market timing ability among mangers in the study.

## 3.3 Performance Attribution of Mutual Fund Performance

Kon and Jen (1976) examine the performance attribution of 49 U.S. mutual funds over the period from 1960 through 1971. The Quandt (1972) switching regression model and the Black (1972) equilibrium model are both employed in the evaluation. Kon and Jen (1976) find that on average, fund managers are unsuccessful in earning abnormal returns from timing the market. However, the results further indicate that most of the fund managers exhibit a significant economic contribution through their asset selection activities. It is also found that fund managers are unsuccessful in selecting assets that allow them to offset the costs associated with their positive asset selection skills.

Henrikson and Merton (1981) introduce a statistical model that examines the contribution of fund managers through their asset selection and market timing activities. The models employ both the parametric and non-parametric statistical procedures to gauge whether or not market movements are predictable by fund managers. Based on this model, Henrikson (1984) evaluates the performance of 116 open-end-funds over the period from February 1968 to June 1980. The results reveal that only 3 out of 166 funds exhibit significant managerial timing ability. Using the Henrikson and Merton (1981) model, Chang and Lewellen (1984) examine the performance of 67 mutual funds over the period from January 1971 to December 1979. In particular, the authors investigate whether or not fund managers add value through their ability to both time the market and select superior assets. The authors find no evidence supporting the existence of both market timing and asset selection ability among managers. Based on this, Chang and Lewellen (1984) posit that collectively their findings support the hypothesis that fund managers still cannot outperform passive investment strategies.



Lee and Rahman (1990) examine market timing and asset selection ability of 93 mutual fund managers over the period from 1977 to 1984. The results reveal that, after employing the Bhattacharya and Pfleiderer (1983) performance measure, the authors find that only 16 to 28 funds under examination exhibit superior timing ability. Similarly, Coggin, Fabozzi and Rahman (1993) employ the Bhattacharya and Pfleiderer's (1983) performance measure to test the hypothesis that fund managers add value through their market timing abilities. In addition, the authors employ the Treynor-Mazuy's (1966) performance measure to gauge manager's abilities to select assets that enables them to earn superior risk-adjusted returns. Upon examining a sample of 71 pension funds over the period from 1983 to 1990, the results

of the study reveal that fund managers exhibit negative market timing abilities. Furthermore, Coggin at el (1993) document no evidence supporting the existence of significant asset selection ability among most of the fund managers under examination.

Bello and Janjigian (1997) extend the model of Treynor-Mazuy (1966) by including the Wilshire 4500 index (which exclude S&P 500 assets) and the Shearson Lehman Government Corporate index as part of the variables in the model. According to Bello and Janjigian (1997) the model possess an added advantage as it is able to examine both the timing and asset selection of fund managers by separating the effect of non-S&P 500 assets in the portfolio. The authors examine a sample comprising 633 domestic equity mutual funds to track the market timing ability and the asset selection ability of fund managers over the period from 1984 to 1994. After accounting for the non-S&P 500 assets in the sample, the authors document evidence of significantly positive alpha exhibited by most of the fund managers. Similarly, the authors find that most of the fund managers also exhibit significantly positive market timing ability.

Daniel, Grinblatt, Titman and Wermers (1997) examine whether or not fund managers can successfully time the market and whether they can select assets that enable them to outperform the market. Quarterly equity returns of 2500 mutual funds are selected and evaluated over the period from 31 December 1974 to 31 December 1994. The fund performance is measured against the performance of three market proxies represented by the NYSE index, American Stock Exchange (AMEX) index and the NASDAQ index respectively. Daniel *et al* (1997) find that a significant number of fund managers do indeed exhibit a superior performance relative to the employed benchmarks. However, the authors further find that amount by which managers outperform the market to be relatively small. Moreover, upon accounting for the management fees, Daniel *et al* (1997) find that the amount that managers outperform to be equivalent to the management fees, indicating the failure of most fund managers in generating abnormal returns net of fees.

Kao, Cheng and Chan (1998) examine the selectivity and market timing ability of U.S. based international mutual funds mangers over the period from January 1989 to December 1993. Two-beta models of Merton (1981) and Hendrickson-Merton (1981) are employed in the study to make distinction in performance attribution between managers' abilities to select assets and their abilities to time the market movements. In total the study employs a sample comprising of 97 mutual funds, selected from the Morningstar database as: Europe (10

funds), World (33 funds), Pacific (11 funds) and Foreign (43 funds). Different market proxies are employed according to their respective geographical regions. The MSCI Europe index, the MSCI Pacific index and the MSCI EAFE (Europe, Australia Far East) index are adapted as market proxies for the European, Pacific and Foreign funds respectively. The results reveal that the majority of the fund managers from the Foreign, Pacific and the World group exhibit superior asset selection ability. However, the results further reveal that fund managers of these groups fail to add significant value through their market timing activities. According to the author, because the majority of the fund managers exhibit positive asset selection ability, 80% of these managers also indicate to exhibit a good risk-adjusted overall performance. Kao *et al* (1998) conclude that on average, the ability for international mutual fund managers in selecting superior assets aids in offsetting their poor performance as a result of their poor market timing ability.

Chen, Jegadeesh, and Wemers (2000) investigate the economic value contribution of active mutual fund managers by examining the performance of U.S. mutual funds over the period from 1975 to 1995. Using a sample of 2424 mutual funds and comparing their performance to the NYSE and the AMEX indices, the results of the study reveal that stocks that are held by mutual funds exhibit some underperformance by those held by the general population. When the author examine the trading frequency of fund managers and the returns generated on funds, the results reveal that assets that are recently purchased by fund managers exhibit significantly higher returns than the assets that are sold. These results are consistent for both the large and small funds together with funds that invest in value and growth stocks. In addition, the authors document evidence indicating that fund managers who trade on a more frequent basis exhibit a better stock picking abilities than those who trade less frequently. Similar trend is also documented with growth-oriented funds, managers of growth-oriented funds are observed to show better abilities in selecting large growth stocks. Chen *et al* (2000) conclude that, overall, most fund managers examined indicate to significantly add economic value through their abilities to select 'winning' stocks that enables them to perform better than their respective benchmarks.

Wermers (2000) investigates the economic value contribution of the active fund managers through their abilities to select superior assets. The sample is comprised of funds that invest in growth-oriented funds, balanced and income funds over the period from 1975 to 1994. The Center for Research in Securities Prices (CRSP) Value-Weighted Index and the Vanguard Index 500 fund are selected as proxies representing the broad markets. The result of the study

reveal that on average, most of the examined funds hold stocks that outperform the CRSP index by basis points of approximately 130 per year. Wermers (2000:1689) finds that '*about 60 basis points is due to the higher average returns associated with characteristics of stocks held by funds, whereas the remaining 70 basis points is due to talents in picking stocks that beat their characteristic benchmark portfolio*'. However, the author finds that on average, mutual funds generate net returns that are approximately 100 basis points per year less than that of the CRSP index. The results of the study further indicate that high-turnover funds produce superior average returns than those generated by low-turnover funds regardless of the high transaction costs associated of them. According to the author, a significant contribution of this performance is attributed to the fact that, managers of high-turnover funds exhibit better asset selection skills, which contribute to their overall performance.

Goetzmann, lngersoll and Ivkovic (2000) question the accuracy of the statistical tests implemented in prior studies on the basis of data collection. The authors argue that the adaption of daily data in previous studies appear to produce more accurate results compared to studies that employ monthly data sets. This is based on the rationale that the classical Henrikson-Merton (1981) performance measure exhibits weakness in measuring market timing ability of fund managers, especially when monthly data is applied. The authors employ a sample of 558 funds to examine whether or not fund managers exhibit some superior market timing skills. To examine the difference in inference reached using daily data from the monthly one, Goetzmann *et al* (2000) employs the Henrikson-Merton (1981) model using both daily and monthly data. According to the authors, regardless of using daily or monthly data the results reveal that only very few fund managers were able to time the market successfully.



Similar to the study of Goetzmann *et al* (2000), Bollen and Busse (2001) examine the performance of mutual funds by applying both the monthly and the daily data. The study employs a sample of 230 domestic equity funds over the period from 2 January 1985 to 29 December 1995. The CRSP value-weighted index together with the NYSE and the AMEX indices are employed to as the benchmarks for the study. The results reveal evidence of significant timing ability among most fund managers when a daily data is used. According to Bollen and Busse (2001), only 11.9% of funds exhibit positive timing skills when data adapted is on a monthly basis. However, the daily data performance indicates the existence of market timing ability to be among the 34.2% of the managers examined. Based on these

results, the authors suggest that the results serve as an indication that the majority of mutual fund managers possess more timing ability than it is previously documented in literature.

Benson and Faff (2002) analyse the performance of Australian international equity trusts over the period from 1990 to 1999. In an attempt to examine the effect of survivorship bias in the results, the authors use a sample comprising of both surviving and non-surviving funds. The authors examine a sample comprising of a total of 64 funds selected according to their investment objectives which includes: the general equity trusts, wholesale equity trusts and the insurance bond equity trusts. The MSCI is implemented as a market proxy and measured against the performance of the funds. Treynor-Mazuy (1966), Henrikson-Merton (1981) and the Jensen performance measure are employed to examine for the existence in market timing and asset selection skills of the fund managers. Using the Jensen's performance measure, the results reveal that 93% of the funds were unable to positively outperform the MSCI. The results further reveal that both models of Treynor-Mazuy (1966) and Henrikson-Merton (1981) document similar inferences that depart from supporting the existence of market timing ability among fund managers. Moreover, with regard to the effect of survivorship bias, the authors find the impact to be minimal on the overall performance of funds.

Jiang, Yao and Yu (2005) point out their concern regarding the traditional methodology used in previous empirical literature including the timing models of Treynor-Mazuy (1966) and Henrikson-Merton (1981) respectively. According to the authors, the performance measures employed in previous studies may fall short in capturing the market timing abilities of fund managers. The argument is based on the rationale that previous studies were based on nonlinear relations between funds and market returns and that fund returns are often observed at low frequency and conducted over a short period of time. In an effort to improve the ability of the study to capture market timing, they employ the holdings-based measure. The authors document evidence that support the existence of superior timing ability possess by the majority of the fund managers in the sample.

Curthbertson, Nitzsche and O'Sullivan (2008) evaluate the performance of open-end mutual funds that invest in the U.K. equity markets over the period from April 1975 to December 2002. In contrast to previous studies, the authors employ a cross-section bootstrap method instead of the conventional statistical measures. According to the authors, the bootstrap approach possesses a better ability to distinguish between returns generated as a result of luck or skill compared to conventional statistical methods. The study comprises a sample of 935

equity funds that are selected in accordance to their investment objectives ranging from: equity-income, small companies and the general and growth equity funds. To minimise the impact of survivorship bias in the overall performance of funds, the authors include a sample comprising of 236 non-surviving funds. The results support the existence of positive stock picking abilities among few top performing funds from the equity-income category. In conclusion, Curthbertson *et al* (2008: 613) point out that *''at the negative end of the performance scale, our analysis strongly rejects the hypothesis that most poor performing funds are merely unlucky. Most of these funds demonstrate bad skill*''. In a follow up study, Curthbertson *et al* (2010) investigate the timing and the asset selection abilities of both U.K. and U.S. fund managers by applying the non-parametric tests over the period from 1988 to 2002. The study examines the performance of 800 equity funds which are compared to the performance of the MSCI employed as a proxy for the market portfolio. The authors find that on average, only a relatively small number of fund managers were able to successfully achieve abnormal returns. In addition, with regard to market timing, the authors document no evidence indicating that the managers are able to successfully forecast future market movements.

Alda, Ferruz and Monoz (2010) investigate the performance of fund managers by testing whether or not fund managers from U.K. and Spain possess superior market timing and asset selection skills. The sample is comprised of 494 U.K. funds and 72 Spanish funds examined over the period from 1999 to 2007. The authors document moderate evidence of asset selection ability among the Spanish and U.K. fund managers. To examine whether fund managers can earn abnormal risk-adjusted returns through their market timing abilities, the study employs both of the Henrikson-Merton (1981) and Treynor-Mazuy (1966) models. The results reveal that, with regard to market timing ability, most fund managers exhibit negative timing abilities. In addition, the authors examine whether or not fund managers uses privilege information to achieve abnormal returns overtime. The authors document evidence indicating the failure of managers (from both U.K. and Spain) in using privilege information to execute their timing strategies. Overall, the results reveal that on average, fund managers exhibit some degree of asset selection ability but are unable to profit from predicting future market movements.

Sheikh and Noreen (2011) examine the performance attribution of 50 U.K. mutual funds over the period from 1990 to 2008 with the Financial Times All Share index adapted as the benchmark index. The Treynor-Mazuy (1966) model is implemented in the study to evaluate

the ability of fund managers in timing the future market movements. To examine the overall performance of the funds, the study employs the Jensen performance measure. The authors find that most fund managers are unable to generate positive abnormal returns on a consistent basis. The results also reveal that most fund managers lack both asset selection and market timing abilities.

Low (2012) investigates the extent to which fund characteristics affect the returns generated by fund managers. The study examines the performance of 65 Malaysian funds over the period from 2000 to 2004. To evaluate the overall performance of funds, Low (2012) employs the Jensen performance measure and employs the Kuala Lumpur Composite Index (KLCI) as the market proxy. Furthermore, the author employs the Henrikson and Merton (1981) model to examine the performance of fund managers by attributing their fund returns to their abilities either select superior assets or to time the market movements. The results provide evidence that fund managers are unlikely to select superior assets and time the market successfully. Moreover, Low (2012) finds that the asset selection ability of the fund managers to be inversely correlated to the fund risk. Thus, the results suggest that funds that are risky and exhibit significant exposure to the market movements are likely to exhibit poor selective performance overtime. However, with regard to market timing ability, the results reveal evidence of high and positive correlation between fund risk and market timing performance of managers. Funds with high exposure to the broad market movements are observed to be better managed by fund managers who possess market timing skills. On fund size, the results indicate that managers holding large funds exhibit a better predictive ability of the market movements. However, as the size of the fund expands, managers holding those funds are likely to underperform the market.

## 3.4 South African Evidence

Gilbertson (1976) is regarded as one of the early contributors to the empirical literature underlying the performance of South African mutual fund managers. In the study, Gilbertson (1976) investigates the performance of 11 unit trusts over the examination period from 1970 to 1976. Using the Jensen's performance measure, the author finds that on average, when performance is evaluated on a risk-adjusted basis, the majority of the managers underperform their respective benchmarks. Study results also reveal that only 2 of the 11 funds under examination successfully achieved positive risk-adjusted abnormal returns. However, Gilbertson (1976) finds that, at a 5% level of significance, the returns generated by the 2 funds are statistically insignificant, indicating an inferior performance by the majority of the trust managers.

Similarly, Taylor (1977) investigates weather or not South African unit trust managers outperform the market. The author employs the Jensen and the Treynor measure to evaluate the performance of 10 unit trusts over the same examination period as that of the Gilbertson's (1976) study. Consistent with the findings of Gilbertson (1976), the results reveal that upon using the Treynor measure and Jensen's alpha, most fund managers achieved risk-adjusted returns that are approximately 2.40% less than those generate by the market proxy.



Gilbertson and Vermaak (1982) examine the performance of 11 unit trusts listed on the Johannesburg Stock Exchange (now the JSE Limited) over the period from 1974 to 1981. Three indices namely: the JSE Actuaries All Share index, the JSE Actuaries Industrial index and the RDM-100 index are employed as the benchmarks to measure the performance of the South African funds. The authors find that the returns achieved by most of the funds ranges from 15.9% per annum to 22.5% per annum and that, on average, these returns underperform the selected benchmark indices. To evaluate the performance of fund on a risk-adjusted basis, three sets of performance measures are employed namely: the Sharpe ratio, the Treynor measure and Jensen's alpha. Gilbertson and Vermaak (1982) find evidence that indicate an outperformance of all three indices by the majority of the funds. However, only 1 of the 11 funds earns risk-adjusted abnormal returns on a consistent basis.

Firer, Ward and Teeuwisse (1987) investigate the performance of South African unit trusts with emphasis placed on the forecasting accuracy needed by managers to ensure superior returns from those of the buy and hold strategy. Four investment instruments namely:

Industrial holding index, All Share index, Banks and Financial Service index are used as indices to gauge the performance of unit trusts over the period from 1967 to 1986. The authors find that on average, for a fund manager to successfully earn abnormal risk-adjusted returns through market timing activities, at least 87% market timing accuracy is required. Overall, the results indicate that most fund managers fail to successfully outperform the market index as their market forecasting accuracy usually fall below the estimated rate of 87%. Fire *et al* (1987) assert that the passive buy and hold strategy seems to be a better investment alternative for a long term investment.

Updating the study of Gilbertson and Vermaak (1982), Knight and Firer (1989) examine the performance of 10 of 11 South African unit trusts over the period from January 1977 to December 1989. The risk-adjusted fund performance is evaluated by Jensen's alpha, Treynor measure and the Sharpe ratio. The results of the study document evidence of outperformance by most of the fund managers when performance is examined on a non-risk-adjusted basis. On a risk-adjusted basis however, only 5 of the 10 funds under examination prevailed in producing statistically significant superior returns that exceed those generated by the market portfolio.



Firer, Sandler and Ward (1992) expand on their early study by examining the predictive accuracy required by the South African unit trust managers to successfully predict and outperform the market over the period from 1967 to 1989. In addition to the stated objective, the authors undertake to investigate the impact of the October 1987 market crash on the forecasting ability of fund managers. The All Gold and the T-bill indices are employed to represent the high-beta and low-beta assets respectively. The results indicate that the returns generated using the All Gold index carries high risk compared to the T-bills index. Additionally, with regard to the stated market crash, the results reveal the impact to be insignificant to the timing performance of fund managers, especially for long investment horizon. According to Fire *et al* (1992), unit trust managers require a forecasting ability of approximately 79% in order to consistently outperform their benchmarks.

Biger and Page (1993) evaluate the performance of South African unit trusts over the period from February 1988 to March 1992 with an added objective of determining the sensitivity associated with the choice of performance measures. Three time series regression based performance measures (single factor, 3-factor and 5-factor models) are employed in order to gauge the performance of the funds over time. It is observed that the power for the models in

explaining returns is increased with the incorporation of other factors in the single factor model. However, from the 3-factor model to the 5-factor model, the authors document no significant difference in explanatory ability of the fund return. According to Biger and Page (1993:8), '*These findings might lend support to the contention that, in the context of the South African capital market, a three factor model may be sufficient in providing explanation to market related phenomena*'. With regard to fund performance, the results indicate evidence of underperformance of the market index by the majority of the funds under examination.

Oldfield and Page (1997: 27) point out that " *No published research into the performance of South African unit trusts has specifically investigated the timing and selection abilities of the unit trust managers although the increasing popularity of unit trust as an investment medium has spawned a dramatic increase in the number of trusts available*". In an attempt to evaluate the economic contribution of South African active fund managers through their 'skills', Oldfield and Page (1997) investigate whether or not returns generated by the funds are attributable to managers' abilities. In particular, the authors examine whether or not equity managers who follow the macro investment strategies were able to earn abnormal risk-adjusted returns consistently through their asset selection and market timing activities. Oldfield and Page (1997: 27) assert that if the hypothesis proves to be true, '*then unit trusts do indeed offer attractive investment opportunities for individual investors over-and-above their ability to provide pure diversification benefits*'. The study employs two risk-adjusted performance measures namely: the Jensen's performance measure and the alternative methodology suggested by Elton and Gruber (1991). According to the authors, the alternative model adopted aids in determining the performance of unit trusts based on the framework of investment flexibility. The study examines the performance of a sample consisted of 8 general equity funds and 9 specialist funds over the period from 1987 to 1994. The results indicate that South African managers do not add significant economic value through their asset selection and market timing activities.

Bradfield (1998) apply the model proposed by Bhattacharya and Pfleidere (1983) which measures the ability of managers' asset selection and market timing separately. The study examine the performance of 13 unit trusts over the period from 1985 to 1995 with the 3 month Treasury Bill and the Johannesburg Stock Exchange Overall index employed as proxies for the risk-free asset and the market portfolio respectively. The results document that none of the unit trust managers under examination exhibit significant asset selection ability. With regard managers' abilities to time the market, 7 funds in the sample earn positive

returns through the activities associated predominantly with market timing skills of the managers and 6 funds document significant negative timing ability. Overall, Bradfield (1998) indicates that unit trust managers do not add any significant value both through their ability to select assets across major classes or their ability to time the market movements.

Brink (2004) investigates the performance of general equity unit trusts relative to the broad market index represented by the FTSE/JSE All Share Index (ALSI). The performance of the unit trusts is examine over a 20-year period spanning from 1 January 1984 to 31 December 2003, divided into three examination periods namely: four 5-year periods, two 10-year periods and the overall examination period. To track the performance of the unit trusts on a risk-adjusted basis, the Sharpe ratio is employed. The three-month JIBAR is employed as the proxy to represent the risk-free rate. The results indicate that most of the funds tend to generate returns that are inferior to the ALSI. Furthermore, on a risk-adjusted basis, the results reveal that on average, most of the unit trusts exhibit an underperformance of the market index. Based on these results, Brink (2004) concludes that individual investors are better off investing in unit trusts that tracks the performance of an index fund instead of seeking an outperformance of the market.



Oldham and Kroeger (2005) evaluate the performance of 20 South African unit trusts over the period from January 1998 to December 2002. The sample is selected from a range of various sectors ranging from the Industrial, Mining, Resource and Financial sector. Jensen's performance measure together the APT based 3-factor model is adapted in the evaluation of the funds. From the 20 funds under examination, the results reveal a significant underperformance by the majority of the unit trust managers. Only 4 of the 20 unit trusts successfully and consistently achieve above average performance relative to ALSI.

Wessels and Krige (2005) investigate the difference in performance between actively and passively managed funds over a period from 1988 to 2003. As an added objective, the study further investigates whether or not the costs and expenses associated with actively managed unit trusts are surpassed by the average superior returns generated. ALSI is employed as the benchmark in this study and the performance measure employed are the Sharpe ratio and the Treynor measure. The examination of the unit trusts is further analysed based on the random sampling investments dates which are subdivided into 3, 5 and 10 years. The results document that on average, the performance of the actively managed unit trusts exhibit an outperformance of the market index by approximately 60% of the time. Nevertheless, the

results reveal that upon accounting for the initial management fees, the level of outperformance significantly diminishes over time. The results further indicate that only the top 25% of the unit trust managers outperform their respective benchmarks before management feeds.

Different from most studies of unit trust performance in the South African markets, Powley (2006) examine the impact of survivorship bias on the overall performance of unit trusts. According to the author, the study aims to differentiate between the pseudo-perception and the actual performance of the unit trusts over time. This is based on the rationale that the impact of the bias can overstate the actual performance of the trusts thereby reflecting better investment opportunities from an investor's point of view. The study employs a survivorship-free database which is examined over the period from 1972 to 2004. Upon examination, Powley (2006) finds the impact of the bias to be significant in that the actual annualised returns of the trusts are overstated by a magnitude of at least 47.7% over a 20 year period.

Pretorius and Wolmarans (2006) evaluate the performance of South African unit trusts over the period from 1988 to 2005. On average, over the 17 year examination period, a passive investment in ALSI could generate returns of nearly 18% per annum. On the other hand, unit trust managers earned average annual returns of nearly 19.5% per annum. However, after taking into account the management costs and expenses, the average returns generated by most of the unit trust managers decrease to only 12.4% per annum.



Nana (2011) investigates whether or not average active unit trust managers are able to deliver superior risk-adjusted returns on a consistent basis. A sample of 151 South African domestic equity unit trusts are examined over a period from 01 January 2001 to 31 December 2010. The measures employed include nominal returns, the alpha generated by the Fama and French (1993) 3-factor model, the Carhart (1997) 4-factor model, the Sharpe ratio, Jensen's alpha and the Ferson and Warther (1996) model. No convincing evidence was found to support the superiority of unit trust managers. The author attributes the inconclusive results to the contradictory results generated by different performance measures employed by the study and possibly the survivorship bias in the dataset.

Hsieh and Hodnett (2012) adopt the Sharpe (1992) return decomposition model to evaluate the economic contribution of South African unit trust managers. The study employs a sample of 6 South African-domiciled global equity trusts examined over the period from 1 January 1996 to 31 December 2008. The 6 unit trusts examined include: ABSA International FOF,

Allen Gray FOF, Orbis Global Equity FOF, Coronation International Active FOF, Investec Global Equity, RMB International Equity FOF and Sanlam Global Equity FOF. The authors find that the majority of the unit trust managers are able to minimise fund risks during turbulent times. However, the stock-picking activities of the South African unit trust managers are found to destroy fund values. Overall, only 2 unit trusts succeeded in earning superior risk-adjusted returns. In conclusion, Hsieh and Hodnett (2012) assert that based on the results, investors are better off investing in Exchange Trade Funds (ETF) that tracks the performance of passive indices..

Mibiola (2013) employs nominal returns, the Sharpe ratio and Jensen's alpha to evaluate the performance of 64 South African domestic general equity unit trusts over a 20 year period from 1 January 1992 to 31 December 2011. In an attempt to avoid the impact of survivorship bias on the overall performance of the unit trusts, the author divides the examination period into seven subperiods. The results reveal that the majority of the managers under examination only deliver superior returns compared to the ALSI during the period from 1992 to 2011, out of all the seven periods. In addition, the results indicate that during the six periods of examination, the ALSI generated higher returns compared to the returns generated by the unit trusts in the sample. Moreover, when performance is evaluated on a risk-adjusted basis, the results reveal that unit trust managers only deliver superior performance in two of the seven examination periods.

## 3.5 Conclusion

A vast collection of literature has evaluated mutual fund performance to validate the conviction stated by both the RWT and the EMH. Sharpe (1964) is among the first around the controversy to have empirically examined the hypothesis of Fama (1964, 1970). In the study, conducted over a period from 1944 to 1953, Sharpe (1964) documents positive evidence of market underperformance exhibited by the majority of fund managers. Since this seminal publication, a large body of empirical evidence evolved in support of these findings together with the rational underlying the passive management framework. Among them are the studies conducted by Jensen (1968), Cumby and Glen (1990), Sinclair (1990) Elton, Gruber, Das and Hlavka (1993), to name a few. All the studies document evidence indicating that, whether individually or collectively, on average investors/managers are unable to consistently outperform the passive benchmark portfolios. Nonetheless, despite the apparent evidence of market underperformance, some studies document evidence that suggests the contrary. For example, Carlson (1970), Mains (1977), Lehman and Model (1987), Grinblatt and Titman (1989) and Ippolito (1989) record evidence of superior performance exhibited by fund managers. Most of the superior performance documented emerged upon addressing issues associated with three factors: the bias associated with sample selection, performance measures employed and the choice of appropriate benchmark proxies.

In addition, some studies examine the performance of mutual funds sourcing the returns generated on funds to managerial "skills" instead of examining the performance on an overall basis. According to the structure of actively managed funds, managers claim to provide the economic benefit that can enhance the performance of their respective portfolios. These include the ability to select superior assets across major asset classes and the ability to consistently achieve abnormal risk-adjusted returns through market timing activities. Most studies find little evidence supporting the rationale underlying the ability of fund managers in consistently generating superior risk-adjusted returns through timing market for example Lee and Rahman (1990), Hallahan and Faff (1999), Tripathy (2006) and Alda, Ferruz and Fernando (2010). In contrast, Bello and Janjigian (1997), Jiang, Yao and Yu (2005) and Chen and Liang (2006) find positive evidence that managers do indeed add economic value through their market timing activities. On the other hand, past literature on superior asset selection identification possessed by managers' yield mixed conclusions across the different markets. While there is strong empirical evidence opposing the rationale underlying superior

asset selection ability (Oldfield and Page, 1997, Metrick, 1999, Curthbertson, Nitzsche and O'Sullivan, 2008 and Fox and Krige, 2013), there is a mounting evidence with the current convictions being in support of the existence in superior asset selection ability among managers (Coggin, Fabozzi and Rahman, 1993, Bello and Janjigian, 1997 and Chen, Jegadeesh, and Wemers, 2000).

# 4

# Data and Methodology

## 4.1 Introduction

In a highly controversial debate of the capital market efficiency, the application of appropriate performance measures, proper data sets and proper data selection processes that minimise potential biases are crucial in evaluating unit trust performance. Errors associated with data selection processes and improper sample construction techniques are potential factors that could prevent this research from attaining robust results. Another major concern in measuring unit trust performance emerges from the selection of appropriate benchmark proxies. Inappropriate benchmarks employed in the research could lead to incorrect conclusions being drawn from the fund evaluation process. As a result, the analysis of fund evaluation and attribution would be compromised.

This study examines the performance of the South African unit trust managers by following a set of performance attribution techniques proposed by Yu (2008) and Hsieh (2010). The study first evaluates the overall performance of the South African equity unit trust managers relative to the performance of the market proxy and sector benchmarks through their asset allocation decisions across major sectors. Following the evaluation of the managers' asset allocation decisions, the study evaluate the managers' abilities to time the market and select superior securities in each of the major sectors on the JSE. This chapter discusses and outlines the research problem statements presented in Section 4.2. Data construction, sample selection processes, benchmark specification and the choice of the risk-free proxy are discussed in Section 4.3. The possible research biases that might have been encountered in the research together with their possible solutions remedies are outlined in Section 4.4. The last section of the chapter (Section 4.5) outlines an overview of the methodologies employed in the research.

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## 4.2 Problem Statement and Research Objectives

Motivated by the growing attraction of the mutual fund industries across the world, this research seeks to explore the economic benefits contributed by the South African equity unit trust managers over the period from 1 January 2002 to 2 September 2012. Based on the usually stated objectives of actively managed funds, managers claim to possess superior skills in asset allocation, security selection and market timing that assist them to consistently generate abnormal returns on a risk-adjusted basis. This research attempts to test this claim by making a distinction in performance attribution between returns generated as a result of managerial skills and those generated as a result of random chance. Upon determining the success or failure of these managers in accomplishing their stated objectives, the research indirectly examines the efficiency of the South African capital market. This is based on the efficient market hypothesis (EMH) which maintains that investors cannot outperform the market on a consistent basis. This dismisses the rationale that professional unit trust managers can use their expertise or skills to consistently generate returns that are in excess to that of their benchmarks (Sharpe, 1991 and Malkiel, 1995). This will render either support or oppose the rationality behind following the passive investment strategy. This goal is achieved by addressing the following sets of objectives:



1. The examination of the South African equity unit trust performance on a risk-adjusted basis relative to the broad market benchmark, proxied by the FTSE/JSE All Share Index.
2. Construct pre-specified sector benchmark indices that mimic the sector allocations of the respective unit trusts using the return decomposition approach of Sharpe (1992).
3. Assess the effectiveness of the sector allocation decisions of the South African unit trust managers by evaluating their performance against the pre-specified sector benchmarks constructed above.
4. Assess the effectiveness of the security selection decisions of the South African unit trust managers by evaluating the statistical significance of their selection returns in the Sharpe (1992) return decomposition model.
5. Assess the effectiveness of the market timing decisions of the South African unit trust managers by evaluating the market timing coefficients in the Trynor-Mazuy (1966) model and the Henriksson-Merton (1981) model.

## 4.3 Database and Sample Selection

This study examines the South African unit trust performance over an eleven year period from 6 January 2002 to 2 September 2012. The study employs the weekly return data set based upon the argument posed by Los (1998). According to Los (1998), because professional fund managers' trading and investment decision activities are usually made on the weekly basis, the adaption of weekly data would enhance the ability to capture managers' strategies, investment styles and the general performance of the funds. The weekly time-series data of the South African unit trusts that exist for the entire examination period are extracted from the I-Net Bridge database. The sample is then examined over two equal ssub-periods namely: 6 January 2002 to 6 May 2007 and 7 May 2007 to 2 September 2012. The evaluation of fund performance over these sub-periods allows the research to gauge the performance of the funds prior to the devastation of the 2007/2008 global financial crisis and the subsequent impact on the overall performances of funds post the crisis. The total weekly unit trust returns are computed using Equation 4.1.

$$R_t^{total} = \frac{P_t + D_t - P_{t-1}}{P_{t-1}} = \frac{P_t - D_t}{P_{t-1}} - 1 \qquad (4.1)$$



where:

$R_t^{total}$ is the total fund return in week *t*;

$D_t$ is the fund's dividend allocated in week *t*;

$P_t$ is the repurchase price of the fund at the end of week *t* and

$P_{t-1}$ is the repurchase price of the fund at the end of week *t*-1 (i.e. the beginning of week *t*.

The unit trusts sample selection process is based on the following criteria:

**(1)** The fund must exhibit a consistent investment objective throughout the examination period.

**(2)** From the period of inception, the fund has to be in existence or operational throughout the examination period. This is done to keep track of the funds that might have ceased operation

or funds that might have merged with other funds during this period. This selection criterion nevertheless introduces a survivorship bias in the study with an upward bias in the evaluation of fund performance. The details and implications of the survivorship bias will be discussed in Section 4.4.

**(3)** Funds with insufficient information or missing data at any given time in the examination period are excluded from the sample.

**(4)** Only unit trusts that are classified as equity by the I-Net Bridge database are included in the sample. Additionally, all the funds are required to primarily invest a substantial proportion of their total assets into the South African markets. This is rooted on an argument posed by Hassan (2005) on the difficulty of applying a suitable international benchmark portfolio when fund composition is predominantly internationally based. According to Hassan (2005:152), "*Particular difficulties in performance measurement arise from international objectives as such objectives require a suitable international benchmark portfolio to be specified for unit trusts that invest a substantial proportion of their funds overseas*".

**(5)** In order to avoid double counting of the funds in the data set, funds of funds are excluded from the sample. Additionally, to ensure the robustness of the research sample selection process, fund profiles together with their investment objectives are extracted from both the Moneyweb and the Morningstar database. Based on the above mentioned sample selection criteria, the resulting sample of the research is comprised of 20 South African equity unit trusts over the examination period.

Table 4.1 displays the inception and the net asset value of funds as of 2 September 2012 together with their investment objectives.

**Table 4.1: The South African Equity Fund Profiles**

| Fund Name | Inception | Net Asset Value |
|---|---|---|
| **1. ALLAN GRAY EQUITY FUND** | **1998/10/01** | **R 31.87 Million** |
| The objective of the fund is to earn a higher total rate of return than that of the average of the South African equity market as represented by the All Share index, including income, without assuming greater risk. | | |
| **2. ANALYTICS MANAGED EQUITY** | **2000/01/08** | **R 936.4 Million** |
| The objective of this fund is to provide steady capital growth over the long term by investing in appropriate domestic shares and unit trust funds. The probability of capital loss over the short to medium term is higher than other asset classes due to the increased volatility of equity returns. | | |
| **3. COMMUNITY GROWTH EQUITY FUND** | **1992/06/01** | **R 2,187 Million** |
| This general equity fund aims to provide long-term capital growth while promoting sustainable and responsible investing. The fund invests in JSE listed companies that are viable and sustainable, and have a clear commitment to job creation, skills development, affirmative action, sound environmental practices and effective corporate governance. | | |
| **4.CORIS CAPITAL GENERAL EQUITY FUND** | **2000/01/01** | **R 348.47 Million** |
| The fund aims to provide consistent returns with low volatility to reap the benefit of compounded interest returns. The fund aims to capitalize on investment opportunities across the equity market via tilting sector weights according to business cycle trends, as well as through thorough researched stock picking. | | |
| **5. CORONATION EQUITY FUND** | **1992/06/01** | **R 4,298.2 Million** |
| This fund seeks to achieve long-term capital growth by investing only in listed equities. The fund's return objective is to provide first quartile relative risk-adjusted investment returns | | |
| **6. FNB GROWTH FUND** | **1998/09/30** | **R 213.8 Million** |
| The primary objectives of the fund managers of the FNB Growth Fund, is to achieve capital appreciation for investors. The fund managers are mandated to invest in any company listed on the FTSE/JSE. | | |
| **7. GRYPHON ALL SHARE TRACKER FUND** | **1999/08/01** | **R 31,80 Million** |
| The Gryphon All Share Tracker Fund is a passively managed index tracking portfolio, replicating the performance of the South African All Share index. Key Features * The fund is designed to track the performance of the South African All Share index, thereby seeking to generate optimal capital growth over time. | | |
| **8. INVESTEC EQUITY FUND** | **1987/11/01** | **R 4,343.3 Million** |
| The Investec Equity Fund aims to provide investors with capital growth over the long-term. The objective is to achieve returns well in excess of the FTSE/JSE All Share index, measured over three year periods. The fund is actively managed and invests in South African equities. | | |
| **9. IP EQUITY FUND** | **1999/12/23** | **R 20.50 Million** |
| The fund is managed in a conservative manner and a long-term horizon is adopted when investment decisions are taken. Nature of the Fund The IP Equity Fund is a pure equity fund suitable for those investors wishing to benefit from the higher growth rates available from equities over time. | | |
| **10. MET COLLECTIVE INV GENERAL EQUITY** | **1991/09/19** | **R 326.9 Million** |
| The portfolio seeks medium to long term capital appreciation through investments in selected companies across various sectors of the equity market. The portfolio aims to provide the investor with an easy, efficient and affordable vehicle for investing in shares quoted mainly on the JSE and includes an element of international exposure. | | |

**Table 4.1: The South African Equity Fund Profiles (Continued)**

| Fund Name | Inception | Net Asset Value |
|---|---|---|
| **11. MOMENTUM EQUITY FUND** | **1987/11/16** | **R 2,707.8 Million** |
| In selecting securities for the Momentum Equity Fund, the Manager shall seek to achieve an investment medium for investors which shall have as its primary objective to deliver high long term capital growth to investors. The portfolio's investment universe will apart from assets in liquid form, consist of equity - and property securities, as well as preference shares. | | |
| **12. MOMENTUM INDUSTRIAL FUND** | **1998/07/01** | **R 141,4 Million** |
| The fund's objective is to maximise equity portfolio returns over the FTSE/JSE Industrial index. The performance of the fund relative to this index is a function of the weightings given to individual securities within this sector. | | |
| **13. OASIS CRESCENT EQUITY FUND** | **1998/07/31** | **R 5,037.9 Million** |
| The Oasis Crescent Equity Fund provides investors with the opportunity to invest in listed equities on both local and international stock exchanges within the ethical parameters of Shari'ah-governed investment. The Fund is a Shari'ah compliant collective investment scheme that adheres to the ethical investment guidelines that are prescribed by our Shari'ah Board. | | |
| **14. OLD MUTUAL ALBARAKA EQUITY FUND** | **1992/06/01** | **R 1,174.2 Million** |
| The Future growth Albaraka Equity Fund is a Shari'ah compliant fund which provides investors with cost-effective access to a broad spectrum of JSE listed investments. The Fund is strictly managed in accordance with Shari'ah Law and therefore does not invest in shares that have an association with alcohol, gambling, non-halaal or interest-bearing instruments. | | |
| **15. PRUDENTIAL EQUITY FUND** | **1999/08/01** | **R 1,722.2 Million** |
| The fund will seek to provide broadly based exposure to shares that offer value and medium to long term growth. Shares that offer value are those that are undervalued relative to their sector, earnings potential and growth potential. | | |
| **16. PSG EQUITY FUND** | **1997/12/31** | **R 766.32 Million** |
| The PSG Equity Fund is a general fund and the manager in selecting securities for the portfolio, will seek to offer investors long-term capital growth and earn a higher total rate of return than that of the South African equity market as represented by the All Share Index including income, without assuming a greater risk. | | |
| **17. SIM GENERAL EQUITY** | **1967/05/30** | **R 3,310.1 Million** |
| This fund seeks maximum capital growth over the long term by investing in selected shares across all industry sectors of the JSE that are undervalued relative to realistic growth prospects. The trust can also invest in foreign markets. | | |
| **18. SIM RESOURCES FUND** | **1998/01/10** | **R 59.90 Million** |
| This specialist fund focus on maximum capital growth by taking advantage of changing resources cycles by investing in companies engaged in exploration, mining, distribution and processing of metals, minerals, energy, chemicals, forestry and other resources. | | |
| **19. SIS EQUITY FUND** | **1998/02/02** | **R 215.01 Million** |
| The principal aim of the fund is to maximise returns to the investor. The manager will identify attractively priced companies with superior growth prospects and entrepreneurial management. The fund will also take advantage of attractive value opportunities. | | |
| **20. STANLIB EQUITY FUND - B1** | **1970/01/01** | **R 2,739.1 Million** |
| The Portfolio's objective is steady growth of income and capital, a reasonable level of current income and the maximum stability for capital invested. The security to be included will consist of securities, non-equity securities and participatory interest of collective investment schemes in securities. | | |

To infer appropriate conclusions on the fund performance, the choices of appropriate benchmarks are of vital importance. Based on the argument posed by Roll (1977) on the unobservable nature of the "true" market portfolio, the proper choice of the market proxy can be a challenge in the process of performance evaluation. As such, research and arguments on the proper choice of the market proxy has evolved not only in the international literature but, to the South African one as well. According to Ward (1994), there have been a considerable amount of practitioners in South Africa who have considered major sector classes such as: Industrial, Resource and Financial sectors to be a proper representation of the entire market on the JSE limited (formally known as the Johannesburg Stock Exchange (JSE)). However, Ward (1994) argues that because of the inability for these classes to display a significant dimension of risk, employing these classes as proxies for the overall market portfolio will result in misleading inferences. As a result, Ward (1994) proposes the application of the ALSI to be the proxy for the broad South African market portfolio.

van Rensburg and Slaney (1997) examine the market segmentation phenomenon on the JSE. According to the authors, because the mining and the industrial sectors are affected differently by the microeconomic factors, it would be more appropriate to employ separate indices to measure fund performances, instead of using the overall index (ALSI). The authors find that the variation in returns on the JSE is sourced mainly to the All-Gold index followed by the industrial index. Based on these findings, van Rensburg and Slaney (1997) proses the use of multi-market proxies to evaluate South African unit trust performance instead of the ALSI. In the later study, van Rensburg (2002:16) points out that because of the changing composition and the March 2000 reclassification of the JSE sector indices, "*the new Financial-Industrial (CI 21) and Resources (CI 11) indices maybe used as observable proxies for the first two principal components extracted from the covariance matrix of JSE returns*." Opposing the arguments posed by Ward (1994) on the suitability of employing the ALSI as a market proxy, van Rensburg (2002) explains that the ALSI ceases to be mean-variance efficient when the possibility of investing taking into account.

Bradfield (2003:47) on the other hand, supports the use of the ALSI as a relevant representation of the market proxy by stating that "*In theory market capitalization weighted indices are preferred to equally weighted indices because they are superior proxies to the true market portfolio. Hence in South Africa, the ALSI should be used.* " Moreover, Bradfield (2003) points out that the suitable index for the overall market proxy is required to be as comprehensive as possible in covering the market. In effect, the market proxy is required by

definition to constitute all or nearly all assets on the JSE, with each asset weighted in proportion to its total presence in the market.

Measured by their respective market capitalisation, the ALSI is comprised of approximately 164 companies/shares listed on the JSE limited as of September 2012. As such, the 164 shares represent approximately 99% of the broad South African market portfolio (Oldham and Kroeger, 2005; Auret and Cline, 2011 and Heerden and Botha, 2012). Based on this composition, the aggregate representative ability of the broad market movements and the arguments posed by both Ward (1994) and Bradfield (2003), this research employs the ALSI as a suitable proxy to represent the broad South African market portfolio. The index is further decomposed into three prominent sector classes which are represented by their respective indices. Among a variety of sector indices in the JSE limited, the research employs the FTSE/JSE financial 15 index (FINI), the FTSE/JSE resource 10 index (RESI) and the FTSE/JSE industrial 25 index (INDI) to represent the broad movements in the financial sector, the resource sector and the industrial sector on the JSE. The FINI is used to track the performance of companies that operate mainly in the financial sector. The index replicates the performance of the top 15 financial companies listed on the JSE by their market capitalisation. This includes companies across a broad spectrum of the financial sectors such as: banks, general financial firms, insurance companies, credit card companies, consumer finance companies and the real estate companies to name a few. The RESI on the other hand, tracks the performance of the JSE listed companies that trade mainly in the resource based markets such as copper, mining companies, oil and gas companies, etc. The INDI is employed as proxy for shares traded mainly in the industrial sector. The index tracks the performance of the top 25 JSE companies that invest primarily on the industrial sector (e.g. manufacturing, agricultural and the financial industry etc.).

On the other hand, the yield on the South African 3-month Treasury bill (TB) and the yield on the government bond index (GOVI) are employed to represent the performance of the risk-free asset and the long-term government bond respectively. The GOVI index is a JSE listed exchange-traded fund (ETF) that replicates the performance of the top 10 government bonds. Theoretically the risk-free investments should exhibit zero risk. However, practically, what is perceived as a risk-free investment could in fact exhibits some degree of risk given the broad range of risk generally associated with securities. In South Africa, the South African Treasury bill and the government bonds are the most commonly employed risk-free proxies based on the premise that government securities are said to exhibit a close to zero

probability to default and exhibit little or no risk (Fire, 1993; van Rensburg, 2001; Correia and Cramer 2008). Therefore, according to Strydom and Charteris (2009:7) "*Government securities are therefore identified as suitable proxies as a government can, under most circumstances, print money or raise taxes to avoid default on its commitments*". Table 4.4 outlines the summary of the respective asset classes, sector groupings together with their respective benchmark indices employed in the research.

**Table 4.4 Market index, Asset Classes and Respective Benchmark Indices**

| **Broad Market Benchmark index** FTSE/JSE All share index **(**ALSI) | | |
|---|---|---|
| **Asset Classes** | **Sector groupings** | **Benchmark indices** |
| Equity | Resource sector | FSTE/JSE Resource 10 index (RESI) |
| | Financial sector | FSTE/JSE financial 15 index (FINI) |
| | Industrial sector | FTTE/JSE Industrial 25 index (INDI) |
| Fixed income Bonds | Bonds | Government bond index (GOVI) |
| Cash equivalents | Money markets | SA Treasury bill (TB) |

## 4.4 Review of Applied Methodologies

The study emerges by evaluating the performance of the South African unit trusts relative to the broad market index proxied by the ALSI over the period from 6 January 2002 to 2 September 2012. This objective is achieved through the computation of funds' performance from two sets of perspectives namely: **(1)** The evaluation of the basic risk-return statistics of funds over the examination period. **(2)** The evaluation of whether or not fund managers are able to consistently generate risk-adjusted returns that are superior to that of the selected benchmark indices. The mean-variance trade-offs of the funds are evaluated by a variety of risk-adjusted performance measures, in which each measure possesses a unique characteristic on how it measures risk and returns. This enables the research to capture and make comparison of the risk-adjusted measures and their general impact on the overall results of the study. The risk-adjusted measures employed by this research include traditional appraisal measures such as the Sharpe ratio, Treynor measure, Jensen's alpha, M-square; and more advanced measures such as the information ratio and the Sortino ratio.

The Sharpe ratio measures the excess fund return per unit of total risk, where the standard deviation of the fund returns is used to measure the total risk of the funds under evaluation. Treynor measure estimates the excess fund return per unit of systematic risk, where the beta coefficient of the CAPM is used as the measure of systematic risk of the funds. Jensen's alpha measures the abnormal return a fund generates in addition to its risk-adjusted returns estimated by the CAPM and the APT multifactor model respectively. The M-square, developed by Modigliani and Modigliani (1997), measures the average expected returns of a portfolio, in which risk is adjusted in relation to a pre-specified benchmark or the broad market index.

The information ratio, on the other hand, measures the fund's active return per unit of active risk. The active return is estimated as the fund return in excess of the benchmark return; and the active risk is measured as the historical volatility of the active return of the fund. Developed to mitigate the limitation of the standard deviation as a measure of risk in mutual fund performance, the Sortino ratio (1991) is proposed as an alternative measure of risk. Instead of using the standard deviation or the beta parameter to measure risk, the ratio employs the downside deviation parameter to measure the additional excess returns generated on funds. The downside risk in this regard implies that fund managers will not be panelised

on the basis of upside variability but, instead are measured on the basis of the variability below their minimum target return (Kobadi, 2011).

In the quest to determining the economic contribution of fund managers, the study employs the return decomposition model developed by Sharpe (1992), as proposed by Yu (2008) and Hsieh (2010). According to Sharpe (1992), the 'abilities' of fund managers to expose weights (allocate assets) across the major asset classes serve as the major factor contributing to the overall performance of funds over time. Under the Sharpe (1992) model, the fund return is decomposed and attributed to either managers' ability to efficiently allocate assets across major classes or their ability to select superior assets within their respective asset classes. In this study, fund returns are decomposed into five benchmark indices defined in Table 4.4, namely RESI, FINI, INDI, TB and GOVI. The return decomposition approach also aids in validating whether or not the reported objectives of active fund managers are in accordance with their respective investment strategies or whether fund managers deviate from their stated objectives in accordance to the changes in market conditions.

Lastly, the study examines the economic contribution of the fund managers through their abilities to accurately time the market movements. This ability refers to fund managers' skill to be able to move in and out of the market at the appropriate time. The study employs the Jensen's (1966) extended version of the time-series regression measures developed by Treynor-Mazuy (1966) and Henriksson-Merton (1981) respectively. Both measures adhered to the same principles but differ in the decomposition of their structures to measure the timing abilities of fund managers. The Treynor-Mazuy (1966) model measures the timing ability of fund managers by adjusting the market portfolio risk in accordance to the changes in market movements. According to the model, fund managers will assume a greater proportion of the market portfolio in anticipation of the bullish period in the market and act otherwise in anticipation of a bearish period. The Henriksson-Merton (1981) model on the other hand, measures the timing ability of the fund managers based upon the conditions of market returns and the risk-free rate. According to the model, fund managers will assume greater risk (measured by beta) in anticipation that the market will exhibit returns that are in excess of the risk-free rate and will act otherwise if the market returns are predicted to be less than the risk-free rate.

## 4.5 Potential Research Biases

The possible data biases that might have an impact on the research results are survivorship bias, data snooping bias and the look-ahead bias respectively. Survivorship bias refers to the systematic exclusion of the funds that cease to be operational during the selected examination period. Reasons underlying the existence of this bias vary from situation to situation. However, the most common reason stems from the closure of the funds due to their poor performance to accumulate ample assets to stay viable or due to the decision of the funds to merge with other funds. According to prior empirical literature such as Brown, Goetzman, Ibbotson and Ross (1992), Elton, Gruber and Blake, (1996), Otten and Bam (2004), the impact of this phenomenon can introduce a significant bias by overstating the performance of the funds in the sample. The implication following this is that "*given that the average performance could be overstated, there may be a pseudo-perception that managed assets, or active investment mandates have a high probability of out-performance relative to a chosen benchmark*" (Pawley, 2006: 21). Based on this statement and prior empirical evidence, this suggests that the persistence of this bias can result in the misspecification errors during the process of performance evaluation. This bias is inevitably introduced into the research since the sample comprise of only the funds that where operational during the examination period. Thus, conservative approach will be followed to take into account the possible upward bias in evaluating fund performance.

Data snooping bias on the other hand, refers to the adaption of historical data set that has been tested in previous studies, with the sole purpose of making inference to results that are expected. For example, conducting a study that uses similar databases to other previous studies might lead to prying on the empirical results of other studies as a form of guidance to one's research analysis and outcome. Similar to the effect of survivorship bias, this phenomenon cannot be totally eliminated from the selected sample, but can be minimised through the application of innovative performance measures concurrently with applying unique time periods. Based on the innovative application of the return decomposing model of Sharpe (1992) employed in this research, the study is to some degree immune to this bias. While the Sharpe (1992) model has been employed before in the South African market, to the author's knowledge none of the studies ever incorporated all the five indices as regression controlled variables as it is employed in this research. Additionally, in an attempt to minimise the effect of this bias, the research employ a unique weekly historical data set with fresh

examination period from 6 January 2002 to 2 September 2012. The examination period employed coupled with weekly data are quite unique, which reduces the likelihood of the research being subject to prying on the results of previous studies. Look-ahead bias emerges in the data sets due to the inclusion of information that would have otherwise been unknown or unavailable during the pre-specified period of examination. As a result, the inclusion of such information will have a significant impact on the accuracy of the inference reached in the study. In effect, the persistence of this bias will, to a certain extent makes it impossible to capture the true performance of the funds. Due to the fact that the attributes relating to the unit trusts such as their prices and dividends are readily available in public domain, it is unlikely that this research would be affected by the look-ahead bias.

# 5

# Unit Trusts Performance Evaluation

## 5.1 Introduction

Prior to the genesis of the risk-adjusted performance measures, mutual fund performances were evaluated in complete isolation of the risk undertaken to yield the returns earned (Reilly and Brown, 1997). Consequently, fund performance, evaluated without considering the risk factor leads to an incomplete and misleading inferences that do not necessarily reflect the underlying true performances of the funds. According to Mains (1977), Kim (1978), Gruber (1996) and Elton, Gruber, Blake (1996), the key to properly conduct a performance evaluation lies in the consideration of the risk assumed in attaining those returns. The rationale is based on the mean-variance framework of the Capital Asset Pricing Model (CAPM) developed independently by Sharpe (1964), Lintner (1965) and Mossin (1966). According to the framework, portfolios' expected returns can be enhanced by assuming higher levels of risk. By considering the risk factor in the performance analysis, investors can adequately capture the sources contributing to the performance of a fund. The performance of funds can then be sourced either to the managerial skill sets or to the risk exposure incurred in the generation of the fund returns. Therefore, it is virtually impossible to capture the true performance without adjusting the risk undertaken in realising those returns. As a result, the growing popularity of the mutual fund industry led to the demand of researchers into developing new risk-adjusted performance measures or merely improving on the existing ones (Le Sourd, 2007). However, because each risk-adjusted performance measure exhibits some degree of shortcomings, it is important to utilise a variety of performance measures in order to attain more robust results. This is particularly important to actively managed funds, as their primary objectives lie with the need to seek for a consistent risk-adjusted outperformance of their benchmarks.

The main objective of this chapter is to evaluate the performance of South African equity unit trusts on the basis of both absolute and risk-adjusted returns. The outperformance or underperformance of the funds is evaluated relative to their respective rivals, as well as the broad market index represented by the FTSE/JSE All Share Index (ALSI). Nonetheless, the focal point underlying this chapter is to test and validated the hypotheses of whether managers

of actively managed funds prevail in their quest to consistently earning the risk-adjusted abnormal returns on the long-term basis. This is achieved through the evaluation of the basic risk-return performances of funds determine by calculating: the weekly market index return, cumulative returns, the annualised arithmetic returns, the annualised standard deviation and their respective beta estimates. To evaluate the performance of the funds upon adjusting for the risk undertaken, this research employs a variety of risk-adjusted performance measures namely: the Sharpe ratio (SR), the Information ratio (IR), the M squared measure $(M^2)$, the Sortino ratio *(R*)*, the CAPM Jansen's alpha (α), the Treynor measure (TM) and the alpha from the multifactor model based on the Arbitrage Pricing Theory (APT). Section 5.3 presents and outlines the empirical results of the study followed by their interpretation. The summary and key findings of this chapter are outlined in Section 5.4.

## 5.2 Methodology

### 5.2.1 Risk- Return Measure

"*The simple way to measure the ability of wealth creation of an investment is the computation of the investment's returns from time to time* (Hsieh and Hodnett, 2013:816)". To determine the basic mean-variance characteristics of the funds, the funds' arithmetic returns, cumulative returns and the fund risk are calculated in this research. In addition, the average arithmetic returns of the funds are then calculated throughout the examination period. The arithmetic return of the funds is computed through the application of a mathematical equation given by:

$$R_{K(Arithmetic)} = \frac{\sum_{t=1}^{T} r_{K,t}}{T} \quad (5.1)$$

where:

$R_{K(Arithmetic)}$ is the arithmetic weekly returns of fund *K*;

$r_{K,t}$ is the return for fund *K* over week *t*; and

$T$ is the number of weeks in the evaluation period.



Upon the completion of computing the arithmetic returns, the fund returns are then expressed in their annualised form, calculated as indicated by Equation 5.2.

$$R_{K(Arithemetic)p.a} = (1 + R_{K(Arithemetic)})^{52}\text{-}1 \quad (5.2)$$

To examine the risk associated with the funds, the fund's weekly standard deviations are calculated as indicated by Equation 5.3. The measure is quantified such that it explains the trade-off between the mean-variance returns of the funds.

$$\sigma_{K(p.a)} = \sqrt{\frac{\sum_{t=1}^{T}(r_{K,t}-R_K)^2}{T-1}} \times \sqrt{52} \quad (5.3)$$

where:

$r_{K,t}$ is the return of fund *K* in week *t*;

$R_K$ is the *T*-week arithmetic average return of *K* ; and

$T$ is a number of weeks in the holding period.

While the standard deviation measures both the downside and the upside risk of the fund, the semi-deviation on the other hand, pays focus only on the effect of the downside risk on the overall performance of the funds. In portfolio theory, the downside risk is considered to be the most relevant risk to gauge the performance risk of funds over a period of time (Estrada, 2003). According to Estrada (2003:12), the reason underlying this rational lies with the fact that "*investors do not dislike upside volatility, they only dislike downside volatility*". In essence, investors or managers will be more concern about the periods at which their respective funds fell below their target margin (pre-specified benchmark). This allows managers the opportunity to examine the extent of losses they might suffer on a fund, instead of only examining the funds' expected fluctuations. The semi-deviation of the fund *K* is then defined as shown by the Equation 5.4.

$$Semi\sigma_{K,(p.a)} = \sqrt{\frac{\sum_{for\ all\ r_{K,t}<R_K}^{T}(r_{K,t}-R_K)^2}{T^*-1}} \times \sqrt{52} \tag{5.4}$$

where:

*T** is the total number of weeks in the *T*-week examination period with $r_{K,t} < R_K$.



### 5.2.2 The Risk-Adjusted Performance Measures

Originally introduced by Sharpe (1966), the Sharpe ratio (SR) is the widely used risk-adjusted performance measure. The ratio is figured by employing the standard deviation to explain the variability in funds expected excess return per unit of risk undertaken. This enables fund managers with the opportunity to evaluate how well the returns of a particular investment compensate for every level of risk assumed. In its annualised form, the Sharpe ratio is defined as the fund's annualised expected excess returns divided by the annualised fund's standard deviation. Mathematically, the ratio can be expressed as indicated by the following Equation:

$$SR_{K,(p.a)} = \frac{R_{K(p.a)} - R_{f(p.a)}}{\sigma_{K(p.a)}} \tag{5.5}$$

where:

$R_{K(p.a)} - R_{f(p.a)}$ is the annualised excess return for fund *K*; and

$\sigma_{K(p.a)}$ is the annualised standard deviation for fund *K*.

While the Sharpe ratio relates the fund's excess returns to the standard deviation, the information ratio (IR) on the other hand measures the performance of funds by substituting the risk-free rate parameter (as defined by Equation 5.5) with the returns of the pre-specified benchmark index (Bossert, Fuss, Rindler and Schneider, 2010). The difference between the returns of the funds and that of a comparable benchmark index represent what is known as the active returns of the funds. By definition, active return refers to a particular segment of return in a fund, generated mainly due to the decisions made by an active fund manager (Ineichen, 2003, Qian and Hua, 2004). The active returns are then evaluated relative to the assumed active risk, defined by the standard deviation. In essence, the ratio examines the amount of fund's excess returns earned by the manager, above the returns of a relevant benchmark index, relative to the active risk undertaken. This can be defined mathematically as depicted by Equation 5.6.

$$IR_{K(p.a)} = \frac{R_{K(p.a)} - R_{B(p.a)}}{\sigma_{K-B(p.a)}} \tag{5.6}$$

where:

$R_{B(p.a)}$ is the annualised arithmetic return for the benchmark for fund *K*; and

$\sigma_{K-B(p.a)}$ is the annualised standard deviation for the active return of fund *K*.

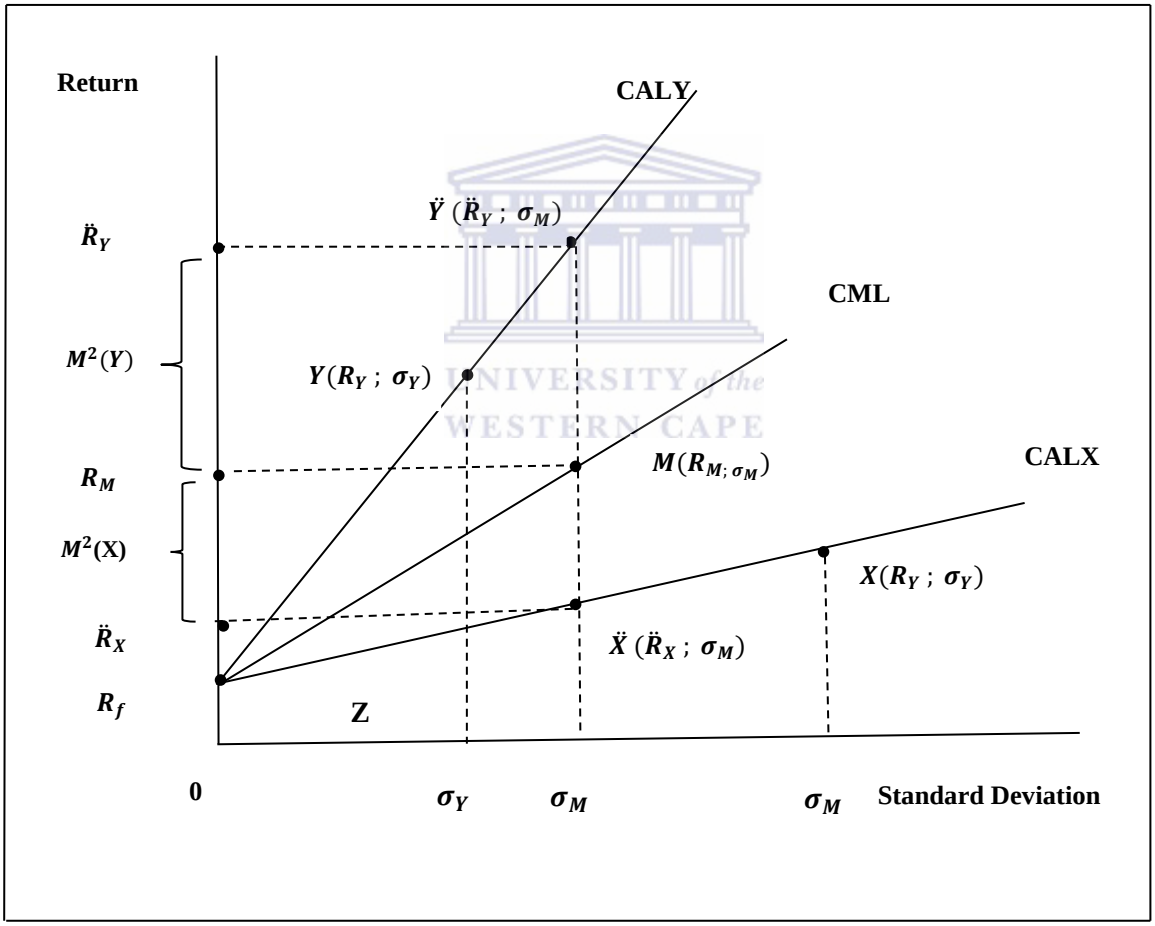


Derived from the framework of the Sharpe ratio, the M-squared ($M^2$) measures the return of the fund by adjusting the standard deviation in relation to the broad market index. The measure was first introduced by Graham and Harvey (1997) and later popularised by Modigliani and Modigliani (1997). According to Modigliani and Modigliani (1997), if a fund and the market exhibit the same level of risk, then their respective performances can be evaluated by comparing their respective returns. To achieve this, the fund performance can either be leveraged or deleveraged to the level of the market proxy. This enables the measure to capture the rewards earned on an investment relative to a selected benchmark and the risk free-rate given the amount of risk taken.

Extracted from Hsieh and Hodnett (2013:819), the M-squared performance measure can be explained as illustrated by Figure 5.1. Consider the two funds *X* and *Y* respectively, where fund *X* denotes an underperforming fund and fund *Y* an outperforming fund. The M-squared of the two funds *X* and *Y* are then determined by deleveraging fund *X* and respectively

leveraging fund *Y* such that they come to the same level as that of the market risk ($\sigma_m$). Upon the completion of leveraging and deleveraging adjustments, the returns of the fund *X* (denoted by $\ddot{R}_X$) and the fund *Y* (denoted by $\ddot{R}_Y$) can then be compared to the returns of the market proxy ($R_m$).The capital market line (CML) employed serves as the benchmark utilised to measure the performance of funds. Funds located on the capital allocation line *Y* (CAL *Y*) are undervalued and exhibit a positive M-squared since they lie below the CML. Similarly, funds located on the capital allocation line *X* (CAL *X*) are overvalued and exhibit a negative M-squared since they lie above CML.

**Figure 5.1: Representation of the M-squared ($M^2$) Performance Measure**




*Source: Modified from Hsieh and Hodnett (2013:819)*

According to Bodie, Kane and Marcus (2008), the M-squared measure is directly linked to the Sharpe ratio and can be expressed as indicated by Equation 5.7.

$$M^2_{K(p.a)} = \sigma_{M(p.a)} \times (SR_{K(p.a)} - SR_{M(p.a)}) \quad (5.7)$$

where:

$\sigma_{M(p.a)}$ is the annualised standard deviation of the market proxy; and

$SR_{K(p.a)} - SR_{M(p.a)}$ is the annualised difference in the Sharpe ratios of fund *K* and the market proxy *M*.

Similar to the M-squared measure, the Sortino ratio is modified from the framework of the Sharpe ratio. However, the Sortino ratio measures risk by relating the downside risk to the difference between the fund returns and the risk-free rate. By substituting the parameter $\sigma_{K(p.a)}$ (total risk of fund *K*) with the downside semi-variance in the Sharpe ratio, the Sortino ratio assumes the downside risk to be the only relevant risk to be considered when penalising investors. The Sortino ratio is then expressed mathematically by Equation 5.8 as follow.

$$Sortino\ Ratio_{K(p.a)} = \frac{R_{K(p.a)} - R_{f(p.a)}}{\sqrt{\frac{1}{T-1}(\sum^{T*}_{R_{K,t}<R_f}(R_{K,t} - R_f)^2} \times \sqrt{52}} \quad (5.8)$$

where:

$R_{K(p.a)} - R_{f(p.a)}$ is the annualised excess return for fund *K*;

$T*$ is the total number of weeks in the evaluation period with $R_{K,t} < R_f$.

The next three performance measures employ the return-beta framework to evaluate the performance of the funds over time. This includes: the Treynor (1966) measure, the single factor CAPM and the multifactor model developed from the framework of Ross's (1976) Arbitrage Pricing Theory (APT). The model uses the slope coefficient beta as an efficient and appropriate measure to evaluate risk instead of the standard deviation (as previously indicated in other models). By employing the beta coefficient in the single factor model, managers are able to examine the sensitivities of the fund's excess returns in relation to the movements in

the market risk premium. The beta coefficient of fund K is then estimated by running the time-series regression model, defined by Equation 5.9.

$$r_{K,t} - r_{f,t} = \alpha_K + \beta_{K,M} \times \left(r_{M,t} - r_{f,t}\right) + \varepsilon_{K,t} \quad (5.9)$$

where:

$r_{K,t}$ is the return of fund *K* in week *t*;

$r_{f,t}$ is the return of the risk-free proxy in week *t*;

$r_{K,t} - r_{f,t}$ is the return of fund *K* in excess of the risk-free rate in week *t*;

$\alpha_K$ is the regression intercept, known as alpha;

$\beta_{K,M}$ is the beta estimate of fund *K* against the market risk premium *M*; and

$\varepsilon_{K,t}$ is the residual of the regression for fund *K* in week *t*.

To evaluate the performance of fund *K* against the market proxy, the annualised Jensen's alpha is calculated as depicted by Equation 5.10.

$$\alpha_{K,(p.a)} = (R_{K,(p.a)} - R_{f,(p.a)}) - \beta_{K,M} \times (R_{M,(p.a)} - R_{f,(p.a)}) \quad (5.10)$$



While the sensitivity of the fund returns is evaluated against the market risk premium in the single factor model, the multifactor model on the other hand, measures the sensitivity of the fund returns against different pre-specified risk premium proxies. The risk factors used to explain the variations in fund's weekly returns includes the prominent sector risk premia represented by the following JSE sector indices: the financial sector index (FINI), the industrial sector index (INDI) and the resource sector index (INDI) on the JSE. The risk coefficients of the respective risk premia are then estimated by the following multifactor model:

$$r_{K,t} - r_{f,t} = \alpha_K + \beta_{1K1}(r_{FINI,t} - r_{f,t}) + \beta_{2K2}(r_{INDI,t} - r_{f,t}) + \beta_{3K3}(r_{RESI,t} - r_{f,t}) + \varepsilon_{K,t} \quad (5.11)$$

where:

$\beta_1, \beta_2, \beta_3$ are the risk coefficients of the risk factors *K1*,*K2* and *K3* respectively;

$r_{FINI,t} - r_{f,t}$ is the return on FINI in excess of the risk-free rate in week *t*;

$r_{INDI,t} - r_{f,t}$ is the return on INDI in excess of the risk-free rate in week *t*; and

$r_{RESI,t} - r_{f,t}$ is the return on RESI in excess of the risk-free rate in week *t*;

Based on the risk coefficients estimated in Equation 5.11, the annualised multifactor Jensen's alpha is then calculated. In this context, the Jensen's alpha is used to measure the abnormal returns of fund *K* over the period of examination. Mathematically this can be calculated as indicated by the following Equation:

$$\alpha_{K,(p.a)} = \left(R_{K,(p.a)} - R_{f,(p.a)}\right) + \beta_{1K1} \times \left(R_{FINI,(p.a)} - R_{f,(p.a)}\right) + \beta_{2K2} \times \left(R_{INDI,(p.a)} - R_{f,(p.a)}\right) + \left(\beta_{3K3}\left(R_{RESI,(p,a)} - R_{f,(p.a)}\right)\right) \quad (5.12)$$

The Treynor measure is another risk-adjusted performance measure that is based on the return-beta framework. Specifically, the measure bears some similarities to the rationale underlying the framework of the Sharpe ratio. Both measures examine the extent to which a particular investment compensates per unit of risk assumed. Moreover, both measures evaluate the excess returns generated on funds over the risk-free proxy for every unit of risk taken. The difference between the two measures is based on how each measure defines fund risk. Instead of considering both systemic and unsystematic risk as depicted the Sharpe ratio, the Treynor measure considers the systematic risk as the relevant risk to explain the returns of funds. In its annualised form, the measure can be expressed mathematically as indicated by Equation 5.13:

$$TM_{K,(p.a)} = \frac{R_{K(p.a)} - R_{f(p.a)}}{\beta_{K,M}} \quad (5.13)$$

## 5.3 Results

The time-series descriptive statistics of the South African equity unit trusts are presented in Table 5.1, Table 5.2 and Table 5.3 respectively. The summary statistics are also presented in Appendix A.1 through Appendix A.3. Each table shows the results of the funds over three evaluation periods, decomposed as follows: sub-period 1 (6/01/2002 to 6/05/2007), sub-period 2 (7/05/2007 to 2/09/2012) and the overall period (6/01/2002 to 2/09/2012). The tables are further sub-dived into two panels namely: panel A and panel B respectively. Panel A reports the performance of the first 10 funds, with the performance of the second 10 funds presented in panel B. Each panel is then divided into three sections. The first section of the panel shows the basic risk and return performance statistics of the funds. The second section displays the results of the annualised risk-adjusted performances of the funds. The time-series regression results of both the single factor model (CAPM) and the multifactor model (APT) are presented in the last section of each panel. Fund names are demonstrated according to their respective codes presented in alphabetical order. The relative performances of the funds are then compared to the corresponding performance of the broad market proxy represented by the FTSE/JSE All Share Index (ALSI). Coefficients that are statistically significant at 5% level are highlighted in bold in each table.



### 5.3.1 Sub-Period 1

Examining the average arithmetic returns of funds reveal that 16 of the 20 funds succeeded in achieving returns that are superior to that of ALSI. In addition, similar conclusion is reached with regard to the cumulative performance of funds. The majority of the funds (17 of the 20 funds) earned superior cumulative returns compared to ALSI. Funds that underperformed the market index during this period include: GIGE, MTLE, PTST and SNFT. The underperformance of these funds can be partially attributed to the high risk exposure in the funds. Managers of these funds demonstrate no effort in the minimisation of their respective funds' risk exposures. This is apparent from the substantially higher standard deviation carried by each of the four funds. Generally, this indicates that assuming high risk exposures during trading or investment activities does not necessarily lead to higher returns over time in the South African unit trust industry during this period. Overall, the results suggest that most fund managers add some degree of economic value though their risk management activities.

**Table 5.1 Fund Performance Evaluation for Sub-Period 1**

| **Panel A ( Sub-Period 1)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fund Codes** | ***ALSI*** | **AGEF** | **BAAF** | **CGMG** | **CORG** | **FEWS** | **FNBG** | **GIGE** | **INAQ** | **LIWC** | **MTLE** |
| **Basic (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 26.42% | 36.79 | 29.15% | 29.92% | 33.38% | 29.62% | 32.03% | 24.80% | 35.57% | 27.01% | 26.28% |
| Cumulative. Return | 3.253 | 5.077 | 3.682 | 3.839 | 4.441 | 3.802 | 4.245 | 3.069 | 4.837 | 3.279 | 3.917 |
| Standard Deviation | 17.11% | 15.76% | 17.41% | 17.72% | 17.73% | 16.52% | 16.15% | 17.27% | 17.00% | 17.10% | 18.58% |
| **Risk-Adj. (*p.a*)** | | | | | | | | | | | |
| Sharpe Ratio | 0.967 | 1.108 | 1.107 | 1.131 | 1.326 | 1.195 | 1.372 | 0.864 | 1.512 | 1.002 | 0.883 |
| Information Ratio | 0.000 | 1.517 | 0.429 | 1.015 | 1.292 | 1.185 | 1.612 | 0.403 | 1.839 | 0.789 | 0.595 |
| M-Squared | 0.00% | 13.55% | 3.32% | 3.74% | 7.06% | 4.82% | 7.83% | -0.80% | 10.21 | 1.54% | -0.49% |
| Sortino Ratio | 0.171 | 1.853 | 1.200 | 1.345 | 1.645 | 1.358 | 1.702 | 0.941 | 1.767 | 1.174 | 1.057 |
| Treynor Ratio | 0.165 | 0.379 | 0.227 | 0.275 | 0.336 | 0.253 | 0.363 | 0.178 | 0.329 | 0.223 | 0.200 |
| JansAlpha (CAPM) | 0.00% | 15.96% | 6.01% | 8.76% | 12.58% | 7.68% | 12.74% | 1.93% | 13.60% | 5.21% | 3.73% |
| | | **[0.001]** | [0.149] | [0.066] | [0.065] | [**0.027**] | [**0.004**] | [0.738] | [0.858] | [0.180] | [0.403] |
| Jansen Alpha (APT) | -7.54% | 8.79% | -1.70% | 2.39% | 6.08% | 0.88% | 7.06% | -4.83% | 7.42% | -1.09% | -2.67% |
| | [0.088] | [**0.001**] | [0.157] | [0.093] | [**0.006**] | [**0.034**] | [**0.004**] | [0.998] | [**0.000**] | [0.231] | [0.529] |
| **Regression Output** | | | | | | | | | | | |
| R Squared (CAPM) | 100.00% | 69.28% | 83.90% | 69.89% | 71.22% | 83.95% | 63.54% | 81.68% | 86.72% | 81.05% | 81.11% |
| R Squared (APT) | 99.56% | 70.30% | 83.92% | 73.85% | 76.74% | 85.05% | 76.13% | 85.89% | 79.85% | 83.37% | 84.12% |
| Slope Coefficient (b) | 1.000 | 0.710 | 0.855 | 0.730 | 0.700 | 0.780 | 0.610 | 0.840 | 0.780 | 0.770 | 0.820 |
| | **[0.00]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** |
| **Panel B** | | | | | | | | | | | |
| **Fund Codes** | ***ALSI*** | **OCEF** | **PRUO** | **PTST** | **RMCF** | **RMEF** | **SNFT** | **SNTR** | **SPGG** | **STPF** | **TREF** |
| **Basic (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 26.42% | 29.77% | 32.51% | 24.20% | 32.77% | 34.58% | 16.22% | 38.55% | 34.77% | 34.44% | 28.98% |
| Cumulative. Return | 3.253 | 3.917 | 4.229 | 2.961 | 4.421 | 4.690 | 2.067 | 5.040 | 4.713 | 4.660 | 3.687 |
| Standard Deviation | 17.11% | 12.91% | 15.69% | 20.23% | 13.35% | 16.76% | 21.26% | 17.05% | 16.55% | 14.98% | 16.91% |
| **Risk-Adj. (*p.a*)** | | | | | | | | | | | |
| Sharpe Ratio | 0.967 | 1.541 | 1.443 | 0.708 | 1.714 | 1.474 | 0.298 | 1.682 | 1.504 | 1.640 | 1.130 |
| Information Ratio | 0.000 | 1.552 | 1.760 | -0.048 | 2.238 | 2.002 | -0.252 | 2.144 | 1.658 | 1.773 | 0.824 |
| M-Squared | 0.00% | 0.57% | 1.04% | -0.38% | 1.09% | 1.40% | -1.75% | 2.08% | 1.43% | 1.37% | 0.44% |
| Sortino Ratio | 0.171 | 1.792 | 1.623 | 0.842 | 2.010 | 1.839 | 0.364 | 1.887 | 1.808 | 1.814 | 1.267 |
| Treynor Ratio | 0.165 | 0.368 | 0.328 | 0.154 | 0.520 | 0.321 | 0.076 | 0.388 | 0.377 | 0.384 | 0.251 |
| Jansen alpha (CAPM) | 0.00% | 11.55% | 11.86% | -0.11% | 16.00% | 14.96% | -6.52% | 16.97% | 14.67% | 14.59% | 12.76% |
| | | **[0.001]** | [**0.005**] | [0.761] | [**0.001**] | [**0.001**] | [0.172] | [**0.000**] | [**0.001**] | [**0.001**] | [0.106] |
| Jansen alpha (APT) | -7.54% | 6.45% | 5.31% | -7.93% | 1.06% | 9.20% | -14.0% | 9.78% | 7.93% | 7.78% | 1.05% |
| | [0.088] | [**0.001**] | [**0.001**] | [0.705] | [**0.001**] | [**0.001**] | [0.372] | [**0.000**] | [**0.002**] | [**0.001**] | [0.146] |
| **Regression output** | | | | | | | | | | | |
| R-Squared (CAPM) | 100.00% | 68.61% | 72.39% | 87.55% | 44.52% | 63.88% | 66.33% | 72.46% | 67.05% | 66.01% | 72.45% |
| R Squared (APT) | 99.56% | 67.75% | 76.33% | 89.10% | 57.45% | 77.25% | 71.46% | 78.69% | 68.86% | 65.35% | 78.69% |
| Slope Coefficient (b) | 1.000 | 0.538 | 0.694 | 0.931 | 0.444 | 0.628 | 0.829 | 0.755 | 0.659 | 0.642 | 0.541 |
| | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** |

The analysis of the risk-adjusted performance of funds (refer to the Sharpe ratio) reveal that most funds performed better and above the market index. Among them, fund RMCF demonstrate to be the most rewarded fund with the highest Sharpe ratio of 1.714. By contrast, the fund SNFT is observed to be the worst performing fund during this period, with a Sharpe ratio of 0.298. In addition, the examination of both the Information ratio and the M-squared performance measure reveal findings that are in agreement with those reached by the Sharpe ratio. According to both measures, most managers were able to deliver positive risk-adjusted returns during this period. More specifically, 18 of the 20 funds earned positive Information ratios while 16 of the 20 funds earned positive M-squared returns. Furthermore, when performance is examined by considering the downside risk as the only relevant risk (refer to the Sortino ratio), all the funds under examination document positive generation of the risk-adjusted returns. Not only did all the funds earn positive risk-adjusted returns, when compared to the performance of the market index, the results of the Sortino ratio reveal that all the funds outperformed the market index. This indicates that all the fund managers were successfully able to achieve their minimum acceptable returns for every amount of risk they have undertaken.

Further analysis of the risk-adjusted performance of funds indicates that all of them exhibited positive Treynor ratios throughout this examination period. With the exception of the funds PTST and SNFT, the results further reveal that all of the funds exhibit an outperformance of the market Treynor ratio. Moreover, all the funds have beta coefficients of less than one. Thus, indicating that most fund managers were able to outperform the market with lower than average systematic risk on the JSE. After examining the CAPM Jensen's alpha, the results reveal evidence of positive risk-adjusted returns earned by 18 of the 20 funds under examination. Among these 18 funds, 10 funds exhibited statistically significant Jensen's alpha. The high R-squared (average of 72.68%) jointly with the statistically significant beta coefficients of the CAPM regressions indicate the power of the market risk in explaining the excess returns of the funds. Moreover, the results of the multifactor Jensen's alpha (refer to APT results in Table 1) yield similar findings to that of the CAPM. During this period, managers of 14 funds were able to earn positive abnormal returns. It is also observed that the R-squared for the sector-based APT regressions improve slightly to an average 76, 51% from that of the CAPM regressions.

**Table 5.2 Fund Performance Evaluation for Sub-Period 2**

| **Panel C (Sub-Period 2)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fund Codes** | ***ALSI*** | **AGEF** | **BAAF** | **CGMG** | **CORG** | **FEWS** | **FNBG** | **GIGE** | **INAQ** | **LIWC** | **MTLE** |
| **Basic (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 9.76% | 10.93% | 6.07% | 6.77% | 13.35% | 8.48% | 8.47% | 4.18% | 10.08% | 8.93% | 8.06% |
| Cumulative. Return | 1.435 | 1.616 | 1.250 | 1.276 | 1.759 | 1.415 | 1.407 | 1.137 | 1.518 | 1.431 | 1.344 |
| Standard Deviation | 22.80% | 14.52% | 16.06% | 14.90% | 14.90% | 14.54% | 13.02% | 15.86% | 14.54% | 14.60% | 15.52% |
| **Risk-Adj. (*p.a*)** | | | | | | | | | | | |
| Sharpe Ratio | 0.053 | 0.164 | -0.154 | -0.120 | 0.322 | -0.005 | -0.007 | -0.276 | 0.105 | 0.026 | -0.032 |
| Information Ratio | 0.000 | 0.269 | -0.656 | -0.601 | 0.126 | -0.427 | -0.149 | -0.613 | -0.011 | -0.331 | -0.566 |
| M-Squared | 0.00% | 0.27% | -0.84% | -0.68% | 0.82% | -0.29% | -0.30% | -1.27% | 0.07% | -0.19% | -0.39% |
| Sortino Ratio | 0.032 | 1.019 | -0.962 | -0.640 | 1.732 | -0.027 | -0.033 | -1.702 | 0.580 | 0.141 | -0.167 |
| Treynor Ratio | 0.012 | 0.035 | -0.033 | -0.021 | 0.061 | -0.001 | -0.001 | -0.059 | 0.020 | 0.005 | -0.006 |
| Jansen Alpha (CAPM) | 0.00% | 1.47% | -3.57% | -2.97% | 3.66% | -1.13 | -1.14 | -5.42% | 0.42% | -0.72% | -1.72% |
| | | [0.698] | [0.275] | [0.393] | [0.356] | [0.772] | [0.805] | [0.330] | **[0.004]** | [0.884] | [0.696] |
| Jansen Alpha (APT) | -0.29% | -0.99% | -4.10% | -3.78% | 1.34% | -2.34% | -1.61% | -5.64% | -1.22% | -1.74% | -2.18% |
| | [0.766] | [0.764] | [0.158] | [0.203] | [0.651] | [0.398] | [0.605] | [0.072] | [0.691] | [0.611] | [0.492] |
| **Regression Output** | | | | | | | | | | | |
| R Squared (CAPM) | 100% | 73.16% | 87.19% | 88.09% | 81.39% | 85.16% | 80.22% | 82.45% | 86.75% | 82.81% | 84.79% |
| R Squared (APT) | 99.57% | 78.07% | 87.12% | 88.63% | 89.06% | 88.21% | 83.44% | 84.56% | 86.88% | 83.37% | 88.15% |
| Slope Coefficient (b) | 1.00 | 0.631 | 0.762 | 0.827 | 0.790 | 0.740 | 0.735 | 0.736 | 0.778 | 0.770 | 0.856 |
| | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** |
| **Panel D (Sub-Period 2) Continues** | | | | | | | | | | | |
| **Fund Codes** | ***ALSI*** | **OCEF** | **PRUO** | **PTST** | **RMCF** | **RMEF** | **SNFT** | **SNTR** | **SPGG** | **STPF** | **TREF** |
| **Basic (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 9.76% | 4.91% | 11.20% | 9.41% | 12.36% | 9.13% | 4.15% | 12.30% | 6.95% | 4.14% | 0.33% |
| Cumulative. Return | 1.435 | 1.223 | 1.631 | 1.407 | 1.756 | 1.442 | 1.060 | 1.697 | 1.303 | 1.159 | 0.930 |
| Standard Deviation | 22.80% | 11.10% | 13.95% | 17.02% | 11.39% | 13.44% | 17.44% | 15.20% | 13.77% | 13.54% | 3.54% |
| **Risk-Adj. (*p.a*)** | | | | | | | | | | | |
| Sharpe Ratio | 0.053 | -0.328 | 0.190 | 0.051 | 0.334 | 0.043 | -0.252 | 0.247 | -0.117 | -0.326 | -2.324 |
| Information Ratio | 0.00 | -0.849 | 0.195 | -2.137 | -0.718 | -0.255 | -0.438 | 0.226 | -0.572 | -0.790 | -1.455 |
| M-Squared | 0.00% | -1.11% | 0.33% | -0.08% | 0.59% | -0.14% | -1.28% | 0.58% | -0.64% | -1.28% | -0.81% |
| Sortino Ratio | 0.032 | -1.827 | 1.111 | 0.271 | 1.829 | 0.213 | -1.293 | 1.451 | -0.615 | -1.973 | -3.217 |
| Treynor Ratio | 0.012 | -0.065 | 0.038 | 0.009 | 0.079 | 0.007 | -0.046 | 0.051 | -0.022 | -0.070 | -0.111 |
| Jansen alpha (CAPM) | 00.00% | -0.04% | 1.65% | -0.52% | 3.12% | -0.53% | -5.77% | 2.70% | -2.64% | -5.32% | -5.47% |
| | | [0.163] | [0.567] | [0.920] | [0.517] | [0.926] | [0.284] | [0.463] | [0.569] | [0.123] | **[0.007]** |
| Jansen alpha (APT) | -0.29% | -5.17% | 0.01% | -0.68% | -0.52% | -3.36% | -3.82% | 1.30% | -4.25% | -5.33% | -8.59% |
| | [0.766] | [0.086] | [0.931] | [0.799] | [0.915] | [0.648] | [0.331] | [0.732] | [0.259] | [0.110] | [**0.004**] |
| **Regression output** | | | | | | | | | | | |
| R-Squared (CAPM) | 100.00% | 78.58% | 85.26% | 92.19% | 52.43% | 82.23% | 79.20% | 81.14% | 75.90% | 79.93% | 76.21% |
| R Squared (APT) | 99.57% | 78.19% | 88.20% | 91.47% | 69.10% | 85.77% | 83.48% | 84.84% | 81.09% | 77.69% | 85.76% |
| Slope Coefficient (b) | 1.00 | 0.559 | 0.697 | 0.969 | 0.477 | 0.774 | 0.956 | 0.737 | 0.720 | 0.633 | 0.522 |
| | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** |

### 5.3.2 Sub-Period 2

Similar to the results attained in the first sub-period, during this period, all of the funds earned positive arithmetic and cumulative returns. When fund performance is evaluated relative to ALSI however, only 6 funds managed to achieve superior arithmetic returns with only 7 funds in accordance with the cumulative performance. Nonetheless, all fund managers displayed some degree of a defensive approach with regard to the minimisation of the total risks associated with funds. This is apparent from the considerably lower standard deviations documented by each fund when comparison is made relative to that of the market's standard deviation. Moreover, according to the results of the Sharpe ratio and Information ratio, the study reveals that only 6 funds (Sharpe ratio) and 4 funds (Information ratio) managed to earn risk-adjusted returns that are superior to that of the broad market index. Similarly, examining the risk-adjusted performance of the funds using the M-squared measure reveals that only 6 of the 20 funds outperform ALSI. In comparison to the first sub-period performance, the underperformance documented by most of the funds during this period can be attributed to the devastation of the 2007/2008 global financial crisis. As already observed, this is further confirmed by the defensive approach of fund managers observed through their fund risk management activities.



Moreover, the examination of the fund performance against the associated downside risk measure (refer to the Sortino ratio), reveals that 9 out of the 20 funds earned positive risk-adjusted returns during this period. In addition, relative to the ALSI, these funds proceeded to earn superior risk-adjusted returns. Relative to the performance of the Sharpe ratio, the Information ratio and the M-squared measure, the results of the Sortino ratio appear to be inconsistent with regard to the number of funds that have shown a market outperformance during this period. This observation could be partially attributed to the fact that the Sharpe ratio, the Information ratio and the M-squared measure do not possess the capacity to differentiate downside risk and upside risk. The impact of the downside risk in particular is not captured by these performance measures.

When beta coefficient is employed as the risk measure, the results of the Treynor ratio reveal that 9 out of the 20 funds managed to earn positive risk-adjusted returns. However, relative to the market index, only 6 funds (AGEF, CORG, INAQ, PRUO, RMCF and SNTR) prevailed in outperforming the market. It is worth highlighting that, with respect to the negative Treynor performance, the interpretation following these results depends on two concepts: **(1)**

Funds earning negative returns because the portfolio returns are less than the risk-free returns with the resulting market risk being positive or **(2)** Funds earning negative returns when portfolio returns are greater than risk-free returns but the resulting market risk being negative. From the positively significant beta of less than 1 obtained, it is apparent that the negative Treynor ratio attained can be attributed to the fact that managers failed to generate returns that are in excess of the risk-free proxy during the relatively more volatile second sub-period. Moreover, with the exception of 6 funds, the results of the CAPM Jensen's alpha indicate an underperformance of the benchmark by all the remaining funds. Of the 6 funds however, only 1 fund (INAQ) managed to yield positively significant alpha. With regard to the multifactor performance (APT) results, 3 funds earned superior but statistically insignificant risk-adjusted returns.

### 5.3.3 Overall Period

During this period, both the performance of the arithmetic and cumulative returns indicate that the majority of the funds exhibited an outperformance of the ALSI. However, when examined on a consistent basis, the results of an arithmetic performance reveal that only the funds AGEF, CORG, INAQ, PRUO, RMCF and SNTR managed to outperform the market. On the other hand, the results of the cumulative performance indicate that 13 of the 20 funds outperformed the market. Although no significant difference between the market's and the funds' standard deviations under examination, the majority of the funds attempted to maintain lower standard deviation compared to the market throughout the examination period. This indicates that, on average, most South African fund managers apply a defensive strategy in an attempt to minimise their exposure. Noticeably, most of the funds that took on higher risk compared to the market have also generated lower returns compared to the market over the examination period.

The examination of the Sharpe ratio of the funds indicates that 14 of the 20 funds succeeded in obtaining positive Sharpe ratios, and outperform the market accordingly. With the exception of the fund SNFT, all of the funds outperformed the market in terms of their Sortino ratios.

**Table 5.3 Performance Evaluation for the Overall Period**

| **Panel E (Overall Period)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fund Codes** | ***ALSI*** | **AGEF** | **BAAF** | **CGMG** | **CORG** | **FEWS** | **FNBG** | **GIGE** | **INAQ** | **LIWC** | **MTLE** |
| **Basic (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 17.82% | 23.22% | 17.07% | 17.81% | 22.98% | 18.61% | 19.70% | 14.05% | 22.20% | 17.65% | 16.84% |
| Cumulative. Return | 4.667 | 8.205 | 4.604 | 4.899 | 7.810 | 5.378 | 5.971 | 3.489 | 7.343 | 4.876 | 4.406 |
| Standard Deviation | 20.16% | 16.81% | 18.60% | 20.09% | 20.09% | 18.24% | 18.70% | 18.52% | 19.06% | 21.18% | 14.36% |
| **Risk-Adj. (*p.a*)** | | | | | | | | | | | |
| Sharpe Ratio | 0.427 | 0.833 | 0.423 | 0.428 | 0.685 | 0.515 | 0.561 | 0.261 | 0.681 | 0.438 | 0.360 |
| Information Ratio | 0.000 | 0.807 | -0.188 | 0.203 | 0.666 | 0.274 | 0.576 | -0.188 | 0.734 | 0.114 | -0.077 |
| M-Squared | 0.00% | 1.09% | -0.15% | 0.00% | 1.04% | 0.16% | 0.38% | -0.76% | 0.88% | -0.03% | -0.20% |
| Sortino Ratio | 0.202 | 0.889 | 0.451 | 0.485 | 0.793 | 0.569 | 0.649 | 0.280 | 0.764 | 0.493 | 0.411 |
| Treynor Ratio | 0.086 | 0.212 | 0.100 | 0.109 | 0.181 | 0.125 | 0.152 | 0.062 | 0.162 | 0.169 | 0.110 |
| Jansen Alpha (CAPM) | 0.00% | 8.57% | 1.29% | 2.07% | 7.50% | 3.18% | 4.80% | -1.55% | 6.67% | 2.09% | 0.69% |
| | | **[0.006]** | [0.659] | [0.503] | [**0.015**] | [0.201] | [0.118] | [0.494] | [0**.013**] | [0.47] | [0.875] |
| Jansen Alpha (APT) | 0.48% | 6.72% | 0.72% | 1.10% | 5.38% | 1.95% | 3.48% | -2.27% | 5.17% | 0.98% | -0.15% |
| | [0.253] | [**0.013**] | [0.723] | [0.634] | [**0.020**] | [0.310] | [0.140] | [0.319] | [**0.027**] | [0.648] | [0.860] |
| **Regression Output** | | | | | | | | | | | |
| R Squared (CAPM) | 100% | 71.26% | 85.10% | 81.31% | 77.74% | 84.63% | 74.16% | 81.86% | 82.55% | 82.20% | 83.49% |
| R Squared (APT) | 99.54% | 73.64% | 85.17% | 82.49% | 84.19% | 86.75% | 79.95% | 84.49% | 82.95% | 83.28% | 86.73% |
| Slope Coefficient (b) | 1.00 | 0.659 | 0.797 | 0.792 | 0.760 | 0.754 | 0.690 | 0.775 | 0.766 | 0.770 | 0.842 |
| | **[0.00]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** |
| **Panel F (Overall Period) Continues** | | | | | | | | | | | |
| **Fund Codes** | ***ALSI*** | **OCEF** | **PRUO** | **PTST** | **RMCF** | **RMEF** | **SNFT** | **SNTR** | **SPGG** | **STPF** | **TREF** |
| **Basic (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 17.82% | 16.72% | 21.42% | 16.59% | 22.16% | 21.22% | 10.04% | 24.78% | 20.09% | 18.37% | 13.80% |
| Cumulative. Return | 4.667 | 4.790 | 7.013 | 4.166 | 7.762 | 6.764 | 2.190 | 9.177 | 6.140 | 5.400 | 3.428 |
| Standard Deviation | 20.16% | 14.36% | 17.21% | 23.01% | 15.00% | 19.45% | 24.52% | 18.64% | 18.83% | 16.12% | 18.43% |
| **Risk-Adj. (*p.a*)** | | | | | | | | | | | |
| Sharpe Ratio | 0.427 | 0.522 | 0.709 | 0.321 | 0.863 | 0.617 | 0.034 | 0.835 | 0.578 | 0.568 | 0.249 |
| Information Ratio | 0.00 | 0.206 | 0.966 | -0.164 | 1.197 | 0.698 | -0.355 | 1.099 | 0.411 | 0.344 | -0.424 |
| M-Squared | 0.00% | -0.22 | 0.73 | -0.25 | 0.85 | 0.69 | -1.57 | 1.40 | 0.46 | 0.11 | -0.81 |
| Sortino Ratio | 0.202 | 0.581 | 0.778 | 0.365 | 0.970 | 0.717 | 0.039 | 0.913 | 0.657 | 0.611 | 0.271 |
| Treynor Ratio | 0.086 | 0.136 | 0.174 | 0.078 | 0.276 | 0.167 | 0.009 | 0.208 | 0.155 | 0.143 | 0.061 |
| Jansen alpha (CAPM) | 0.00% | 2.94% | 6.46% | -0.49% | 9.10% | 6.05% | -6.68% | 9.42% | 5.11% | 3.89% | 2.97% |
| | | [0.219] | **[0.013]** | [0.713] | [**0.01**] | [0.051] | [0.061] | [**0.02**] | [0.115] | [0.172] | [0.494] |
| Jansen alpha (APT) | 0.48% | 0.21% | 4.99% | -0.56% | 5.77% | 4.33% | -4.18% | 7.47% | 3.67% | 3.75% | -2.26% |
| | [0.253] | [0.282] | **[0.007]** | [0.806] | [**0.022**] | [0.067] | [0.179] | [**0.002**] | [0.165] | [0.138] | [0.341] |
| **Regression output** | | | | | | | | | | | |
| R-Squared (CAPM) | 100.00% | 74.63% | 80.13% | 90.52% | 49.56% | 75.53% | 74.54% | 77.63% | 72.61% | 73.94% | 74.55% |
| R Squared (APT) | 99.54% | 73.85% | 82.69% | 90.26% | 64.45% | 81.79% | 79.25% | 82.02% | 75.94% | 72.13% | 82.51% |
| Slope Coefficient (b) | 1.00 | 0.553 | 0.697 | 0.955 | 0.467 | 0.723 | 0.910 | 0.745 | 0.700 | 0.639 | 0.567 |
| | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** |

However, inferior performances of the funds have been reported in terms of the Information ratio, M-squared measure and the Treynor ratio over the examination period. Only 6 funds, 4 funds and 6 funds have outperformed the market in terms of their Information ratio, M-squared measure and Treynor measure respectively. Corroborating these outcomes is the results depicted by the performance of both the CAPM Jensen's alpha concurrently with the multifactor (APT) Jensen's alpha. According to the measures, during this period most of the funds failed to accomplish their investments objectives as depicted by their generation of positive but insignificant risk-adjusted returns. The funds AGEF, CORG, INAQ, PRUO, RMCF and SNTR are the only exceptions that consistently earned positive and significant alpha as indicated by the performance of both measures. Thus, suggesting that on average, only a minimal number of fund managers where able to successfully exhibit economic value contribution during this examination. Additionally, the high R-squared jointly with the statistically significant betas coefficient of the CAPM attained in this period, indicate that market risk is able to explain fund performance successfully. The explanatory power improves slightly when the market risk is decomposed to prominent sector risks employed by the APT model.

## 5.4 Conclusion

The chapter undertakes to investigate the performance of the 20 South African equity unit trusts from the period 6 January 2002 to 2 September 2012. The performance is examined over two equally weighted sub-periods and the overall examination period. While the first sub-period captures the performance of the respective funds before the 2007/2008 global financial crisis, the second sub-period captures the devastation in performance of the funds in the crisis. These objectives are achieved by utilising a variety of statistical risk-adjusted performance measures. Most of these performance measures document significant superior performance of the funds during the first sub-period followed by a drastic decline in performance during the second sub-period of examination. However, the degree in which funds outperform or underperforms depends on the application or the decomposition of the risk-adjusted measures employed to evaluate their performances.

The Sharpe ratio, Information ratio, Treynor measure and the Sortino ratio document similar results in performance of the funds during the bullish sub-period, regardless of the difference in application of the risk parameter each measure employs. During this period managers' superiority in performance is observed to be dominant to that of the market index. Consequently, this supports the rationale underlying the value contribution of the South African managers with regard to earning additional excess returns per unit of risk and/or earning excess returns relative to a pre-specified benchmark per unit risk. Additionally, the above mentioned risk-adjusted performance measures reached the same inference with regard to the best and worst performers during the first sub-period. Entering the 2007/2008 global financial crisis (refer to the second sub-period of examination), most of the funds under examination demonstrated a diminishing performance during this period. The majority of the risk-adjusted performance measures applied report evidence of drastic inferiority of the funds in comparison to the performance of the market.

The results of the CAPM and APT regressions demonstrate to be a good fit for the study's data set. This is indicated by the high R-squared and the respective statistical significance of the funds attained in all the sub-periods and the overall examination period. Moreover, the models' ability to explain asset return variations proved to have improved upon the synthesis of other risk premium factors (sector indices). As a result, this lends support to the Roll (1977, 1978) argument about the existence of other various economic factors that can

potentially explain the return variations of assets over time. In addition, all the funds exhibited statistically significant beta coefficients of less than 1.0, suggesting that fund managers undertakes some kind of a defensive investment strategy as an effort to minimise their funds' total risks relative to the movements of the market index.

The single factor and multifactor Jensen's alphas demonstrate a positive relation in measuring fund performance during both sub-period 1 and sub-period 2. Both models record a significant risk-adjusted outperformance in the first sub-period followed by a drastic underperformance in the second sub-period of examination. When performance is examined over the whole sample period, although the majority of the funds managed to earn positive abnormal returns, most of the alpha intercepts appear to be statistically insignificant. This indicates that most of the South African equity unit trust managers are unable to outperform the market on a consistent basis.

# 6

# Managers' Asset Allocation and Selection Abilities

## 6.1 Introduction

This chapter undertakes to investigate the performance of the South African equity unit trusts and the sources contributing to their performances. Unlike in chapter 5 where performance is evaluated in relation to the broad market index (ALSI), this chapter evaluates the performance of the unit trust managers relative to their respective pre-specified sector benchmark indices. Based on prior empirical evidence, the return variation of assets can be explained or influenced by the existence of a verity of economic factors (Banz, 1981; Reinganum, 1981; Fama and French, 1992, 1993). This research attempts to evaluate the variation of these returns sourced either to the tactical abilities of managers in efficiently allocating assets across major assets classes or their abilities to efficiently select assets in their portfolios. Based on previous empirical literature, the rationale of asset allocation is indicated to explain a large proportion of portfolio variability in returns (Brinson, Hood, Beebower, 1986 and Bogle, 1994). As such, asset allocation ability is regarded as the major contributor in the enhancement of unit trust performance (Sharpe, 1992).



The study employs the time-series return decomposition model of Sharpe (1992) to measure performance attribution of South African unit trust managers. The model is decomposed as such it captures the exposures of the managers' portfolios to each major asset class. The Financial index (FINI), the Resource index (RESI), the Industrial index (INDI), the Treasury bill (TB) and the government bonds (GOVI) are employed as proxies to explain the variation in returns driven mainly by mangers' asset allocation activities. The total returns generated by these sectors will then serve as the pre-specified benchmark performances of the funds under evaluation. The returns that cannot be explained by the return movements of the constructed benchmark depict the returns earned as a result of the managers' security selection activities. Sharpe (1992) points out that the existence in significant selection ability of managers will imply either that (1) the indices employed are mis-specified or (2) that unit trust managers outperform/underperform the benchmark index due to their security selection activities. Section 6.2 presents a detailed methodology employed by the study. The results and conclusion of the study are outlined in section 6.3 and section 6.4 respectively.

## 6.2 Methodology

The study emerges by fist estimating the exposures (weights) of the selected equity unit trusts by employing the return decomposition model developed by Sharpe (1992). Similar methodology was recommended by Yu (2008) who employed 3 JSE sector indices (FINI, RESI and INDI) in the model together with three style indices (momentum, size and value) to analyse South African unit trust performance. This study employs the same three sector indices with proxies for cash equivalent (TB) and bonds (GOVI) as explanatory variables for measuring the exposures of funds. The rationale of including proxies for cash equivalents and bonds is to measure the managers' ability to preserve capital by observing their allocations into cash and bonds during turbulent times. Such analysis is recommended by Hsieh, Hodnett and van Rensburg (2012) to measure the managers' ability to manage risk.

Mathematically, the weekly time-series returns of funds can be regressed against the time-series returns of the selected proxies as define by Equation 6.1.

$$R_{k,t} = \{w_{k,FINI}R_{FINI,t} + w_{k,INDI}R_{INDI,t} + w_{k,RESI}R_{RESI,t} + w_{k,GOVI}R_{GOVI,t} + w_{k.TB}R_{TB,t}\} + \varepsilon_{k,t} \quad (6.1)$$



where:

$R_{k,t,}$ , $R_{FINI,t}$ , , $R_{RESI,t}$, $R_{GOVI,t}$ and $R_{TB,t}$ represent the returns on fund *k* and the respective sector indices in week *t*;

$w_{k,FINI}$ , $w_{k,INDI}$ , $w_{k,RESI}$, $w_{k,GOVI}$ and $w_{k,TB}$ represent fund *k* 's exposures (weights) and the respective sector proxies; and

$\varepsilon_{k,t}$ is the in-sample selection return for fund *k* in week *t* that is not explained by sector exposures of funds.

The sum of the parameters in the brackets represents the in-sample benchmark returns of funds during the examination period *t*. The residual component of the model on the other hand, represents the in-sample selection returns of funds that are not attributed to the selected benchmark returns. The returns attributed to this component will represent the value added by unit trust managers through their security selection abilities. In effect, the variation in selection returns of the funds will represent the fund's tracking error.

While the model possesses the ability to identify the asset mix performance of funds and managers' selection ability, this approach is not without limitations. According to Ben Dor and Jagannathan (2002: 9), '*in order to get coefficients' estimates that closely reflect the fund's actual investment policy it is important to incorporate restrictions on the style benchmark weight*'. Based on this limitation, the factors of the models are restricted such that the estimated weights of the selected asset classes sum to one and are non-negative. The two restrictions imposed can be defined mathematically as indicated by Equation 6.2 and 6.3 respectively.

$\sum_{k=1}^{5} \beta_{k,z} = 1$ For any fund *k* and fund class z (6.2)

$\beta_{k,z} \geq 0 \quad \forall_{k,z}$ Positive constrain where short selling is prohibited (6.3)

Equation 6.2 reflects the prohibition of unit trust managers from short selling or employing some leverage. The restriction defined by an inequality on other hand (refer to Equation 6.3), is an indication that funds' exposures can only be dynamically obtained through the application of a quadratic programing algorithm instead of the ordinary least square (OLS) approach. Based on the rational that the standard regression packages do not accommodate these restrictions, this research employs the weighted least square (WLS) technique to allocate weights to the selected fund returns, as recommended by Hsieh, Hodnett and van Rensburg (2012). The weekly WLS performance of the funds is examined over a series of 52-weeks in which the respective fund return weights of each week is equivalently to $2^{1/52}$ times the weight allocated on previous period. The measure starts by first allocating weights of 1.0 to the returns of funds during the first week of the examination period. This is done to place emphasis on returns earned by unit trust managers during recent periods relative to the returns earned over distant periods. The ultimate goal underlying the application of this model is to minimise the variance residual defined by the weighted tracking error in Equation 6.1.



Upon the completion of estimating weights over the examination period, this research follows the methodology employed by the Yu (2008) and Hsieh, Hodnett and van Rensburg (2012) to estimate the funds' out-of-sample exposures on a weekly basis, based on the in-sample (period of 52-weeks prior) fund exposures estimates. The out-of–sample benchmark returns are thus estimated as the sum of products of fund exposures and their respective returns calculated as indicated by Equation 6.4.

$$\tilde{R}_{k,t} = \left(\widetilde{w}_{k,FINI} \times R_{FINI,t}\right) + \left(\widetilde{w}_{k,INDI} \times R_{INDI,t}\right) + (\widetilde{w}_{K,RESI} \times R_{RESI,t}) + (\widetilde{w}_{k.GOVI} \times R_{GOVI,t}) + (\widetilde{w}_{k,TB} \times R_{TB,t})^{+} \quad (6.4)$$

where:

$\tilde{R}_{k,t}$ is the out-of-sample benchmark return for fund *k* in week *t*; and

$\widetilde{w}_{k,FINI}$, $\widetilde{w}_{k,INDI}$, $\widetilde{w}_{K,RESI}$, $\widetilde{w}_{k.GOVI}$ and $\widetilde{w}_{k,TB}$ is the out-of-sample weight estimates for fund *k* in week *t* calculated using return data from week t-52 to week t-1.

The difference between the actual fund returns in week *t* and its estimated benchmark returns is therefore calculated by following Equation 6.5.

$$\tilde{\varepsilon}_{k,t} = R_{k,t} - \left\{\widetilde{w}_{k,FINI}R_{FINI,t} + \widetilde{w}_{k,INDI}R_{INDI,t} + \widetilde{w}_{k,RESI}R_{RESI,t} \widetilde{w}_{k,GOVI}R_{GOVI,t} + \widetilde{w}_{k.TB}R_{TB,t}\right\} \quad (6.5)$$

The statistical significance of the estimated residual term $\tilde{\varepsilon}_{k,t}$ represents the economic value added by unit trust managers through their security selection activities. Similar to the method adapted by Yu (2008) and Hsieh, Hodnett and van Rensburg (2012), the performance of the funds is evaluated on a risk-adjusted basis by comparing their Sharpe ratios against the Sharpe ratios of their respective sector benchmarks using Equation 6.6.



$$S_P = \frac{R_p - R_f}{\sigma_p} \quad (6.6)$$

where:

$R_p$ is the return on portfolio *p* over the period of examination;

$R_f$ is the risk-free proxy (denoted by the S.A Treasury bill yield); and

$\sigma_p$ is the standard deviation of portfolio *P's* return over the period of examination.

To estimate the ability of the employed benchmark in replicating the actual fund returns using an out-of-sample period, Equation 6.7 proposed by Hsieh, Hodnett and van Rensburg (2012) is adapted.

$$R_{k,t} = \alpha_k + b_k \times r_{k,t} + u_{k,t} \quad (6.7)$$

where:

$a_k$ is a regression constant parameter unexplained by fund *k*'s risk;

$b_{k,sector}$ is the sensitivity of fund *k*'s returns relative to the movements in benchmark returns; and

$\mu_{k,t}$ is the "noise" component of the regression, reflecting factors independent of benchmark.

## 6.3 Results

This section presents the results of the equity unit trust performance attributions over three examination periods namely: Sub-period 1, sub-period 2 and the overall period respectively. Table 6.1, Table 6.2 and Table 6.3 display the results underlying each examination period in which each table is sub-divided into two sections. The format of the tables is adopted from Hsieh 2010 and Hsieh, Hodnett and van Rensburg (2012). The first section demonstrates the results of the first 10 unit trusts selected in the sample followed by second 10 unit trusts presented in the second section of each table. The results of the return performance attributed to managers' abilities are presented under the heading 'performance attribution'. The heading is decomposed into three sections namely: (1) average out-of-sample returns of the funds, (2) benchmark returns and (3) the average selection return. Moreover, the statistical significance (using Student's t-statistics) of the fund returns, benchmark returns, selection returns and the slope-coefficients are displayed by their respective parentheses. The statistical significance of the funds is evaluated at 5 percent level.

The summary statistics of Table 6.1 through Table 6.3 are depicted in the top section of Appendix B.1 through Appendix B.20. The time-series sector compositions of each fund are demonstrated in Chart (a) of Appendix B.1 through Appendix B.20. Each sector proxy is represented through a colour coded system defined as: FINI-Financial index (**Blue**), INDI-Industrial index (**Red**), RESI-Resource index (**Yellow**), GOVI-Government bonds (**Purple**) and the SATB-South African Treasury bill index (**Green**). Chart (c) on the same appendix compares the historical performance between the fund against its benchmark and selection returns. The format of the appendices is adopted from Hsieh (2010).



### 6.3.1 Performance Evaluation and Attribution

#### 6.3.1.1 Sub-Period 1

The examination of the fund performance during this period reveals that all of the funds successfully earned positive returns. This performance is exhibited even when the funds are examined on a risk-adjusted basis. None of the funds generated negative Sharpe ratios over the examination period. To examine the sources contributing to the returns of these funds, the funds' performances are evaluated against the performances of their respective benchmark

returns and the selection returns. By comparing fund performance to the benchmark performance, the analysis captures whether or not fund managers are able to outperform their corresponding benchmarks on a consistent basis with the outperformance attributed to their superior selection skills.

According to the analysis illustrated by Hsieh, Hodnett and van Rensburg, when the actual fund returns are superior to that of the benchmark returns and the resulting selection returns are positive, the outperformance could be attributed to the managers' security selection abilities. By contrast, the negative selection returns indicate an underperformance of the benchmark attributed to the inferiority in the manager's security selection ability. The analysis of the actual fund returns against the benchmark in Table 6.1 reveals that, during this period, most fund managers were able to outperform their respective benchmarks. Based on the resulting positive but insignificant selection returns exhibited by the majority of the funds, it is apparent that most South African equity unit trust managers do not add significant value through their security selection skills over this period. This indicates that the outperformance exhibited by the fund managers was driven mainly by their sector allocation decisions during this period. However, despite their superior performance, the South African unit trust managers took on higher risk compared to their benchmarks. With the exception of the fund BAAF, STPF and TREF, all of the selected funds exhibited standard deviations that were higher than those of their respective benchmarks.



The slope coefficients in the sector replication section measure the sensitivity of the fund returns to the movements in the benchmark returns. All of the funds have significant positive slopes with high R-square, indicating that the sector proxies selected to construct the benchmark are appropriate in modelling the fund returns. The high value indicates that the forecasted returns of the benchmark are able to explain a large variation of actual out-of-sample returns of funds. The regression intercepts are positive but insignificant, indicating inconsistent outperformance of the funds over their respective benchmarks during this period.

**Table 6.1: Return Attribution of South African Equity Funds Sub-Period 1**

| Fund codes | AGEF | BAAF | CGMG | CORG | FEWS | FNBG | GIGE | INAQ | LIWC | MTLE |
|---|---|---|---|---|---|---|---|---|---|---|
| **Performance Attribution** | | | | | | | | | | |
| 1. Fund Returns | 0.60% | 0.49% | 0.50% | 0.56% | 0.50% | 0.54% | 0.43% | 0.59% | 0.46% | 0.45% |
| | [5.012] | [3.698] | [4.079] | [4.688] | [4.144] | [4.958] | [3.243] | [4.861] | [3.803] | [3.490] |
| Standard Deviation | 2.00% | 2.00% | 2.46% | 1.98% | 2.02% | 1.80% | 2.20% | 2.02% | 2.02% | 2.15% |
| Sharpe Ratio | 0.210 | 0.140 | 0.156 | 0.189 | 0.016 | 0.196 | 0.111 | 0.201 | 0.381 | 0.124 |
| 2. Benchmark Returns | 0.11% | 0.45% | 0.04% | 0.42% | 0.40% | 0.38% | 0.39% | 0.42% | 0.39% | 0.39% |
| | [4.420] | [3.718] | [3.701] | [4.101] | [3.609] | [3.919] | [3.239] | [3.823] | [3.609] | [3.332] |
| Standard Deviation | 0.17% | 2.03% | 1.71% | 1.71% | 1.84% | 1.61% | 2.00% | 1.84% | 1.79% | 1.97% |
| Sharpe Ratio | 0.115 | 0.133 | 0.116 | 0.141 | 0.018 | 0.122 | 0.103 | 0.131 | 0.138 | 0.107 |
| 3. Selection Return | 0.17% | 0.04% | 0.13% | 0.13% | 0.10% | 0.16% | 0.04% | 0.16% | 0.08% | 0.06% |
| | [2.696] | [0.003] | [1.876] | [2.332] | [2.186] | [2.959] | [0.076] | [3.296] | [1.472] | [0.067] |
| Standard Deviation | 1.03% | 0.89% | 0.10% | 0.93% | 0.78% | 0.89% | 0.09% | 0.84% | 0.85% | 0.87% |
| **Sector Replication** | | | | | | | | | | |
| R-Squared | 85.86% | 83.87% | 70.80% | 77.73% | 85.15% | 75.86% | 84.93% | 82.84% | 82.29% | 83.82% |
| Intercept | 0.001 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | 0.001 | 0.001 | 0.006 |
| | [2.281] | [0.711] | [1.740] | [2.202] | [2.062] | [3.054] | [0.649] | [3.244] | [1.227] | [1.090] |
| Slope Coefficient | 1.048 | 1.006 | 1.016 | 0.001 | 1.008 | 0.975 | 1.013 | 0.995 | 1.029 | 0.999 |
| | [27.88] | [37.96] | [25.92] | [31.10] | [39.86] | [29.50] | [39.50] | [36.57] | [35.87] | [37.89] |

**Sub-period 1 Fund Analysis Continues...**

| Fund codes | OCEF | PRUO | PTST | RMCF | RMEF | SNFT | SNTR | SPGG | STPF | TREF |
|---|---|---|---|---|---|---|---|---|---|---|
| **Performance Attribution** | | | | | | | | | | |
| 1. Fund Returns | 0.50% | 0.54% | 0.41% | 0.55% | 0.57% | 0.29% | 0.63% | 0.58% | 0.57% | 0.49% |
| | [5.451] | [4.688] | [2.956] | [5.782] | [5.134] | [1.999] | [4.986] | [5.035] | [5.077] | [3.919] |
| Standard Deviation | 1.54% | 1.93% | 2.36% | 1.58% | 1.86% | 2.42% | 2.11% | 1.19% | 1.88% | 0.49% |
| Sharpe Ratio | 0.209 | 0.187 | 0.100 | 0.231 | 0.210 | 0.045 | 0.212 | 0.206 | 0.207 | 0.063 |
| 2. Benchmark Returns | 0.34% | 0.35% | 0.42% | 0.33% | 0.38% | 0.33% | 0.40% | 0.38% | 0.37% | 0.40% |
| | [2.892] | [3.567] | [3.567] | [4.682] | [3.736] | [2.681] | [3.595] | [3.888] | [1.443] | [3.705] |
| Standard Deviation | 1.24% | 1.65% | 2.18% | 1.16% | 1.68% | 2.04% | 1.82% | 1.64% | 1.42% | 1.81% |
| Sharpe Ratio | 0.135 | 0.104 | 0.110 | 0.125 | 0.116 | 0.072 | 0.116 | 0.122 | 0.130 | 0.122 |
| 3. Selection Return | 0.16% | 0.19% | -0.01% | 0.22% | 0.20% | -0.04% | 0.24% | 0.19% | 0.20% | 0.09% |
| | [2.892] | [3.242] | [-0.091] | [3.416] | [3.640] | [-0.498] | [3.826] | [2.961] | [3.233] | [1.523] |
| Standard Deviation | 0.89% | 0.97% | 0.78% | 1.18% | 0.91% | 1.26% | 1.03% | 1.09% | 1.05% | 0.98% |
| **Sector Replication** | | | | | | | | | | |
| R-Squared | 67.17% | 74.79% | 88.82% | 53.51% | 85.86% | 72.83% | 76.23% | 67.75% | 68.98% | 77.87% |
| Intercept | 0.001 | 0.001 | -0.000 | 0.002 | 0.001 | -0.000 | 0.002 | 0.002 | 0.002 | 0.000 |
| | [2.706] | [3.116] | [-0.268] | [3.321] | [2.281] | [-0.545] | [3.698] | [3.139] | [2.613] | [1.344] |
| Slope Coefficient | 1.012 | 1.008 | 1.020 | 0.992 | 1.048 | 1.013 | 1.006 | 0.095 | 1.095 | 1.021 |
| | [23.81] | [28.67] | [46.93] | [17.86] | [27.28] | [27.25] | [29.81] | [24.03] | [24.82] | [31.22] |

#### 6.3.1.2 Sub-Period 2

Evaluating the fund performance during this period (refer to Table 6.2) indicates that 19 of 20 funds delivered positive but insignificant returns. On a risk-adjusted basis (refer to the Sharpe ratio), most fund managers earn negative risk-adjusted returns during this period. Considering the superior performance exhibited by the fund managers in the first sub-period, the underperformance exhibited by the fund managers can be attributed to the devastation of the 2007/2008 global financial crisis and the fund managers' inability to manage this risk. The impact of this crisis is also captured on the underperformance exhibited by fund managers relative to their corresponding benchmarks. With the exception of the funds AGEF, CORG, PRUO and SNTR, all of the funds earned returns that are less than those earned by their respective benchmarks. On a risk-adjusted basis relative to the benchmarks, 15 of the 20 funds underperform the benchmark with 2 funds namely, INAQ and SNTR generating the same risk-adjusted returns to those generated by the benchmark. The remaining 3 funds AGEF, CORG and PRUO outperform their benchmarks on a risk-adjusted basis in terms of their Sharpe ratios. Additionally, from the negative selection returns documented by most of the funds during this period, it is apparent that on average, South African unit trust managers do not exhibit any superiority when it comes to their security selection skills during turbulent times.



Regardless of the difference in market conditions between sub-period 1 and sub-period 2, most of the funds exhibit higher volatilities compared to their benchmarks during this period. This finding provides further evidence that South African fund managers were not good in managing risk in economic turmoil. Thus, the underperformance of the funds during this period was driven partially by their inabilities to reduce fund risk. Similar to the first sub-period, the majority of the funds document high values of R-squared and positive slope coefficients, indicating the ability of the benchmark returns in explaining a large variation in actual fund returns. In addition, during this period, 8 of the 20 funds earn insignificantly positive risk-adjusted excess returns, as indicated by the regression intercepts, while the remaining funds earn insignificant negative excess returns.

**Table 6.2: Return Attribution of South African Equity Funds Sub-Period 2**

| Fund codes | AGEF | BAAF | CGMG | CORG | FEWS | FNBG | GIGE | INAQ | LIWC | MTLE |
|---|---|---|---|---|---|---|---|---|---|---|
| **Performance Attribution** | | | | | | | | | | |
| 1. Fund Returns | 0.20% | 0.11% | 0.13% | 0.24% | 0.16% | 0.16% | 0.08% | 0.18% | 0.16% | 0.15% |
| | [1.428] | [1.428] | [0.754] | [1.452] | [1.038] | [1.005] | [0.512] | [1.166] | [1.027] | [0.847] |
| Standard Deviation | 2.33% | 2.00% | 2.79% | 2.77% | 2.53% | 2.59% | 2.57% | 2.64% | 2.67% | 2.95% |
| Sharpe Ratio | 0.106 | -0.017 | -0.011 | 0.030 | -0.010 | - 0.000 | -0.131 | 0.010 | 0.381 | 0.124 |
| 2. Benchmark Returns | 0.16% | 0.20% | 0.20% | 0.23% | 0.21% | 0.18% | 0.16% | 0.19% | 0.21% | 0.22% |
| | [1.180] | [1.253] | [1.212] | [1.437] | [1.423] | [1.219] | [1.093] | [1.240] | [1.422] | [1.330] |
| Standard Deviation | 2.25% | 2.63% | 2.75% | 2.62% | 2.41% | 2.42% | 2.42% | 2.61% | 2.49% | 2.82% |
| Sharpe Ratio | 0.001 | 0.015 | 0.017 | 0.026 | 0.019 | 0.008 | 0.001 | 0.010 | 0.022 | 0.024 |
| 3. Selection Return | 0.04% | -0.08% | -0.07% | 0.15% | -0.05% | -0.02% | -0.08% | -0.01% | - 0.05% | -0.07% |
| | [0.568] | [-1.400] | [-1.87] | [0.258] | [-0.200] | [-0.316] | [-1.332] | [-0.157] | [-0.695] | [-1.189] |
| Standard Deviation | 1.18% | 0.10% | 1.02% | 0.95% | 0.90% | 0.10% | 1.02% | 0.98% | 1.15% | 1.06% |
| **Sector Replication** | | | | | | | | | | |
| R-Squared | 75.42% | 85.67% | 86.92% | 93.81% | 87.30% | 81.95% | 87.78% | 86.56% | 81.77% | 87.03% |
| Intercept | 0.001 | -0.000 | -0.000 | 0.000 | -0.000 | -0.000 | 7.690 | 0.000 | -0.000 | -0.000 |
| | [0.810] | [-1.124] | [-0.036] | [0.299] | [-0.829] | [-0.231] | [7.461] | [0.034] | [-0.591] | [-1.090] |
| Slope Coefficient | 0.898 | 0.898 | 0.944 | 0.989 | 0.982 | 0.968 | 1.035 | 0.942 | 0.967 | 0.973 |
| | [29.10] | [29.10] | [42.84] | [44.98] | [43.57] | [35.40] | [39.86] | [42.14] | [34.83] | [34.83] |

**Sub-period 1 Fund Analysis Continues...**

| Fund codes | OCEF | PRUO | PTST | RMCF | RMEF | SNFT | SNTR | SPGG | STPF | TREF |
|---|---|---|---|---|---|---|---|---|---|---|
| **Performance Attribution** | | | | | | | | | | |
| 1. Fund Returns | 0.09% | 0.20% | 0.17% | 0.22% | 0.17% | 0.08% | 0.22% | 0.13% | 0.08% | 0.00% |
| | [0.722] | [1.428] | [0.905] | [1.798] | [1.038] | [1.384] | [1.440] | [0.825] | [0.582] | [0.041] |
| Standard Deviation | 1.99% | 2.38% | 3.19% | 2.08% | 2.70% | 3.40% | 2.59% | 2.61% | 2.24% | 2.56% |
| Sharpe Ratio | -0.209 | 0.019 | 0.005 | 0.032 | 0.004 | -0.023 | 0.015 | -0.011 | -0.036 | -0.059 |
| 2. Benchmark Returns | 0.19% | 0.18% | 0.20% | 0.23% | 0.20% | 0.16% | 0.19% | 0.21% | 0.19% | 0.19% |
| | [1.330] | [1.033] | [1.077] | [2.095] | [1.339] | [1.335] | [1.341] | [1.518] | [1.443] | [1.339] |
| Standard Deviation | 1.84% | 2.29% | 3.15% | 1.79% | 2.52% | 3.09% | 2.40% | 2.34% | 2.23% | 2.40% |
| Sharpe Ratio | 0.022 | 0.011 | 0.014 | 0.037 | 0.018 | -0.000 | 0.015 | 0.024 | 0.015 | 0.017 |
| 3. Selection Return | -0.11% | 0.02% | -0.03% | - 0.01% | -0.03% | -0.04% | 0.03% | -0.08% | -0.01% | -0.19% |
| | [-1.823] | [0.407] | [-0.518] | [-0.007] | [-0.534] | [-0.498] | [3.826] | [-1.209] | [-1.704] | [-3.186] |
| Standard Deviation | 0.97% | 0.87% | 0.97% | 1.18% | 1.08% | 1.37% | 1.06% | 1.16% | 1.12% | 1.01% |
| **Sector Replication** | | | | | | | | | | |
| R-Squared | 76.20% | 75.42% | 90.73% | 67.89% | 75.42% | 83.74% | 83.25% | 80.18% | 76.30% | 84.40% |
| Intercept | -0.000 | 0.000 | -0.000 | 0.000 | 0.000 | -0.000 | 0.000 | -0.002 | -0.002 | -0.002 |
| | [2.706] | [3.116] | [-0.397] | [0.125] | [0.810] | [-0.963] | [0.526] | [-0.810] | [-1.387] | [-3.098] |
| Slope Coefficient | 0.898 | 0.898 | 1.020 | 0.992 | 1.048 | 1.013 | 1.006 | 0.095 | 1.095 | 1.021 |
| | [23.81] | [29.10] | [51.91] | [24.15] | [29.10] | [37.71] | [37.05] | [33.43] | [29.81] | [38.65] |

#### 6.3.1.3 Overall Period

When funds are evaluated over the entire examination period (refer to Table 6.3), the actual and risk-adjusted performance results of the funds reveal that all fund managers were able to earn positive returns during this period. This implies that the superior performance exhibited by fund managers during the first sub-period dominates the inferior performance of the funds documented during the second sub-period period. Relative to the performance of the benchmark returns, 14 of the 20 funds exhibit an outperformance of the benchmark in terms of both their absolute and risk-adjusted performances. Only the funds BAAF, GIGE, MTLE4, PTST, SNFT and TREF underperformed their respective benchmarks over the examination period.

The analysis of the funds' selection returns indicates that most of the funds exhibit positive but insignificant selection returns. This serves as an indication that on average, South African unit trust managers fail to provide significant economic value through their security picking skills in addition to their asset allocation decisions. In addition, an analysis of the funds' standard deviation against the standard deviation of the benchmark reveals that, with the exception of managers of AGEF and BAAF, all the fund managers exhibited higher standard deviations compared to their benchmarks. The overall high R-squared and positive slope coefficients reflect the appropriateness of the selected sector proxies in modeling actual fund returns.

**Table 6.3: Return Attribution of South African Equity Funds Overall Period**

| Fund codes | AGEF | BAAF | CGMG | CORG | FEWS | FNBG | GIGE | INAQ | LIWC | MTLE |
|---|---|---|---|---|---|---|---|---|---|---|
| **Performance Attribution** | | | | | | | | | | |
| 1. Fund Returns | 0.40% | 0.30% | 0.32% | 0.39% | 0.33% | 0.35% | 0.25% | 0.39% | 0.31% | 0.30% |
| | [4.344] | [2.967] | [3.082] | [3.905] | [3.386] | [3.650] | [2.495] | [3.872] | [3.124] | [2.746] |
| Standard Deviation | 0.22% | 0.41% | 2.46% | 2.40% | 2.29% | 2.24% | 2.39% | 2.36% | 2.37% | 2.58% |
| Sharpe Ratio | 0.106 | 0.055 | 0.059 | 0.095 | 0.069 | 0.079 | 0.035 | 0.092 | 0.060 | 0.050 |
| 2. Benchmark Returns | 0.30% | 0.32% | 0.29% | 0.33% | 0.30% | 0.29% | 0.27% | 0.31% | 0.30% | 0.31% |
| | [3.563] | [3.261] | [2.987] | [3.459] | [3.326] | [3.187] | [2.894] | [3.220] | [3.259] | |
| [2.998] | | | | | | | | | | |
| Standard Deviation | 1.98% | 1.98% | 2.29% | 2.22% | 2.14 % | 2.06% | 2.24% | 2.24% | 2.16% | 2.16% |
| Sharpe Ratio | 0.065 | 0.065 | 0.052 | 0.070 | 0.062 | 0.053 | 0.047 | 0.061 | 0.059 | 0.057 |
| 3. Selection Return | 0.10% | -0.02% | 0.03% | 0.13% | 0.03% | 0.07% | -0.02% | 0.08% | 0.01% | -0.01% |
| | [2.206] | [-0525] | [0.569] | [1.811] | [0.743] | [1.605] | [-0.538] | [2.012] | [0.318] | [0.217] |
| Standard Deviation | 1.03% | 0.95% | 0.07% | 0.94% | 0.84% | 1.00% | 0.94% | 0.91% | 1.01% | 0.97% |
| **Sector Replication** | | | | | | | | | | |
| R-Squared | 74.39% | 84.70% | 74.39% | 84.52% | 86.42% | 79.93% | 84.33% | 85.08% | 81.70% | 85.87% |
| Intercept | 0.001 | -0.000 | 0.001 | 0.001 | 0.000 | 0.001 | -0.000 | 0.001 | 0.000 | -3.533 |
| | [2.281] | [-0.087] | [2.482] | [1.823] | [0.789] | [0.001] | [-0.409] | [2.302] | [0.391] | [-0.085] |
| Slope Coefficient | 0.953 | 0.954 | 0.966 | 0.966 | 0.996 | 0.998 | 1.769 | 0.962 | 0.944 | 0.983 |
| | [40.16] | [55.44] | [48.70] | [55.06] | [59.43] | [47.02] | [54.79] | [56.26] | [49.77] | [58.08] |

**Sub-period 1 Fund Analysis Continues...**

| Fund codes | OCEF | PRUO | PTST | RMCF | RMEF | SNFT | SNTR | SPGG | STPF | TREF |
|---|---|---|---|---|---|---|---|---|---|---|
| **Performance Attribution** | | | | | | | | | | |
| 1. Fund Returns | 0.30% | 0.37% | 0.30% | 0.39% | 0.37% | 0.18% | 0.43% | 0.35% | 0.32% | 0.25% |
| | [3.926] | [1.055] | [2.487] | [4.916] | [3.765] | [1.473] | [4.527] | [3.626] | [3.690] | [2.505] |
| Standard Deviation | 1.79% | 2.18% | 2.81% | 1.85% | 2.32% | 2.95% | 2.36% | 2.30% | 2.08% | 2.35% |
| Sharpe Ratio | 0.072 | 0.094 | 0.045 | 0.117 | 0.087 | 0.005 | 0.109 | 0.080 | 0.075 | 0.034 |
| 2. Benchmark Returns | 0.27% | 0.27% | 0.31% | 0.28% | 0.29% | 0.24% | 0.30% | 0.30% | 0.28% | 0.30% |
| | [4.122] | [3.166] | [2.728] | [4.314] | [3.186] | [2.183] | [3.245] | [3.458] | [3.535] | [3.333] |
| Standard Deviation | 1.57% | 2.00% | 2.71% | 1.51% | 2.14% | 2.62% | 2.14% | 2.02% | 1.87% | 1.81% |
| Sharpe Ratio | 0.067 | 0.049 | 0.053 | 0.070 | 0.056 | 0.028 | 0.058 | 0.063 | 0.059 | 0.061 |
| 3. Selection Return | 0.02% | 0.11% | -0.02% | 0.11% | 0.08% | -0.06% | 0.13% | 0.05% | 0.04% | 0.05% |
| | [2.892] | [2.682] | [-0.460] | [2.289] | [1.929] | [-1.041] | [2.992] | [1.139] | [0.966] | [-1.205] |
| Standard Deviation | 0.93% | 0.92% | 0.89% | 1.13% | 1.00% | 1.32% | 1.05% | 1.13% | 1.10% | 1.01% |
| **Sector Replication** | | | | | | | | | | |
| R-Squared | 72.56% | 81.99% | 90.01% | 62.52% | 81.53% | 80.09% | 80.34% | 75.61% | 72.23% | 81.57% |
| Intercept | 0.000 | 0.000 | -0.000 | 0.001 | 0.001 | -0.001 | 0.001 | 0.000 | 0.000 | -0.000 |
| | [0.777] | [2.772] | [-0.318] | [2.416] | [2.046] | [-1.071] | [3.012] | [1.210] | [1.287] | [-1.344] |
| Slope Coefficient | 0.970 | 0.983 | 0.983 | 0.971 | 0.980 | 0.008 | 0.992 | 0.986 | 1.095 | 1.021 |
| | [38.31] | [50.27] | [70.72] | [30.42] | [49.51] | [47.25] | [47.69] | [41.48] | [37.99] | [49.56] |

### 6.3.2 Time-series Sector Decomposition Examination

The periodic exposures of the funds to the sector proxies are displayed in Chart (a) in Appendix B.1 to Appendix B.20 respectively. The results reveal that 8 of the 20 funds exhibit a balanced and consistent exposures primarily across the financial, industrial and the resource sector (refer to appendices B.1, B.4, B.5, B.6, B.7, B.10, B.12 and B.17). Managers of these funds however, exhibited inferior security selection ability as indicated by their respective negative cumulative selection returns (refer to Chat (b) in the respective appendices). Moreover, the funds BAAF, SPGG, STPF and TREF (refer to Appendix B.2, B.18, B.19 and B.20 respectively) were found to change their investment strategies in accordance to changes in market conditions. All of these funds temporarily pulled out from the financial sector during the period from 2007 to 2008 and switched to industrial sector. However, the funds appear to have only tilted their exposures after the impact of the 2007/2008 global financial crisis. After the crisis, the funds rotated most frequently between the industrial sector, resource sector and the financial sector. In addition, the negative cumulative selection returns exhibited in Chat (b) of these funds, indicate that the managers' security picking activities actually eroded fund values.



The strategy of the fund SNFT (refer to Appendix B.16) is dominated by the exposure in the resource sector throughout the period of examination. By the end of 2004 to 2009, the fund completely withdrew its exposure to the financial sector and introduces its exposure to cash and bonds (SATB and GOVI). Another fund that displays a unique investment strategy is the fund RMCF (refer to Appendix B.14). The fund allocated significant capital to the risk-fee portfolio at the beginning of the examination period. However, overtime, the fund rotated its capital between the risk-free portfolio and the investments in the industrial sector. Although funds employed unique investment strategies across the examination period, on average, the results show that fund managers fail at their quest to add economic value through their security picking activities.

## 6.4 Conclusion

The study examines the performance of the South African equity unit trust managers relative to the pre-specified benchmarks constructed from a set of sector and fixed-income proxies. Specifically, the chapter examines whether or not fund managers are able to deliver value through their security selection skills in addition to the value created by their asset allocation activities. The funds are evaluated over two sub-periods and the overall examination period over 6 January 2002 to 2 September 2012. The first sub-period attempts to capture the performance of the fund managers prior to the 2007/2008 global financial crisis, while the second sub-period captures the fund performance during and after the crisis. The results reveal that during the first sub-period, most of the funds outperformed their corresponding benchmarks in both absolute and risk-adjusted basis. When examined over the second, more volatile sub-period, however, the majority of the funds underperformed their benchmarks. During this examination period, only 3 of the 20 fund managers were able to successfully deliver positive selection returns. The deterioration of fund performance during this period could to some degree be attributed to the devastation of the 2007/2008 global financial crisis and the managers' inability to manage risk during turbulent times.



The analysis of the fund managers' economic contribution through their security selection activities reveals that most of the fund managers failed to accumulate significant positive selection returns over time. Thus, the performances of South African unit trusts are primarily driven primarily by their exposures to different asset classes. In addition, the fund returns were found to be more volatile compared to the benchmarks. In all the examined period, fund managers show standard deviations that are higher than those of their benchmarks. On the other hand, the analysis documents the highly significant R-squared and slope coefficients exhibited by all the funds, indicating the appropriateness of the sector proxies used to derive the benchmarks.

The examination of fund managers' periodic exposures reveals that most fund managers have consistent sector exposures in the financial sector, resource sector and the industrial sector. However, some of the funds actively change their exposures in accordance with the changes in market conditions. More particularly, these funds actively switched their exposures from the financial sector to the industrial sector during financial crisis. After the crisis however, most funds' investments strategies changes to the one that allowed a frequent rotation

between the financial sector, industrial sector, resource sector and the occasional exposures to the risk-free portfolios (government bonds and the South African treasury bills). Two of the funds SNFT and RMCF displayed a unique investment strategy from the ones employed by the other funds. These two funds have significant exposures in the risk-free portfolios throughout the period of examination. However, despite the differences of the funds in applying their asset allocation strategies, South African equity fund managers' security selection skills do not add significant values in the funds' performances derived from their sector exposures.

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# 7

# Evaluation of Managers' Market Timing Ability

## 7.1 Introduction

This chapter involves the examination of the value added by the South African unit trust managers through their abilities to time the market movements. As discussed in Chapter 1 of this research, the primary objective of actively managed funds lies with the consistent generation of superior risk-adjusted returns over time. As part of their economic value contribution, managers of actively managed funds claim to possess this ability and that it enables them to achieve their superior performance. According to the market timing strategy, fund managers are able to use tools such as technical indicators (analysis) in order to improve their accuracy in anticipating the next bullish or bearish phase in the market. In the case where a fund manager anticipates a next bullish phase in the broad market, the manager will systematically adjust his/her portfolio by increasing the risk exposures of that portfolio before the market advances. In contrast, a fund manager will decrease the portfolio's risk exposure in anticipation of downward adjustments in the market.



The success of this strategy however, will serve as a violation underlying the framework of Kendall's (1953) random walk hypothesis (RWH) and Fama's (1965, 1970) efficient market hypothesis (EMH). According to these frameworks, since the changes in asset price movements are random and independent, it should be impossible for a fund manager to successfully and consistently deliver abnormal returns through market predictions. To investigate this objective, the study employs two of the widely used time-series regression models of Treynor-Mazuy (1966) and Henriksson-Merton (1981) outlined in Section 7.2. The results and conclusions of the study are presented in Section 7.3 and 7.4 respectively.

## 7.2 Methodology

To evaluate the manager's market timing ability, the time-series performance measures of Treynor-Mazuy (1966) (TM henceforth) and Henrikson-Merton (1981) (HM henceforth) are employed. Constructed as an extended version of the Jensen's (1966) performance measure, the TM's performance measure is developed such that it offers reward to managers the ability to adjust their overall portfolios' risk exposures according to the anticipated market movements. That is, in the case of a positive upwards anticipation of the broad market, the mutual fund manager will increase the portfolio's risk exposure before the markets advances. By contrast, the fund manager will decrease the portfolio's risk exposure in anticipation of the downward movement of the broad market. Mathematically, the market timing activities of mutual fund managers are evaluated by Equation 7.1.

$$R_{P,t} - R_{f,t} = \alpha_P + \beta\left(R_{m,t} - R_{f,t}\right) + k\left(R_{m,t} - R_{f,t}\right)^2 + \varepsilon_t \quad (7.1)$$

where:

$R_{p,t} - R_{f,t}$ is the excess return of portfolio *p* at time *t*,

$\alpha_p$ denotes the selective ability of unit trust managers,

$R_{m,t}$ is the market return at time *t*,

$R_{f,t}$ is the risk-free rate at time *t*,

$k$ denotes the market timing ability of unit trust managers.

According to the model, to infer a superior timing ability of mutual fund managers, the outcome (value) of the quadratic coefficient *k* , obtained from the regression output, has to be significantly positive ($k>0$) at 5% level. Therefore, the negative quadratic coefficient estimated will serve as an indication for the inferiority in fund managers' abilities to time the market.

The return based regression model of HM also captures the market timing ability of managers by adjusting the portfolio's risk exposure according to the movements of the general market. However, it differs from the TM's timing model in that, managers are required to predict the

precise time period where the market returns will outperform the risk-free rate ($R_{m,t} > R_{f,t}$) or vice versa ($R_{f,t} > R_{m,t}$). The period where $R_{m,t} > R_{f,t}$ will demonstrates the bull phase of the market and the period were $R_{f,t} > R_{m,t}$ will demonstrate the bear phase of the market. Built from the framework of the Jensen's (1966) performance measure, the HM's performance measure incorporates an additional market risk premium factor with a dummy variable property such that it forms the regression model defined by Equation 7.2:

$$R_{P,t} - R_{f,t} = \alpha_P + \beta\left(R_{m,t} - R_{f,t}\right) + k\left[D(R_{m,t} - R_{f,t})\right] + \varepsilon_t \quad (7.2)$$

where:

$R_{P,t} - R_{f,t}$ is the excess returns of portfolio *p* at time *t*,

$\alpha_P$ is the selective ability of managers of portfolio *p*, and

$R_{m,t} - R_{f,t}$ denotes the market risk premium at time *t*.

The slope coefficient $\beta$ represents the systematic risk of the portfolio during the up-market and the significantly positive coefficient *k* represents the existence of the market timing abilities possessed by the fund manager. By contrast, if the slope coefficient *k* is insignificantly different from 0, then it will imply that managers are unable to anticipate precisely the market movements. The dummy variable *D* incorporated in the model, serves as a function indicator which is assigned 1 when the market risk premium is positive $\left(R_{m,t} - R_{f,t}\right) > 0$ and 0 otherwise.

## 7.3 Results

The results of the regression estimates obtained from both the TM and the HM are presented in Table 7.1, 7.2 and 7.3 respectively. Each table reports the results of three examination periods (sub-period 1, sub-period 2 and the overall examination period). The results in the table are further sub-dived into two panels namely: Panel A and Panel B respectively. The results of the market timing performance of unit trust managers in accordance to the TM's market timing performance measure are presented in Panel A of each table. Panel B, then outlines the results of the unit trust managers based on the HM's market timing model. The fund names are expressed according to their respective codes as indicated by appendices B.1 to B20. To examine the power of the independent variables in explaining the returns generated by the dependent variable, the R-squared of the corresponding funds are reported in each table. The statistical significance of funds at 5% level is highlighted in bold in each table. It is worth highlighting that, although the regression alphas (selectivity ability) are presented in the results, the analysis of this chapter will focus only on the market timing ability of unit trust managers since the selection ability is already analysed in Chapter 6.

### 7.3.1 Sub-Period 1



The examination of the market timing ability of managers during this period reveals that 18 of the 20 unit trusts failed to deliver significantly positive slope coefficient *k* in accordance with the TM's timing measure. Similar conclusion is reached when the market timing ability of unit trust managers is examined by the HM's performance measure. According to the measure, only 2 of the 20 unit trusts were successful in generating a positive slope coefficient. In both performance measures however, of the 2 unit trusts that delivered positive slope coefficients, only the manager of the fund SNFT was able to successfully deliver positive and statistically significant *k*. Thus, indicating that on average, during this period, only one South African unit manager was able to successfully move in and out of the market at an appropriate time in a consistent manner. The average R-squared of the unit trusts for the TM and HM measures are 72.77% and 72.58% respectively, indicating the models' abilities in explaining the variation of unit trust returns.

**Table 7.1 Results of TM and HM Regression Estimates in Sub-Period 1**

| **Panel A** | **TM model:** $R_{P,t} - R_{f,t} = \alpha_P + \beta(R_{m,t} - R_{f,t}) + k(R_{m,t} - R_{f,t})^2 + \varepsilon_t$ | | | | | | |
|---|---|---|---|---|---|---|---|
| **Fund codes** | **α** | **p-value (α)** | **β** | **p-value (β)** | **K** | **p-value (K)** | $\bar{R}^2$ |
| AGEF | 0.003 | 0.000 | 0.699 | **0.000** | -0.722 | 0.350 | 69.38% |
| BAAF | 0.001 | 0.086 | 0.850 | **0.000** | -0.593 | 0.352 | 83.04% |
| CGMG | 0.002 | 0.009 | 0.716 | **0.000** | -1.500 | 0.055 | 70.29% |
| CORG | 0.003 | 0.000 | 0.686 | **0.000** | -2.224 | **0.002** | 72.17% |
| FEWS | 0.001 | 0.010 | 0.759 | **0.000** | -0.733 | **0.001** | 85.00% |
| FNBG | 0.003 | 0.000 | 0.591 | **0.000** | -1.909 | **0.011** | 64.38% |
| GIGE | 0.001 | 0.268 | 0.829 | **0.000** | -0.964 | 0.139 | 81.82% |
| INAQ | 0.003 | 0.000 | 0.727 | **0.000** | -1.588 | **0.021** | 76.15% |
| LIWC | 0.001 | 0.091 | 0.763 | **0.000** | -0.631 | 0.302 | 81.12% |
| MTLE | 0.000 | 0.442 | 0.844 | **0.000** | -0.386 | 0.098 | 83.57% |
| OCEF | 0.002 | 0.003 | 0.536 | **0.000** | -0.198 | 0.740 | 68.62% |
| PRUO | 0.003 | 0.000 | 0.675 | **0.000** | -2.436 | **0.000** | 73.59% |
| PTST | 0.000 | 0.524 | 0.933 | **0.000** | 0.398 | 0.577 | 87.57% |
| RMCF | 0.003 | 0.000 | 0.431 | **0.000** | -1.661 | **0.041** | 45.36% |
| RMEF | 0.003 | 0.000 | 0.615 | **0.000** | -1.620 | **0.036** | 64.45% |
| SNFT | -0.002 | 0.021 | 0.845 | **0.000** | 2.002 | **0.039** | 66.85% |
| SNTR | 0.003 | 0.000 | 0.741 | **0.000** | -1.665 | **0.029** | 72.93% |
| SPGG | 0.003 | 0.000 | 0.642 | **0.000** | -2.043 | **0.007** | 67.91% |
| STPF | 0.002 | 0.002 | 0.638 | **0.000** | -0.524 | 0.489 | 66.07% |
| TREF | 0.002 | 0.006 | 0.746 | **0.000** | -1.831 | **0.011** | 75.14% |
| **Panel B** | **HM model** $R_{P,t} - R_{f,t} = \alpha_P + \beta(R_{m,t} - R_{f,t}) + k[D(R_{m,t} - R_{f,t})] + \varepsilon_t$ | | | | | | |
| **Fund codes** | **α** | **p-value (α)** | **β** | **p-value (β)** | **K** | **p-value (K)** | $\bar{R}^2$ |
| AGEF | 0.003 | 0.005 | 0.746 | **0.000** | -0.085 | 0.351 | 69.38% |
| BAAF | 0.001 | 0.133 | 0.883 | **0.000** | -0.059 | 0.435 | 83.02% |
| CGMG | 0.003 | 0.023 | 0.791 | **0.000** | -0.135 | 0.147 | 70.11% |
| CORG | 0.004 | 0.000 | 0.822 | **0.000** | -0.252 | **0.004** | 72.09% |
| FEWS | 0.003 | 0.000 | 0.884 | **0.000** | -0.227 | **0.001** | 84.63% |
| FNBG | 0.004 | 0.000 | 0.711 | **0.000** | -0.223 | **0.012** | 64.38% |
| GIGE | 0.002 | 0.103 | 0.903 | **0.000** | -0.139 | 0.071 | 81.89% |
| INAQ | 0.003 | 0.000 | 0.820 | **0.000** | -0.171 | **0.035** | 76.07% |
| LIWC | 0.001 | 0.123 | 0.799 | **0.000** | -0.066 | 0.361 | 81.11% |
| MTLE | 0.001 | 0.223 | 0.849 | **0.000** | -0.069 | 0.372 | 81.17% |
| OCEF | 0.002 | 0.014 | 0.554 | **0.000** | -0.035 | 0.619 | 68.63% |
| PRUO | 0.005 | 0.000 | 0.835 | **0.000** | -0.300 | **0.000** | 73.69% |
| PTST | -0.001 | 0.444 | 0.907 | **0.000** | 0.050 | 0.463 | 87.58% |
| RMCF | 0.004 | 0.000 | 0.540 | **0.000** | -0.204 | **0.034** | 45.41% |
| RMEF | 0.004 | 0.000 | 0.715 | **0.000** | -0.185 | **0.043** | 64.41% |
| SNFT | -0.003 | 0.029 | 0.738 | **0.000** | 0.195 | 0.089 | 66.68% |
| SNTR | 0.003 | 0.000 | 0.831 | **0.000** | -0.163 | 0.071 | 72.78% |
| SPGG | 0.004 | 0.000 | 0.751 | **0.000** | -0.196 | **0.029** | 67.62% |
| STPF | 0.003 | 0.010 | 0.674 | **0.000** | -0.067 | 0.453 | 66.08% |
| TREF | 0.003 | 0.010 | 0.843 | **0.000** | -0.175 | **0.043** | 74.94% |

### 7.3.1 Sub-Period 2

The examination of the market timing abilities of the South African equity unit trust managers during this period reveals evidence of inferiority in market timing ability of all the managers in Table 7.2. All of the managers failed to deliver positive estimates of market timing coefficients. However, both timing measures report that 8 of the 20 unit trusts exhibited significantly negative timing slope coefficients. Since this examination period includes the devastation of the 2007/2008 global financial crisis, it indicates that the managers' poor timing abilities have contributed to the poor performances of the funds they manage during turbulent times. Based on the timing coefficients produced by both timing measures in both sub-periods, it is apparent that, regardless of the impact of the financial crisis, the majority of the unit trust managers fail to add value through their market timing activities.

The explanatory power of the models is observed to have improved during this examination period relative to the first examination period. While the average R-squared according to the TM's model is 72.77% in the first sub-period, during this period the R-squared is 80.60%. Similarly, in comparison with the average R-squared of the unit trusts in the first sub-period for the HM model (72.58%), the explanatory power of the model appears to have increased and documented an average R-squared of 80.60% in the second sub-period.

**Table 7.2 Results of TM and HM Regression Estimates in Sub-Period 2**

| **Panel A** | **TM model:** $R_{P,t} - R_{f,t} = \alpha_P + \beta(R_{m,t} - R_{f,t}) + k(R_{m,t} - R_{f,t})^2 + \varepsilon_t$ | | | | | | |
|---|---|---|---|---|---|---|---|
| **Fund codes** | **α** | **p-value (α)** | **β** | **p-value (β)** | **K** | **p-value (K)** | $\bar{R}^2$ |
| AGEF | 0.001 | 0.472 | 0.636 | **0.000** | -0.282 | 0.333 | 73.26% |
| BAAF | 0.000 | 0.609 | 0.767 | **0.000** | -0.303 | 0.174 | 87.28% |
| CGMG | 0.002 | 0.009 | 0.767 | **0.000** | -1.500 | 0.055 | 70.28% |
| CORG | 0.001 | 0.292 | 0.793 | **0.000** | -0.154 | 0.593 | 81.41% |
| FEWS | 0.000 | 0.578 | 0.747 | **0.000** | -0.521 | **0.026** | 85.43% |
| FNBG | 0.001 | 0.494 | 0.746 | **0.000** | -0.683 | **0.014** | 80.65% |
| GIGE | -0.001 | 0.264 | 0.741 | **0.000** | -0.170 | 0.513 | 82.56% |
| INAQ | 0.001 | 0.366 | 0.787 | **0.000** | -0.460 | **0.047** | 86.91% |
| LIWC | 0.001 | 0.092 | 0.787 | **0.000** | -1.045 | **0.000** | 83.76% |
| MTLE | 0.000 | 0.878 | 0.861 | **0.000** | -0.386 | 0.163 | 84.90% |
| OCEF | -0.001 | 0.796 | 0.569 | **0.000** | -0.626 | **0.005** | 79.20% |
| PRUO | 0.001 | 0.302 | 0.770 | **0.000** | -0.298 | 0.177 | 85.36% |
| PTST | 0.000 | 0.899 | 0.971 | **0.000** | -0.128 | 0.551 | 92.20% |
| RMCF | 0.002 | 0.053 | 0.497 | **0.000** | -1.215 | **0.000** | 54.55% |
| RMEF | 0.001 | 0.389 | 0.786 | **0.000** | -0.692 | **0.011** | 82.63% |
| SNFT | -0.001 | 0.537 | 0.963 | **0.000** | -0.382 | 0.308 | 79.28% |
| SNTR | 0.001 | 0.399 | 0.739 | **0.000** | -0.118 | 0.664 | 81.15% |
| SPGG | 0.000 | 0.878 | 0.730 | **0.000** | -0.571 | 0.065 | 76.20% |
| STPF | 0.000 | 0.859 | 0.647 | **0.000** | -0.825 | **0.000** | 80.78% |
| TREF | -0.001 | 0.047 | 0.748 | **0.000** | -0.363 | 0.140 | 84.22% |
| **Panel B** | **HM model:** $R_{P,t} - R_{f,t} = \alpha_P + \beta(R_{m,t} - R_{f,t}) + k[D(R_{m,t} - R_{f,t})] + \varepsilon_t$ | | | | | | |
| **Fund codes** | **α** | **p-value (α)** | **β** | **p-value (β)** | **K** | **p-value (K)** | $\bar{R}^2$ |
| AGEF | 0.001 | 0.348 | 0.663 | **0.000** | -0.061 | 0.348 | 73.25% |
| BAAF | 0.000 | 0.657 | 0.867 | **0.000** | -0.086 | 0.087 | 87.33% |
| CGMG | 0.000 | 0.823 | 0.841 | **0.000** | -0.028 | 0.594 | 88.11% |
| CORG | 0.001 | 0.120 | 0.833 | **0.000** | -0.083 | 0.202 | 81.50% |
| FEWS | 0.001 | 0.152 | 0.803 | **0.000** | -0.122 | **0.023** | 85.45% |
| FNBG | 0.002 | 0.116 | 0.815 | **0.000** | -0.153 | **0.014** | 80.65% |
| GIGE | 0.000 | 0.334 | 0.741 | **0.000** | -0.005 | 0.926 | 82.53% |
| INAQ | 0.001 | 0.167 | 0.827 | **0.000** | -0.092 | 0.077 | 86.87% |
| LIWC | 0.002 | 0.009 | 0.888 | **0.000** | -0.226 | **0.000** | 83.69% |
| MTLE | 0.001 | 0.282 | 0.917 | **0.000** | -0.118 | 0.057 | 84.99% |
| OCEF | 0.001 | 0.136 | 0.650 | **0.000** | -0.172 | **0.000** | 79.36% |
| PRUO | 0.001 | 0.084 | 0.746 | **0.000** | -0.092 | 0.062 | 85.44% |
| PTST | 0.000 | 0.585 | 0.991 | **0.000** | -0.042 | 0.384 | 92.21% |
| RMCF | 0.003 | 0.004 | 0.614 | **0.000** | -0.261 | **0.001** | 54.37% |
| RMEF | 0.001 | 0.133 | 0.845 | **0.000** | -0.136 | **0.027** | 82.53% |
| SNFT | -0.001 | 0.650 | 0.975 | **0.000** | -0.036 | 0.672 | 79.21% |
| SNTR | 0.001 | 0.185 | 0.773 | **0.000** | -0.069 | 0.256 | 81.22% |
| SPGG | 0.002 | 0.090 | 0.827 | **0.000** | -0.203 | **0.003** | 76.64% |
| STPF | 0.320 | 0.717 | 0.674 | **0.000** | -0.159 | **0.003** | 80.56% |
| TREF | -0.001 | 0.523 | 0.794 | **0.000** | -0.100 | 0.070 | 84.28% |

### 7.3.2 Overall Period

The analysis of the unit trust performance over the entire examination period documents evidence of inferior market timing ability exhibited by most of the managers (refer to Table 7.3). With the exception of the unit trust SNFT, according to the TM's timing measure, all the other unit trusts produced negative timing coefficients. The HM's timing model also documents the manager of the unit trust SNFT to be the only manager to have successfully delivered positive timing coefficient during the overall examination period. However, the existence of this market timing ability demonstrates to be statistically insignificant for the fund SNFT under both timing measures.

Regardless of the effect of the 2007/2008 global financial crisis, the period of examination of the study and the employed market timing performance measures, the South African unit trust managers possess poor market timing skills that actually destroy the values of the funds. The explanatory power for the market timing models is excellent for both models. During the overall examination period, the TM and HM models document the average R-squared of 78.22% and 78.20% respectively.

**Table 7.3 Results of TM and HM Regression Estimates on Overall Period**

| **Panel A** | **TM model:** $R_{P,t} - R_{f,t} = \alpha_P + \beta(R_{m,t} - R_{f,t}) + k(R_{m,t} - R_{f,t})^2 + \varepsilon_t$ | | | | | | |
|---|---|---|---|---|---|---|---|
| **Fund codes** | **α** | **p-value (α)** | **β** | **p-value (β)** | **K** | **p-value (K)** | $\bar{R}^2$ |
| AGEF | 0.002 | 0.001 | 0.663 | **0.000** | -0.472 | 0.070 | 71.43% |
| BAAF | 0.001 | 0.200 | 0.801 | **0.000** | -0.480 | **0.021** | 85.24% |
| CGMG | 0.000 | 0.509 | 0.792 | **0.000** | -0.025 | 0.917 | 81.30% |
| CORG | 0.001 | 0.007 | 0.762 | **0.000** | -0.290 | 0.252 | 77.79% |
| FEWS | 0.001 | 0.009 | 0.759 | **0.000** | -0.733 | **0.000** | 85.00% |
| FNBG | 0.001 | 0.014 | 0.695 | **0.000** | -0.682 | **0.007** | 74.49% |
| GIGE | 0.000 | 0.971 | 0.778 | **0.000** | -0.405 | 0.074 | 81.97% |
| INAQ | 0.001 | 0.001 | 0.770 | **0.000** | -0.567 | **0.000** | 82.76% |
| LIWC | 0.001 | 0.018 | 0.777 | **0.000** | -0.981 | **0.000** | 82.82% |
| MTLE | 0.000 | 0.442 | 0.845 | **0.000** | -0.386 | 0.098 | 83.57% |
| OCEF | 0.001 | 0.558 | 0.569 | **0.000** | -0.605 | **0.003** | 75.04% |
| PRUO | 0.001 | 0.302 | 0.702 | **0.000** | -0.298 | 0.178 | 85.36% |
| PTST | 0.000 | 0.758 | 0.955 | **0.000** | -0.017 | 0.930 | 90.52% |
| RMCF | 0.002 | 0.000 | 0.476 | **0.000** | -1.225 | **0.000** | 51.15% |
| RMEF | 0.002 | 0.006 | 0.728 | **0.000** | -0.647 | **0.011** | 75.81% |
| SNFT | -0.001 | 0.074 | 0.910 | **0.000** | 0.048 | 0.885 | 74.55% |
| SNTR | 0.001 | 0.000 | 0.748 | **0.000** | -0.355 | 0.153 | 77.71% |
| SPGG | 0.001 | 0.705 | 0.705 | **0.000** | -0.701 | **0.009** | 72.96% |
| STPF | 0.001 | 0.008 | 0.645 | **0.000** | -0.864 | **0.000** | 74.57% |
| TREF | 0.000 | 0.755 | 0.755 | **0.000** | -0.606 | **0.009** | 80.33% |
| **Panel B** | **HM model:** $R_{P,t} - R_{f,t} = \alpha_P + \beta(R_{m,t} - R_{f,t}) + k[D(R_{m,t} - R_{f,t})] + \varepsilon_t$ | | | | | | |
| **Fund codes** | **α** | **p-value (α)** | **β** | **p-value (β)** | **K** | **p-value (K)** | $\bar{R}^2$ |
| AGEF | 0.003 | 0.002 | 0.703 | **0.000** | -0.087 | 0.098 | 71.40% |
| BAAF | 0.001 | 0.050 | 0.845 | **0.000** | -0.094 | **0.024** | 85.23% |
| CGMG | 0.001 | 0.186 | 0.820 | **0.000** | -0.056 | 0.237 | 81.35% |
| CORG | 0.002 | 0.000 | 0.824 | **0.000** | -0.128 | **0.012** | 77.99% |
| FEWS | 0.002 | 0.000 | 0.836 | **0.000** | -0.162 | **0.000** | 85.08% |
| FNBG | 0.002 | 0.001 | 0.774 | **0.000** | -0.166 | **0.001** | 74.65% |
| GIGE | 0.000 | 0.583 | 0.806 | **0.000** | -0.063 | 0.168 | 81.93% |
| INAQ | 0.002 | 0.000 | 0.826 | **0.000** | -0.119 | **0.006** | 82.78% |
| LIWC | 0.002 | 0.001 | 0.860 | **0.000** | -0.179 | **0.000** | 82.72% |
| MTLE | 0.001 | 0.092 | 0.893 | **0.000** | -0.100 | **0.032** | 83.63% |
| OCEF | 0.002 | 0.001 | 0.623 | **0.000** | -0.139 | **0.001** | 75.17% |
| PRUO | 0.003 | 0.000 | 0.778 | **0.000** | -0.160 | **0.000** | 80.61% |
| PTST | 0.000 | 0.934 | 0.959 | **0.000** | -0.009 | 0.821 | 90.52% |
| RMCF | 0.004 | 0.000 | 0.900 | **0.000** | -0.245 | **0.000** | 51.14% |
| RMEF | 0.002 | 0.001 | 0.794 | **0.000** | -0.142 | **0.006** | 75.87% |
| SNFT | -0.002 | 0.069 | 0.885 | **0.000** | 0.050 | 0.452 | 74.57% |
| SNTR | 0.001 | 0.186 | 0.773 | **0.000** | -0.069 | 0.256 | 81.29% |
| SPGG | 0.003 | 0.000 | 0.802 | **0.000** | -0.204 | **0.000** | 73.32% |
| STPF | 0.002 | 0.001 | 0.712 | **0.000** | -0.145 | **0.002** | 74.39% |
| TREF | 0.001 | 0.091 | 0.819 | **0.000** | -0.137 | **0.003** | 80.40% |

## 7.4 Conclusion

This chapter examines the value added by the South African unit trust managers through their abilities to time the broad market movements. In addition to the value claimed to be added by the fund managers through their asset allocation and security selection abilities, the managers claim to have superior timing abilities to correctly anticipate the bull phase (bear phase) of the broad market. The presence of this ability however, will deviate from honouring the rationale underlying the Random Walk Hypothesis (RWH) and the Efficient Market Hypothesis (EMH) developed by Kendall (1953) and Fama (1965, 1970) respectively. Under these hypotheses, the changes in asset price movements are assumed to be random and exhibit no systematic patterns that are vulnerable to any predictable biases. Thus, tools such as technical analysis employed by fund managers are considered fruitless under these frameworks.

To identify the economic value contribution of the unit trust managers, the study employs two of the widely used market timing performance measures developed by Treynor-Mazuy (1966) and Henriksson-Merton (1981) respectively. This objective is achieved through the evaluation of the unit trusts over two sub-periods and the overall examination period. The results reveal that during the first sub-period, the majority of the unit trust managers exhibited significantly negative market timing ability. Similar to the first sub-period, most of the unit trusts failed to add value during the second sub-period. When performance is evaluated over the entire examination period, the results reveal evidence that support the inferences reached in both sub-periods. During this period, none of the unit trust mangers succeeded in maintaining a significantly positive timing coefficient. Instead, a substantial number of unit trusts actually recorded significantly negative timing coefficients in the sub-periods and in the overall examination period. This implies that many of the South African equity unit trust managers actually destroy funds' values through their market timing activities.

# 8

# Conclusion

## 8.1 General Research Summary

The growth in numbers of mutual funds and their respective net worth have led to an intense debate among academics and practitioners on active versus passive portfolio managements for decades. The debate is based on whether or not the active management strategy yields better performance compared to the passive management strategy. Passive investing involves a strategy rooted on the replication of the broad market index instead of seeking to outperform that index. The belief underlying passive investment strategy is that the market is efficient and creates no exploitable arbitrage opportunities for investors. In contrast, the active investment strategy adheres to the belief that the markets are not always perfectly efficient. This research contributes to this debate by investigating the value added of active South African equity unit trust managers over the period 01 January 2002 to 02 September 2012. The value contribution of the unit trust managers is evaluated by attributing their performance to three managerial abilities (skills) namely: (1) asset allocation ability, (2) security selection ability and (3) the market timing ability. Asset allocation refers to the systematic ability of mutual fund managers in efficiently spreading fund weights across major asset classes. The proper and efficient spread of assets will constitute a well-balanced risk-reward profile of the funds. Subsequently, this will lead to a better performance by mutual fund managers over long investment horizons. The security selection ability on the other hand, refers to the capabilities of the mutual fund managers in efficiently choosing the best securities within major asset classes. Moreover, the market timing ability refers to the ability of the manager to correctly anticipate future movements of the market and alter the exposures in risky assets according to such anticipation.

The research commences by introducing the most pertinent theories underlying the development of the research problem statements, hypothesis and objectives (discussed in Chapter 1 and Chapter 2). Chapter 2 outlines the theories underlying the investment decision making process of investors in capital markets. According to the expected utility hypothesis (EUH), modern portfolio theory (MPT), the capital asset pricing model (CAPM) and the

arbitrage pricing theory (APT), under efficient market, investor are rational when making investment decisions. Other theories underpinning this research are the random walk hypothesis (RWH) and the efficient market hypothesis (EMH). According to the EMH, the market always incorporates all the available information and the asset price adjustment to new information is always instantaneous. As such, eliminating any abnormal profitable opportunities associated with the identification of mispriced assets in the market. On the other hand, the RWH postulates that the movements of asset prices in the market are random and unpredictable. This implies that, given that the market is efficient, no investor should be able to consistently generate superior risk-adjusted returns without assuming higher active risk. This runs counter to the rational underlying the framework of active management, since its primary objective is to outperform the market or the corresponding benchmark.

The research first examines the performance of 20 South African unit trusts against the broad market, proxied by the FTSE/JSE All Share Index (ALSI). The results of the study reveals that, most of the performance measures employed document superior performance of the funds during the first sub-period (bull phase). However, during the second sub-period (bear phase), the performance measures document evidence of underperformance. When performance is examined over the enter period, the results reveal that the majority of the risk-adjusted performance measures documents evidence of drastic inferiority in performance by most of the South African fund managers. These results lend support to the framework underlying the EHM which opposes the possibility of consistent outperformance of the market. In addition, all the funds exhibited statistically significant beta coefficients of less than 1.0, suggesting that fund managers undertook some kind of a defensive investment strategy as an effort to minimise their funds' total risks relative to the movements of the market index.



Despite the difference in application of performance measures, Chapter 6 reaches similar inference to that obtained in Chapter 5. The results reveal that unit trust managers perform better during the first sub-period and poor during the second sub-period. The inferiority in performance of managers during the second sub period can be attributed to the devastation of the 2007/2008 global financial crisis and the managers' inability to manage risk during the economic turmoil. The results reveal that during the first sub-period of examination, most funds outperform their corresponding benchmarks in both absolute and risk-adjusted basis. When examined over the second sub-period however, the majority of the fund managers underperform their benchmarks. The analysis of performance attribution of fund managers

reveals that most of the fund managers do not possess significant security selection ability that contributes positively to fund performance. In addition, South African unit trusts in general exhibit higher standard deviations compared to their benchmarks.

The examination of the fund managers' historical exposures to major asset classes reveals that most fund managers employ consistent sector allocation strategies into the financial sector, the resource sector and the industrial sector. Some funds however change their respective fund exposures in accordance to the changes in market movements. Regardless of the fund's asset allocation strategies, the results indicate that fund managers failed at their quest to outperform the market in a consistent manner.

The examination of the value added by South African unit trust managers through their ability to forecast the market movements reveals poor performance exhibited by the managers. The timing ability of managers is examined using the widely used market timing performance measures developed by Treynor-Mazuy (1966) and Henrikson-Merton (1981) respectively. The results reveal that, regardless of the difference in the structure of the market timing measures employed, the majority of the unit trust managers' exhibit poor market timing ability. A substantial number of the unit trusts indeed exhibited significantly negative timing coefficients in the sub-periods and the overall examination period, which indicates that the managers' market timing activities actually destroyed fund values.



In line with empirical literature, the study finds that asset allocation explains most of the return variations of the South African equity unit trusts. During the bull phase of the examination period, the study finds that South African equity funds were able to outperform the market and their respective sector benchmark with positive but insignificant selection returns on average. Such outperformance was diminished by the managers' poor ability to manage risk and time the market in the bear phase of the examination period. Overall, South African equity unit trust managers are found to possess inferior market timing ability that actually destroys the values of the funds they manage. Based on the above analysis, this paper concludes by stating that the South African unit trusts were poorly managed over the examination period and investors would have been better off by investing their money in passive investment vehicles, such as the exchange-traded funds (ETF's).

## 8.2 Limitations and Recommendations for Future Research

The main limitation of the research comes from the adaption of the return decomposition model proposed by Sharpe (1992). The model incorporated the South African 3-month Treasury bill (TB) and the government bond index as one of the variables (as explained in chapter 6) to evaluate the performance of unit trust managers. It was observed that the model was unable to successfully replicate the performance of unit trust managers by estimating the funds' exposures to the risk inherent in these classes. Based on this limitation, it will be valuable to employ unit trusts performance measures that can effectively capture the dimension of fixed-income instruments in future research endeavors. Additionally, since each asset class exhibits its unique characteristics, it will be of valuable interest to re-examine whether or not the Sharpe's (1992) decomposition model is applicable to other asset classes such as real estate, options and derivatives. Moreover, since the research is limited to the South African unit trusts only, it could be of value to extend the sample to other international markets especially emerging markets.

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## Fund Performance Evaluation for Sub-Period 1

| **Panel A ( Sub-Period 1)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fund Codes** | ***ALSI*** | **AGEF** | **BAAF** | **CGMG** | **CORG** | **FEWS** | **FNBG** | **GIGE** | **INAQ** | **LIWC** | **MTLE** |
| **Returns (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 26.42% | 36.79 | 29.15% | 29.92% | 33.38% | 29.62% | 32.03% | 24.80% | 35.57% | 27.01% | 26.28% |
| Cumulative. Return | 3.253 | 5.077 | 3.682 | 3.839 | 4.441 | 3.802 | 4.245 | 3.069 | 4.837 | 3.279 | 3.917 |
| Standard Deviation | 17.11% | 15.76% | 17.41% | 17.72% | 17.73% | 16.52% | 16.15% | 17.27% | 17.00% | 17.10% | 18.58% |
| **RAPM (*p.a*)** | | | | | | | | | | | |
| Sharp Ratio | 0.967 | 1.108 | 1.107 | 1.131 | 1.326 | 1.195 | 1.372 | 0.864 | 1.512 | 1.002 | 0.883 |
| Information Ratio | 0.000 | 1.517 | 0.429 | 1.015 | 1.292 | 1.185 | 1.612 | 0.403 | 1.839 | 0.789 | 0.595 |
| M-Squared | 0.00% | 13.55% | 3.32% | 3.74% | 7.06% | 4.82% | 7.83% | -0.80% | 10.21 | 1.54% | -0.49% |
| Sortino Ratio | 0.171 | 1.853 | 1.200 | 1.345 | 1.645 | 1.358 | 1.702 | 0.941 | 1.767 | 1.174 | 1.057 |
| Treynor Ratio | 0.165 | 0.379 | 0.227 | 0.275 | 0.336 | 0.253 | 0.363 | 0.178 | 0.329 | 0.223 | 0.200 |
| JansAlpha (CAPM) | 0.00% | 15.96% | 6.01% | 8.76% | 12.58% | 7.68% | 12.74% | 1.93% | 13.60% | 5.21% | 3.73% |
| | | **[0.001]** | [0.149] | [0.066] | [0.065] | [**0.027**] | [**0.004**] | [0.738] | [0.858] | [0.180] | [0.403] |
| Jansen Alpha (APT) | -7.54% | 8.79% | -1.70% | 2.39% | 6.08% | 0.88% | 7.06% | -4.83% | 7.42% | -1.09% | -2.67% |
| | [0.088] | [**0.001**] | [0.157] | [0.093] | [**0.006**] | [**0.034**] | [**0.004**] | [0.998] | [**0.000**] | [0.231] | [0.529] |
| **Regression Output** | | | | | | | | | | | |
| R Squared (CAPM) | 100.00% | 69.28% | 83.90% | 69.89% | 71.22% | 83.95% | 63.54% | 81.68% | 86.72% | 81.05% | 81.11% |
| R Squared (APT) | 99.56% | 70.30% | 83.92% | 73.85% | 76.74% | 85.05% | 76.13% | 85.89% | 79.85% | 83.37% | 84.12% |
| Slope Coefficient (b) | 1.000 | 0.710 | 0.855 | 0.730 | 0.700 | 0.780 | 0.610 | 0.840 | 0.780 | 0.770 | 0.820 |
| | **[0.00]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** |
| **Panel B** | | | | | | | | | | | |
| **Fund Codes** | ***ALSI*** | **OCEF** | **PRUO** | **PTST** | **RMCF** | **RMEF** | **SNFT** | **SNTR** | **SPGG** | **STPF** | **TREF** |
| **Returns (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 26.42% | 29.77% | 32.51% | 24.20% | 32.77% | 34.58% | 16.22% | 38.55% | 34.77% | 34.44% | 28.98% |
| Cumulative. Return | 3.253 | 3.917 | 4.229 | 2.961 | 4.421 | 4.690 | 2.067 | 5.040 | 4.713 | 4.660 | 3.687 |
| Standard Deviation | 17.11% | 12.91% | 15.69% | 20.23% | 13.35% | 16.76% | 21.26% | 17.05% | 16.55% | 14.98% | 16.91% |
| **RAPM(*p.a*)** | | | | | | | | | | | |
| Sharp Ratio | 0.967 | 1.541 | 1.443 | 0.708 | 1.714 | 1.474 | 0.298 | 1.682 | 1.504 | 1.640 | 1.130 |
| Information Ratio | 0.000 | 1.552 | 1.760 | -0.048 | 2.238 | 2.002 | -0.252 | 2.144 | 1.658 | 1.773 | 0.824 |
| M-Squared | 0.00% | 0.57% | 1.04% | -0.38% | 1.09% | 1.40% | -1.75% | 2.08% | 1.43% | 1.37% | 0.44% |
| Sortino Ratio | 0.171 | 1.792 | 1.623 | 0.842 | 2.010 | 1.839 | 0.364 | 1.887 | 1.808 | 1.814 | 1.267 |
| Treynor Ratio | 0.165 | 0.368 | 0.328 | 0.154 | 0.520 | 0.321 | 0.076 | 0.388 | 0.377 | 0.384 | 0.251 |
| Jansen alpha (CAPM) | 0.00% | 11.55% | 11.86% | -0.11% | 16.00% | 14.96% | -6.52% | 16.97% | 14.67% | 14.59% | 12.76% |
| | | **[0.001]** | [**0.005**] | [0.761] | [**0.001**] | [**0.001**] | [0.172] | [**0.000**] | [**0.001**] | [**0.001**] | [0.106] |
| Jansen alpha (APT) | -7.54% | 6.45% | 5.31% | -7.93% | 1.06% | 9.20% | -14.0% | 9.78% | 7.93% | 7.78% | 1.05% |
| | [0.088] | [**0.001**] | [**0.001**] | [0.705] | [**0.001**] | [**0.001**] | [0.372] | [**0.000**] | [**0.002**] | [**0.001**] | [0.146] |
| **Regression output** | | | | | | | | | | | |
| R-Squared (CAPM) | 100.00% | 68.61% | 72.39% | 87.55% | 44.52% | 63.88% | 66.33% | 72.46% | 67.05% | 66.01% | 72.45% |
| R Squared (APT) | 99.56% | 67.75% | 76.33% | 89.10% | 57.45% | 77.25% | 71.46% | 78.69% | 68.86% | 65.35% | 78.69% |
| Slope Coefficient (b) | 1.000 | 0.538 | 0.694 | 0.931 | 0.444 | 0.628 | 0.829 | 0.755 | 0.659 | 0.642 | 0.541 |
| | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** |

## Fund Performance Evaluation for Sub-Period 2

| Panel C (Sub-Period 2) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fund Codes** | ***ALSI*** | **AGEF** | **BAAF** | **CGMG** | **CORG** | **FEWS** | **FNBG** | **GIGE** | **INAQ** | **LIWC** | **MTLE** |
| **Returns (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 9.76% | 10.93% | 6.07% | 6.77% | 13.35% | 8.48% | 8.47% | 4.18% | 10.08% | 8.93% | 8.06% |
| Cumulative. Return | 1.435 | 1.616 | 1.250 | 1.276 | 1.759 | 1.415 | 1.407 | 1.137 | 1.518 | 1.431 | 1.344 |
| Standard Deviation | 22.80% | 14.52% | 16.06% | 14.90% | 14.90% | 14.54% | 13.02% | 15.86% | 14.54% | 14.60% | 15.52% |
| **RAPM (*p.a*)** | | | | | | | | | | | |
| Sharp Ratio | 0.053 | 0.164 | -0.154 | -0.120 | 0.322 | -0.005 | -0.007 | -0.276 | 0.105 | 0.026 | -0.032 |
| Information Ratio | 0.000 | 0.269 | -0.656 | -0.601 | 0.126 | -0.427 | -0.149 | -0.613 | -0.011 | -0.331 | -0.566 |
| M-Squared | 0.00% | 0.27% | -0.84% | -0.68% | 0.82% | -0.29% | -0.30% | -1.27% | 0.07% | -0.19% | -0.39% |
| Sortino Ratio | 0.032 | 1.019 | -0.962 | -0.640 | 1.732 | -0.027 | -0.033 | -1.702 | 0.580 | 0.141 | -0.167 |
| Treynor Ratio | 0.012 | 0.035 | -0.033 | -0.021 | 0.061 | -0.001 | -0.001 | -0.059 | 0.020 | 0.005 | -0.006 |
| Jansen Alpha (CAPM) | 0.00% | 1.47% | -3.57% | -2.97% | 3.66% | -1.13 | -1.14 | -5.42% | 0.42% | -0.72% | -1.72% |
| | | [0.698] | [0.275] | [0.393] | [0.356] | [0.772] | [0.805] | [0.330] | **[0.004]** | [0.884] | [0.696] |
| Jansen Alpha (APT) | -0.29% | -0.99% | -4.10% | -3.78% | 1.34% | -2.34% | -1.61% | -5.64% | -1.22% | -1.74% | -2.18% |
| | [0.766] | [0.764] | [0.158] | [0.203] | [0.651] | [0.398] | [0.605] | [0.072] | [0.691] | [0.611] | [0.492] |
| **Regression Output** | | | | | | | | | | | |
| R Squared (CAPM) | 100% | 73.16% | 87.19% | 88.09% | 81.39% | 85.16% | 80.22% | 82.45% | 86.75% | 82.81% | 84.79% |
| R Squared (APT) | 99.57% | 78.07% | 87.12% | 88.63% | 89.06% | 88.21% | 83.44% | 84.56% | 86.88% | 83.37% | 88.15% |
| Slope Coefficient (b) | 1.00 | 0.631 | 0.762 | 0.827 | 0.790 | 0.740 | 0.735 | 0.736 | 0.778 | 0.770 | 0.856 |
| | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** |

| Panel D (Sub-Period 2) Continues | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fund Codes** | ***ALSI*** | **OCEF** | **PRUO** | **PTST** | **RMCF** | **RMEF** | **SNFT** | **SNTR** | **SPGG** | **STPF** | **TREF** |
| **Returns (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 9.76% | 4.91% | 11.20% | 9.41% | 12.36% | 9.13% | 4.15% | 12.30% | 6.95% | 4.14% | 0.33% |
| Cumulative. Return | 1.435 | 1.223 | 1.631 | 1.407 | 1.756 | 1.442 | 1.060 | 1.697 | 1.303 | 1.159 | 0.930 |
| Standard Deviation | 22.80% | 11.10% | 13.95% | 17.02% | 11.39% | 13.44% | 17.44% | 15.20% | 13.77% | 13.54% | 3.54% |
| **RAPM (*p.a*)** | | | | | | | | | | | |
| Sharp Ratio | 0.053 | -0.328 | 0.190 | 0.051 | 0.334 | 0.043 | -0.252 | 0.247 | -0.117 | -0.326 | -2.324 |
| Information Ratio | 0.00 | -0.849 | 0.195 | -2.137 | -0.718 | -0.255 | -0.438 | 0.226 | -0.572 | -0.790 | -1.455 |
| M-Squared | 0.00% | -1.11% | 0.33% | -0.08% | 0.59% | -0.14% | -1.28% | 0.58% | -0.64% | -1.28% | -0.81% |
| Sortino Ratio | 0.032 | -1.827 | 1.111 | 0.271 | 1.829 | 0.213 | -1.293 | 1.451 | -0.615 | -1.973 | -3.217 |
| Treynor Ratio | 0.012 | -0.065 | 0.038 | 0.009 | 0.079 | 0.007 | -0.046 | 0.051 | -0.022 | -0.070 | -0.111 |
| Jansen alpha (CAPM) | 00.00% | -0.04% | 1.65% | -0.52% | 3.12% | -0.53% | -5.77% | 2.70% | -2.64% | -5.32% | -5.47% |
| | | [0.163] | [0.567] | [0.920] | [0.517] | [0.926] | [0.284] | [0.463] | [0.569] | [0.123] | **[0.007]** |
| Jansen alpha (APT) | -0.29% | -5.17% | 0.01% | -0.68% | -0.52% | -3.36% | -3.82% | 1.30% | -4.25% | -5.33% | -8.59% |
| | [0.766] | [0.086] | [0.931] | [0.799] | [0.915] | [0.648] | [0.331] | [0.732] | [0.259] | [0.110] | [**0.004**] |
| **Regression output** | | | | | | | | | | | |
| R-Squared (CAPM) | 100.00% | 78.58% | 85.26% | 92.19% | 52.43% | 82.23% | 79.20% | 81.14% | 75.90% | 79.93% | 76.21% |
| R Squared (APT) | 99.57% | 78.19% | 88.20% | 91.47% | 69.10% | 85.77% | 83.48% | 84.84% | 81.09% | 77.69% | 85.76% |
| Slope Coefficient (b) | 1.00 | 0.559 | 0.697 | 0.969 | 0.477 | 0.774 | 0.956 | 0.737 | 0.720 | 0.633 | 0.522 |
| | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** |

**Performance Evaluation for the Overall Period**

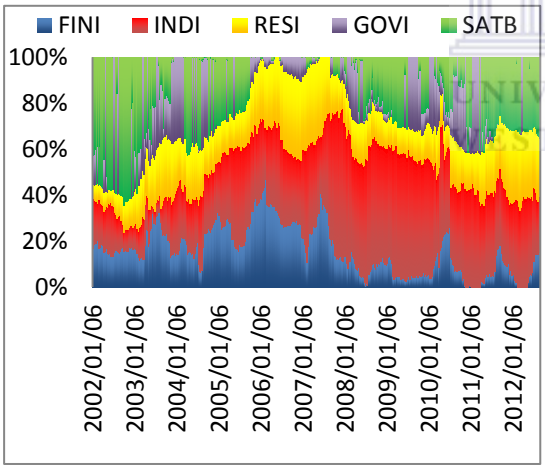
| **Panel A (Overall Period)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fund Codes** | ***ALSI*** | **AGEF** | **BAAF** | **CGMG** | **CORG** | **FEWS** | **FNBG** | **GIGE** | **INAQ** | **LIWC** | **MTLE** |
| **Returns (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 17.82% | 23.22% | 17.07% | 17.81% | 22.98% | 18.61% | 19.70% | 14.05% | 22.20% | 17.65% | 16.84% |
| Cumulative. Return | 4.667 | 8.205 | 4.604 | 4.899 | 7.810 | 5.378 | 5.971 | 3.489 | 7.343 | 4.876 | 4.406 |
| Standard Deviation | 20.16% | 16.81% | 18.60% | 20.09% | 20.09% | 18.24% | 18.70% | 18.52% | 19.06% | 21.18% | 14.36% |
| **RAPM (*p.a*)** | | | | | | | | | | | |
| Sharp Ratio | 0.427 | 0.833 | 0.423 | 0.428 | 0.685 | 0.515 | 0.561 | 0.261 | 0.681 | 0.438 | 0.360 |
| Information Ratio | 0.000 | 0.807 | -0.188 | 0.203 | 0.666 | 0.274 | 0.576 | -0.188 | 0.734 | 0.114 | -0.077 |
| M-Squared | 0.00% | 1.09% | -0.15% | 0.00% | 1.04% | 0.16% | 0.38% | -0.76% | 0.88% | -0.03% | -0.20% |
| Sortino Ratio | 0.202 | 0.889 | 0.451 | 0.485 | 0.793 | 0.569 | 0.649 | 0.280 | 0.764 | 0.493 | 0.411 |
| Treynor Ratio | 0.086 | 0.212 | 0.100 | 0.109 | 0.181 | 0.125 | 0.152 | 0.062 | 0.162 | 0.169 | 0.110 |
| Jansen Alpha (CAPM) | 0.00% | 8.57% | 1.29% | 2.07% | 7.50% | 3.18% | 4.80% | -1.55% | 6.67% | 2.09% | 0.69% |
| | | **[0.006]** | [0.659] | [0.503] | [**0.015**] | [0.201] | [0.118] | [0.494] | [0.**013**] | [0.47] | [0.875] |
| Jansen Alpha (ATP) | 0.48% | 6.72% | 0.72% | 1.10% | 5.38% | 1.95% | 3.48% | -2.27% | 5.17% | 0.98% | -0.15% |
| | [0.253] | [**0.013**] | [0.723] | [0.634] | [**0.020**] | [0.310] | [0.140] | [0.319] | [**0.027**] | [0.648] | [0.860] |
| **Regression Output** | | | | | | | | | | | |
| R Squared (CAPM) | 100% | 71.26% | 85.10% | 81.31% | 77.74% | 84.63% | 74.16% | 81.86% | 82.55% | 82.20% | 83.49% |
| R Squared (ATP) | 99.54% | 73.64% | 85.17% | 82.49% | 84.19% | 86.75% | 79.95% | 84.49% | 82.95% | 83.28% | 86.73% |
| Slope Coefficient (b) | 1.00 | 0.659 | 0.797 | 0.792 | 0.760 | 0.754 | 0.690 | 0.775 | 0.766 | 0.770 | 0.842 |
| | **[0.00]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** | **[0.000]** |
| **Panel B (Overall Period) Continues** | | | | | | | | | | | |
| **Fund Codes** | ***ALSI*** | **OCEF** | **PRUO** | **PTST** | **RMCF** | **RMEF** | **SNFT** | **SNTR** | **SPGG** | **STPF** | **TREF** |
| **Returns (*p.a*)** | | | | | | | | | | | |
| Arithmetic. Returns | 17.82% | 16.72% | 21.42% | 16.59% | 22.16% | 21.22% | 10.04% | 24.78% | 20.09% | 18.37% | 13.80% |
| Cumulative. Return | 4.667 | 4.790 | 7.013 | 4.166 | 7.762 | 6.764 | 2.190 | 9.177 | 6.140 | 5.400 | 3.428 |
| Standard Deviation | 20.16% | 14.36% | 17.21% | 23.01% | 15.00% | 19.45% | 24.52% | 18.64% | 18.83% | 16.12% | 18.43% |
| **RAPM (*p.a*)** | | | | | | | | | | | |
| Sharp Ratio | 0.427 | 0.522 | 0.709 | 0.321 | 0.863 | 0.617 | 0.034 | 0.835 | 0.578 | 0.568 | 0.249 |
| Information Ratio | 0.00 | 0.206 | 0.966 | -0.164 | 1.197 | 0.698 | -0.355 | 1.099 | 0.411 | 0.344 | -0.424 |
| M-Squared | 0.00% | -0.22 | 0.73 | -0.25 | 0.85 | 0.69 | -1.57 | 1.40 | 0.46 | 0.11 | -0.81 |
| Sortino Ratio | 0.202 | 0.581 | 0.778 | 0.365 | 0.970 | 0.717 | 0.039 | 0.913 | 0.657 | 0.611 | 0.271 |
| Treynor Ratio | 0.086 | 0.136 | 0.174 | 0.078 | 0.276 | 0.167 | 0.009 | 0.208 | 0.155 | 0.143 | 0.061 |
| Jansen alpha (CAPM) | 0.00% | 2.94% | 6.46% | -0.49% | 9.10% | 6.05% | -6.68% | 9.42% | 5.11% | 3.89% | 2.97% |
| | | [0.219] | **[0.013]** | [0.713] | [**0.01**] | [0.051] | [0.061] | [**0.02**] | [0.115] | [0.172] | [0.494] |
| Jansen alpha (ATP) | 0.48% | 0.21% | 4.99% | -0.56% | 5.77% | 4.33% | -4.18% | 7.47% | 3.67% | 3.75% | -2.26% |
| | [0.253] | [0.282] | **[0.007]** | [0.806] | [**0.022**] | [0.067] | [0.179] | [**0.002**] | [0.165] | [0.138] | [0.341] |
| **Regression output** | | | | | | | | | | | |
| R-Squared (CAPM) | 100.00% | 74.63% | 80.13% | 90.52% | 49.56% | 75.53% | 74.54% | 77.63% | 72.61% | 73.94% | 74.55% |
| R Squared (ATP) | 99.54% | 73.85% | 82.69% | 90.26% | 64.45% | 81.79% | 79.25% | 82.02% | 75.94% | 72.13% | 82.51% |
| Slope Coefficient (b) | 1.00 | 0.553 | 0.697 | 0.955 | 0.467 | 0.723 | 0.910 | 0.745 | 0.700 | 0.639 | 0.567 |
| | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** | **[0.00]** |

**ALLAN GRAY EQUITY FUND** **(I- Net bridge code: AGEF)**

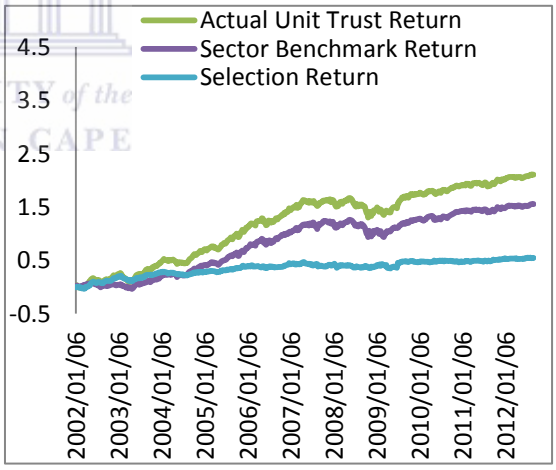
**Description:** The objective of the fund is to earn a higher total rate of return than that of the average of the South African equity market as represented by the All Share index, including income, without assuming greater risk.

| **Inception: 1998/01/01**<br>**Fund value: R 31.87 m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.60% | 5.012 | 0.000 | 0.20% | 1.428 | 0.154 | 0.40% | 4.344 | 0.000 |
| Standard Deviation | 2.00% | | | 2.33% | | | 0.22% | | |
| Sharp Ration | 0.210 | | | 0.106 | | | | | |
| (i) Benchmark Return | 0.11% | 4.420 | 0.000 | 0.16% | 1.180 | 0.239 | 0.30% | 3.563 | 0.000 |
| Standard Deviation | 0.17% | | | 2.25% | | | 1.98% | | |
| Sharp Ratio | 0.115 | | | 0.001 | | | 0.065 | | |
| (ii) Selection Return | 0.17% | 2.696 | 0.008 | 0.04% | 0.567 | 0.570 | 0.10% | 2.206 | 0.027 |
| Standard Deviation | 1.03% | | | 1.18% | | | 1.03% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 85.86% | | | 75.42% | | | 74.39% | | |
| Intercept | 0.001 | 2.281 | 0.023 | 0.000 | 0.810 | 0.419 | 0.001 | 2.482 | 0.013 |
| Slope Coefficient | 1.048 | 27.88 | 0.000 | 0.898 | 29.10 | 0.000 | 0.953 | 40.16 | 0.00 |

***(a)*** ***Sector decomposition***




***(b)*** ***Log Cum. Return***

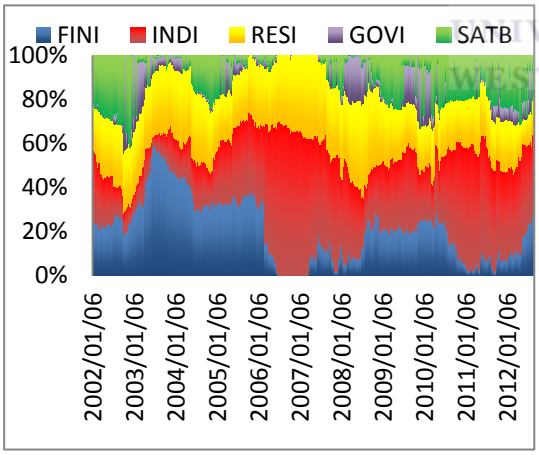


**SIS EQUITY FUND** **(I-Net bridge code: BAAF)**

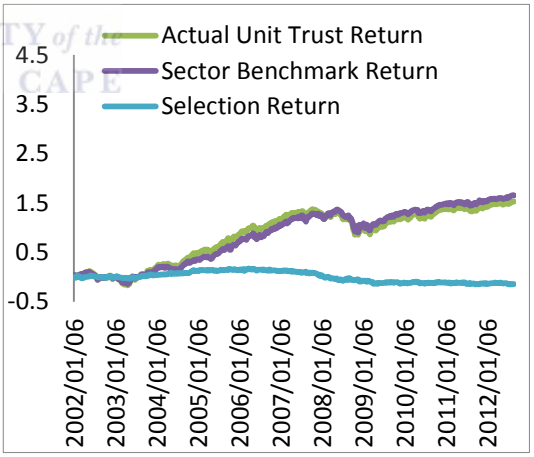
**Description:** The principal aim of the fund is to maximize returns to the investor. The manager will identify attractively priced companies with superior growth prospects and entrepreneurial management. The fund will also take advantage of attractive value opportunities. . Performance fees for this fund will be calculated each quarter for the preceding year's performance.

| **Inception: 1998/02/02**<br>**Fund value: R 215.01 m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.49% | 3.698 | 0.000 | 0.11% | 1.428 | 0.154 | 0.30% | 2.967 | 0.003 |
| Standard Deviation | 2.00% | | | 2.53% | | | 0.41% | | |
| Sharp Ration | 0.140 | | | -0.017 | | | 0.055 | | |
| (i) Benchmark Return | 0.45% | 3.718 | 0.000 | 0.20% | 1.253 | 0.211 | 0.32% | 3.261 | 0.001 |
| Standard Deviation | 2.03% | | | 2.63% | | | 1.98% | | |
| Sharp Ratio | 0.133 | | | 0.015 | | | 0.065 | | |
| (ii) Selection Return | 0.04% | 0.003 | 0.998 | -0.08% | -1.400 | 0.163 | -0.02% | -0.525 | 0.600 |
| Standard Deviation | 0.89% | | | 0.10% | | | 0.95% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 83.87% | | | 85.69% | | | 84.70% | | |
| Intercept | 0.000 | 0.711 | 0.477 | -0.000 | -1.124 | 0.262 | -0.001 | - 0.087 | 0.931 |
| Slope Coefficient | 1.006 | 37.96 | 0.000 | 0.898 | 29.10 | 0.000 | 0.945 | 55.44 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

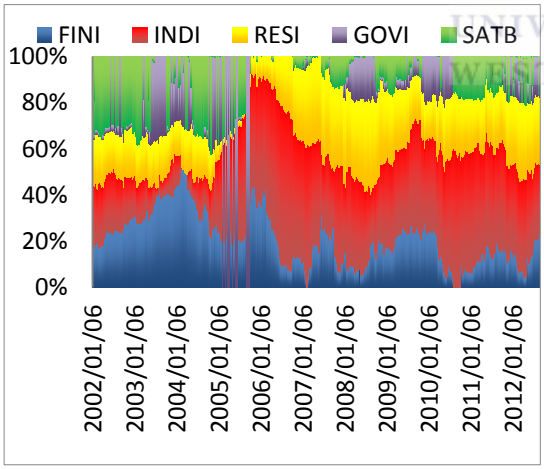


**COMMUNITY GROWTH EQUITY FUND (I-Net bridge code: CGMG)**

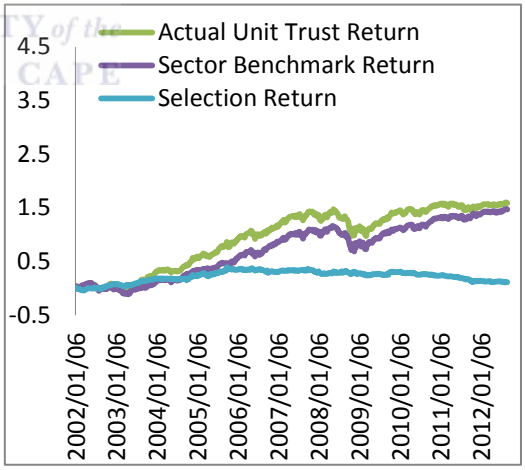
**Description:** This general equity fund aims to provide long-term capital growth while promoting sustainable and responsible investing. It also aims to achieve long-term investment returns in excess of inflation. This is a medium to higher risk fund. The fund is exposed to share price movements, which are affected by the activities of individual companies, general market conditions as well as global and local political and economic changes.

| **Inception: 1992/06/01**<br>**Fund value: R 2187 m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.50% | 4.079 | 0.000 | 0.13% | 0.754 | 0.451 | 0.32% | 3.032 | 0.002 |
| Standard Deviation | 2.46% | | | 2.79% | | | 2.46% | | |
| Sharp Ration | 0.156 | | | -0.011 | | | 0.059 | | |
| (i) Benchmark Return | 0.04% | 3.701 | 0.000 | 0.20% | 1.212 | 0.226 | 0.29% | 2.987 | 0.003 |
| Standard Deviation | 1.71% | | | 2.75% | | | 2.29% | | |
| Sharp Ratio | 0.116 | | | 0.017 | | | 0.052 | | |
| (ii) Selection Return | 0.13% | 1.876 | 0.061 | -0.07% | -1.211 | 0.230 | 0.03% | 0.569 | 0.569 |
| Standard Deviation | 1.10% | | | 1.02% | | | 0.07% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 70.80% | | | 86.92% | | | 74.39% | | |
| Intercept | 0.001 | 1.740 | 0.023 | -0.000 | -0.036 | 0.301 | 0.001 | 2.482 | 0.013 |
| Slope Coefficient | 1.016 | 25.92 | 0.000 | 0.944 | 42.84 | 0.000 | 0.966 | 48.70 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

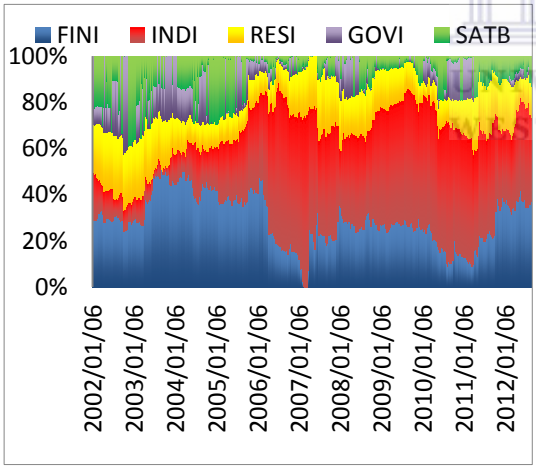


**CORONATION EQUITY FUND - R** **(I-Net bridge code: CORG)**

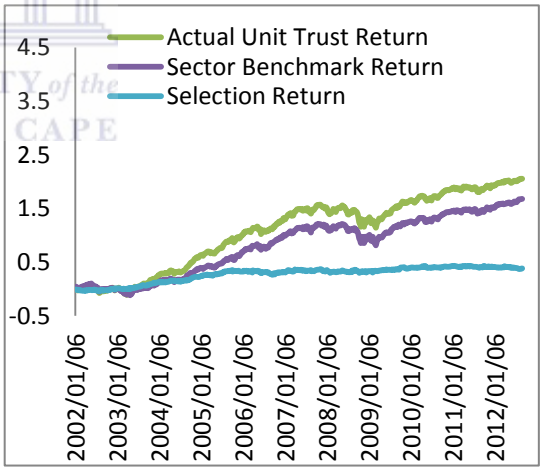
**Description:** This fund seeks to achieve long-term capital growth by investing only in listed equities. The fund's return objective is to provide first quartile relative risk-adjusted investment returns.

| **Inception: 1992/06/01**<br>**Fund value: R 4,298.2 m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.56% | 4.688 | 0.000 | 0.24% | 1.452 | 0.145 | 0.39% | 3.905 | 0.000 |
| Standard Deviation | 1.98% | | | 2.77% | | | 2.40% | | |
| Sharp Ration | 0.189 | | | 0.030 | | | 0.095 | | |
| (i) Benchmark Return | 0.42% | 4.101 | 0.000 | 0.23% | 1.437 | 0.152 | 0.33% | 3.459 | 0.001 |
| Standard Deviation | 1.73% | | | 2.62% | | | 2.22% | | |
| Sharp Ratio | 0.141 | | | 0.026 | | | 0.070 | | |
| (ii) Selection Return | 0.13% | 2.332 | 0.020 | 0.15% | 0.258 | 0.800 | 0.07% | 1.811 | 0.071 |
| Standard Deviation | 0.93% | | | 0.95% | | | 0.94% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 77.73% | | | 93.81% | | | 84.52% | | |
| Intercept | 0.001 | 2.202 | 0.028 | 0.000 | 0.299 | 0.765 | 0.000 | 1.823 | 0.069 |
| Slope Coefficient | 1.001 | 31.10 | 0.000 | 0.944 | 44.98 | 0.000 | 0.996 | 55.06 | 0.000 |

***(a)*** ***Sector decomposition***




***(b)*** ***Log Cum. Return***

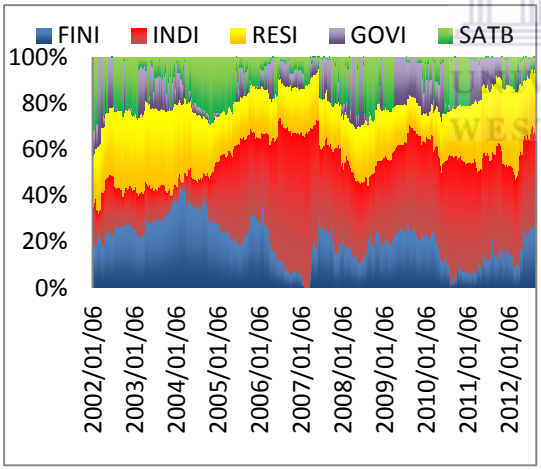


## ANALYTICS MANAGED EQUITY (I Net-bridge code: FEWS)

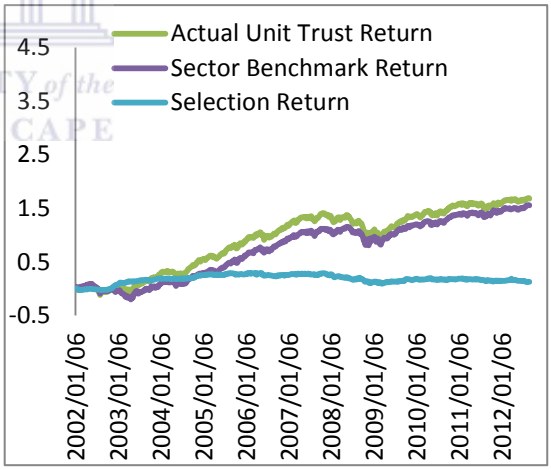
**Description:** The objective of the fund is to earn a higher total rate of return than that of average South African equity market as presented by all share index, including income, without assuming greater risk.

| Inception: 1992/06/01<br>Fund value: R 4,298.2 m | Sub period 1<br>(6 Jan 2002 to May 2007) | | | Sub period 2<br>(7 May 2007 to 2 Sep 2012) | | | Overall periods<br>(6 Jan 2002 to 2 Sep 2012) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.50% | 4.144 | 0.000 | 0.16% | 1.038 | 0.303 | 0.33% | 3.386 | 0.001 |
| Standard Deviation | 2.02% | | | 2.53% | | | 2.29% | | |
| Sharp Ration | 0.016 | | | -0.010 | | | 0.069 | | |
| (i) Benchmark Return | 0.40% | 3.609 | 0.000 | 0.21% | 1.423 | 0.1526 | 0.30% | 3.326 | 0.001 |
| Standard Deviation | 1.84% | | | 2.41% | | | 2.14% | | |
| Sharp Ratio | 0.018 | | | 0.019 | | | 0.062 | | |
| (ii) Selection Return | 0.10% | 2.186 | 0.030 | -0.05% | -0.200 | 0.369 | 0.03% | 0.743 | 0.458 |
| Standard Deviation | 0.78% | | | 0.90% | | | 0.84% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 85.15% | | | 87.30% | | | 86.42% | | |
| Intercept | 0.001 | 2.062 | 0.040 | -0.000 | -0.829 | 0.408 | 0.000 | 0.789 | 0.430 |
| Slope Coefficient | 1.008 | 39.86 | 0.000 | 0.982 | 43.57 | 0.000 | 0.993 | 59.43 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

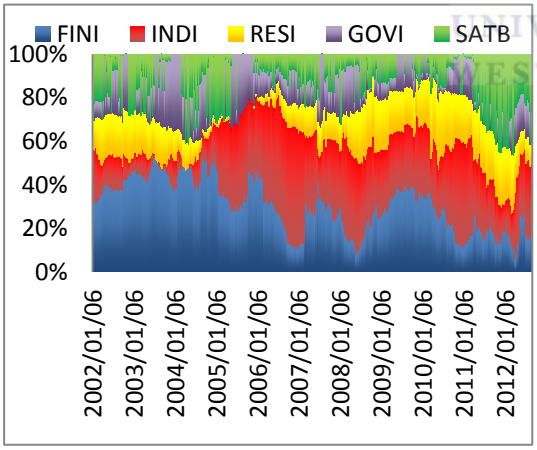


**FNB GROWTH FUND** **(I-Net bridge code: FNBG)**

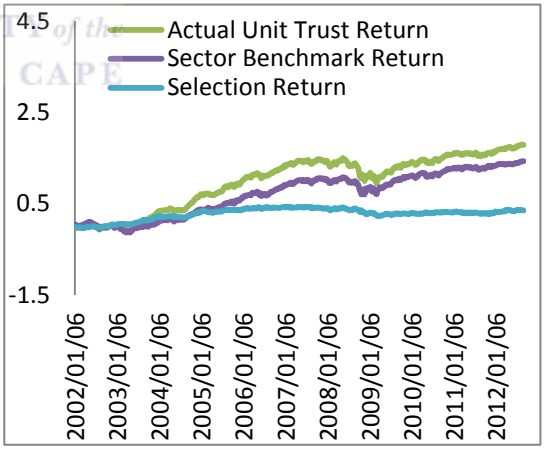
**Description:** The primary objectives of the fund managers of the FNB Growth Fund, (a general equity fund), is to achieve capital appreciation for investors. The fund managers are mandated to invest in any company listed on the FTSE/JSE. The fund managers use dynamic fund management to limit downside exposure and aim to outperform the JSE All Share Index over time.

| **Inception: 1998/09/30**<br>**Fund value: R 213.8 m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.54% | 4.958 | 0.000 | 0.16% | 1.005 | 0.316 | 0.35% | 3.650 | 0.000 |
| Standard Deviation | 1.80% | | | 2.59% | | | 0.24% | | |
| Sharp Ration | 0.196 | | | -0.000 | | | 0.079 | | |
| (i) Benchmark Return | 0.38% | 3.919 | 0.000 | 0.18% | 1.219 | 0.224 | 0.28% | 3.187 | 0.001 |
| Standard Deviation | 1.61% | | | 2.42% | | | 2.06% | | |
| Sharp Ratio | 0.122 | | | 0.008 | | | 0.053 | | |
| (ii) Selection Return | 0.16% | 2.959 | 0.003 | -0.02% | -0.316 | 0.752 | 0.07% | 1.605 | 0.109 |
| Standard Deviation | 0.89% | | | 0.10% | | | 1.00% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 75.86% | | | 87.30% | | | 79.93% | | |
| Intercept | 0.001 | 3.054 | 0.002 | -0.000 | -0.231 | 0.818 | 0.001 | 1.769 | 0.074 |
| Slope Coefficient | 0.975 | 29.50 | 0.000 | 0.968 | 35.40 | 0.000 | 0.972 | 47.02 | 0.000 |

***(a)*** ***Sector decomposition***




***(b)*** ***Log Cum. Return***

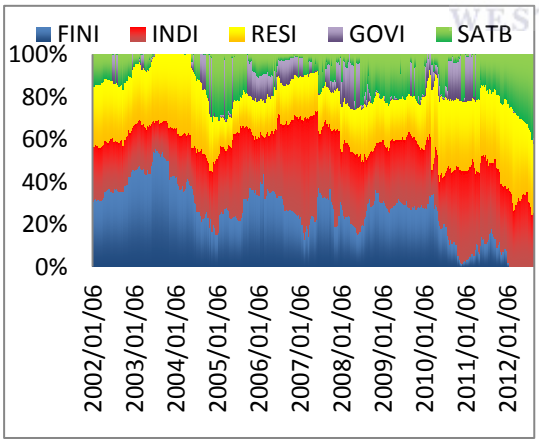


**CORIS CAPITAL GENERAL EQUITY FUND (I-Net bridge code: GIGE)**

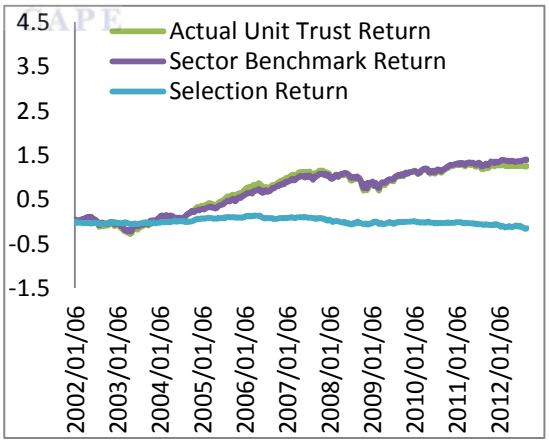
**Description:** The fund reflects the fund manager's core equity investment philosophy and style. The fund aims to provide consistent returns with low volatility to reap the benefit of compounded interest returns. The fund aims to capitalize on investment opportunities across the equity market via tilting sector weights according to business cycle trends, as well as through thorough researched stock picking. The fund has a higher than average risk profile and gives investors a broad exposure to shares with a medium to larger market capitalization. The fund focus is on companies trading at or below intrinsic value

| Inception: 1992/06/01<br>Fund value: R 348, 47 | Sub period 1<br>(6 Jan 2002 to May 2007) | | | Sub period 2<br>(7 May 2007 to 2 Sep 2012) | | | Overall periods<br>(6 Jan 2002 to 2 Sep 2012) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.43% | 3.243 | 0.001 | 0.08% | 0.512 | 0.609 | 0.25% | 2.495 | 0.013 |
| Standard Deviation | 2.20% | | | 2.57% | | | 2.39% | | |
| Sharp Ration | 0.111 | | | -0.031 | | | 0.035 | | |
| (i) Benchmark Return | 0.39% | 3.239 | 0.001 | 0.16% | 1.093 | 0.275 | 0.27% | 2.894 | 0.004 |
| Standard Deviation | 2.00% | | | 2.42% | | | 2.24% | | |
| Sharp Ratio | 0.103 | | | 0.001 | | | 0.047 | | |
| (ii) Selection Return | 0.04% | 0.076 | 0.982 | -0.08% | -1.332 | 0.369 | -0.02% | -0.538 | 0.591 |
| Standard Deviation | 0.09% | | | 1.02% | | | 0.94% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 84.93% | | | 87.78% | | | 84.33% | | |
| Intercept | 0.000 | 0.649 | 0.516 | 7.690 | 7.461 | 0.419 | -0.000 | -0.409 | 0.682 |
| Slope Coefficient | 1.013 | 39.50 | 0.000 | 10.35 | 39.86 | 0.000 | 0.982 | 54.79 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

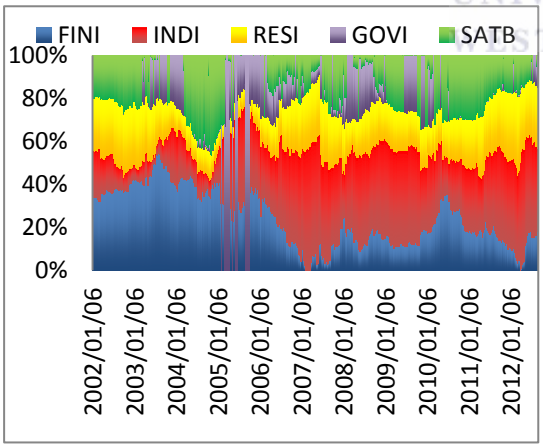


**INVESTEC EQUITY FUND - A** **(I Net-bridge code: INAQ)**

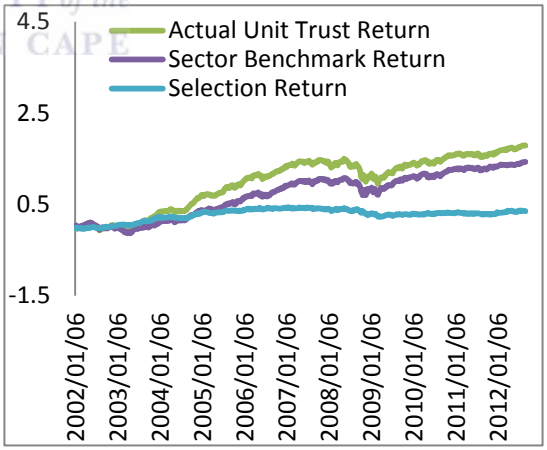
**Description:** The Investec Equity Fund aims to provide investors with capital growth over the long-term. The objective is to achieve returns well in excess of the FTSE/JSE All Share index, measured over three year periods. The fund is actively managed and invests in South African equities. The mandate is not restricted to any specific investment style. The investment strategy is underpinned by extensive research focusing on three sector groupings: resources, industrials and financials

| **Inception: 1987/11/01**<br>**Fund value: R 4,343.3 m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.59% | 4.861 | 0.000 | 0.18% | 1.166 | 0.244 | 0.39% | 3.872 | 0.000 |
| Standard Deviation | 2.02% | | | 2.64% | | | 2.36% | | |
| Sharp Ration | 0.201 | | | 0.010 | | | 0.092 | | |
| (i) Benchmark Return | 0.42% | 3.823 | 0.000 | 0.19% | 1.240 | 0.216 | 0.31% | 3.220 | 0.001 |
| Standard Deviation | 1.84% | | | 2.61% | | | 2.24% | | |
| Sharp Ratio | 0.131 | | | 0.010 | | | 0.061 | | |
| (ii) Selection Return | 0.16% | 3.296 | 0.070 | -0.01% | -0.157 | 0.069 | 0.08% | 2.012 | 0.910 |
| Standard Deviation | 0.84% | | | 0.98% | | | 0.91% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 82.84% | | | 86.56% | | | 85.03% | | |
| Intercept | 0.001 | 0.244 | 0.001 | 0.000 | 0.034 | 0.973 | 0.001 | 2.302 | 0.022 |
| Slope Coefficient | 0.995 | 36.57 | 0.000 | 0.942 | 42.14 | 0.000 | 0.982 | 56.26 | 0.000 |

***(a)*** ***Sector decomposition***




***(b)*** ***Log Cum. Return***

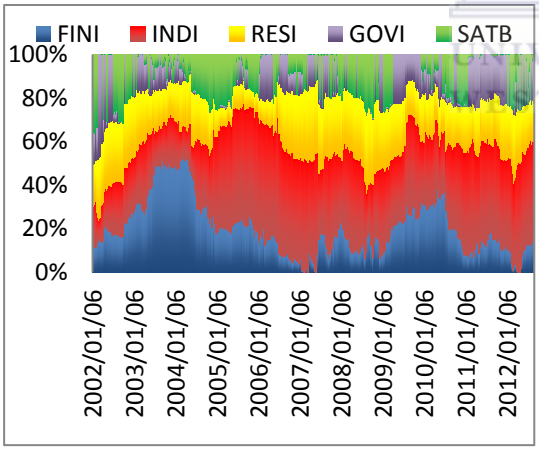


**STANLIB EQUITY FUND - B1** **(I-Net bridge code: LIWC)**

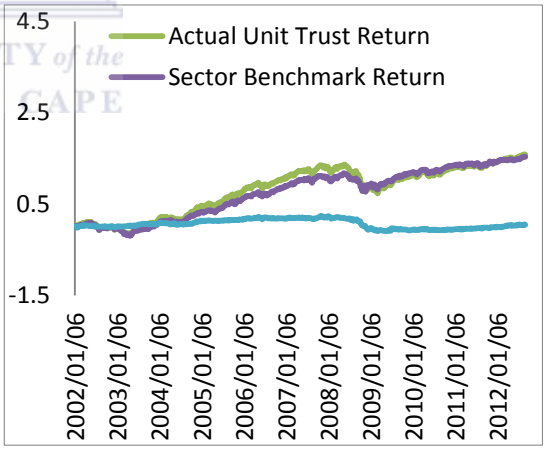
**Description:** The Portfolio's objective is steady growth of income and capital, a reasonable level of current income and the maximum stability for capital invested. The security to be included will consist of securities, non-equity securities and participatory interest of collective investment schemes in securities

| **Inception: 1970/01/01**<br>**Fund value: R 2,739.1m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.46% | 3.803 | 0.000 | 0.16% | 1.027 | 0.305 | 0.31% | 3.124 | 0.001 |
| Standard Deviation | 2.02% | | | 2.67% | | | 2.37% | | |
| Sharp Ration | 0.381 | | | 0.003 | | | 0.060 | | |
| (i) Benchmark Return | 0.39% | 3.609 | 0.000 | 0.21% | 1.422 | 0.156 | 0.30% | 3.256 | 0.001 |
| Standard Deviation | 1.79% | | | 2.49% | | | 2.16% | | |
| Sharp Ratio | 0.138 | | | 0.022 | | | 0.059 | | |
| (ii) Selection Return | 0.08% | 1.472 | 0.142 | -0.05% | -0.695 | 0.487 | 0.01% | 0.318 | 0.750 |
| Standard Deviation | 0.85% | | | 1.15% | | | 1.01% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 82.28% | | | 84.47% | | | 81.69% | | |
| Intercept | 0.000 | 1.227 | 0.221 | -0.000 | -0.592 | 0.554 | 0.000 | 0.391 | 0.696 |
| Slope Coefficient | 1.029 | 35.87 | 0.000 | 0.898 | 34.83 | 0.000 | 0.989 | 49.77 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***



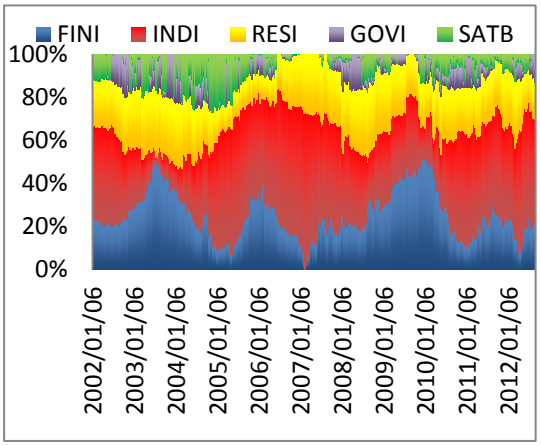
**MET COLLECTIVE INV GENERAL EQUITY (I-Net bridge code: MTLE)**

**Description:** The portfolio seeks medium to long term capital appreciation through investments in selected companies across various sectors of the equity market. The portfolio aims to provide the investor with an easy, efficient and affordable vehicle for investing in shares quoted mainly on the JSE and includes an element of international exposure. To achieve superior returns while containing the risks associated with equity investments, the portfolio invests in a broadly diversified portfolio of shares and is actively managed. Liquidity is increased in times of perceived higher risk and reduced in times of perceived lower risk. Occasional use is made of derivatives to manage targeted exposures in the short term. The portfolio favours shares that represent quality and value and which are expected to appreciate over time. The fund is suitable for investors seeking a long term, high capital growth unit trust with medium risk exposure

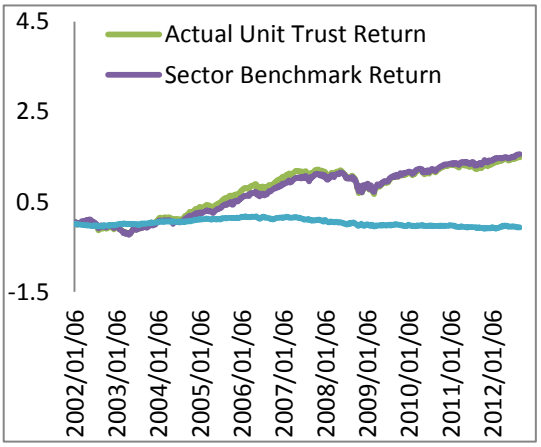
| **Inception: 1991/09/19**<br>**Fund value: R 326.9m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.45% | 3.490 | 0.001 | 0.15% | 0.847 | 0.154 | 0.30% | 2.746 | 0.006 |
| Standard Deviation | 2.15% | | | 2.95% | | | 2.58% | | |
| Sharp Ration | 0.124 | | | -0.003 | | | 0.050 | | |
| (i) Benchmark Return | 0.39% | 3.332 | 0.001 | 0.22% | 1.330 | 0.184 | 0.31% | 2.998 | 0.003 |
| Standard Deviation | 1.97% | | | 2.82% | | | 2.16% | | |
| Sharp Ratio | 0.107 | | | 0.024 | | | 0.057 | | |
| (ii) Selection Return | 0.06% | 0.067 | 0.947 | -0.07% | -1.189 | 0.253 | -0.01% | -0.217 | 0.828 |
| Standard Deviation | 0.87% | | | 1.06% | | | 0.97% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 83.28% | | | 87.03% | | | 85.87% | | |
| Intercept | 0.006 | 1.090 | 0.277 | -0.000 | -1.090 | 0.276 | -3.533 | -0.085 | 0.932 |
| Slope Coefficient | 0.999 | 37.89 | 0.000 | 0.973 | 29.10 | 0.000 | 0.983 | 58.08 | 0.000 |



***(a) Sector decomposition***




***(b) Log Cum. Return***



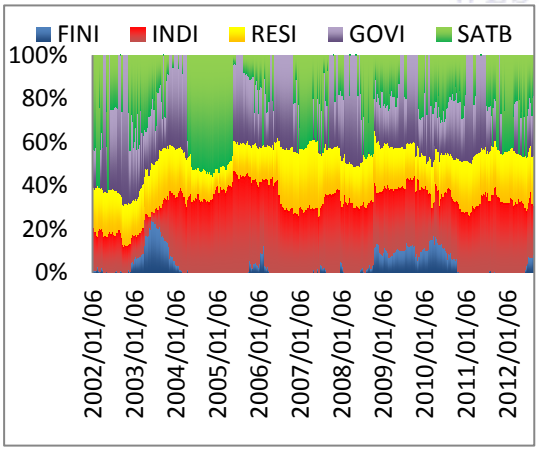
**OASIS CRESCENT EQUITY FUND** **(I- Net bridge code: OCEF)**

**Description:** The Oasis Crescent Equity Fund provides investors with the opportunity to invest in listed equities on both local and international stock exchanges within the ethical parameters of Shari'ah-governed investment. The Fund is a Shari'ah compliant collective investment scheme that adheres to the ethical investment guidelines that are prescribed by our Shari'ah Board. As a medium to high-risk investment vehicle, the primary objective of the Oasis Crescent Equity Fund is the protection and growth of investor capital through the application of stringent stock selection criteria to the investment process. The Fund's portfolio is managed in accordance with the Oasis investment philosophy of low volatility fund management that seeks to provide superior returns at lower than market risk

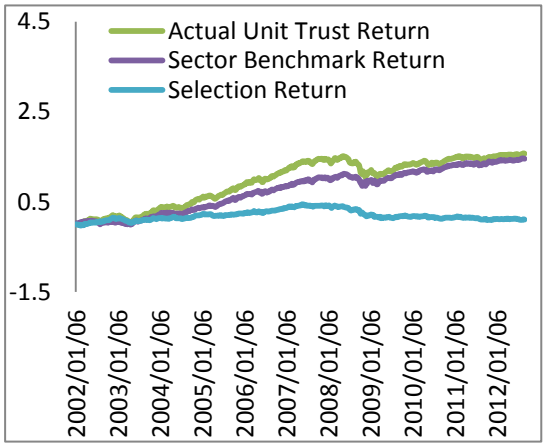
| **Inception: 1998/07/31**<br>**Fund value: R 5,037.9m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.50% | 5.451 | 0.000 | 0.09% | 0.722 | 0.441 | 0.30% | 3.926 | 0.000 |
| Standard Deviation | 1.54% | | | 1.99% | | | 1.79% | | |
| Sharp Ration | 0.209 | | | -0.003 | | | 0.072 | | |
| (i) Benchmark Return | 0.34% | 2.892 | 0.004 | 0.19% | 1.330 | 0.184 | 0.27% | 4.122 | 0.000 |
| Standard Deviation | 1.24% | | | 1.84% | | | 1.57% | | |
| Sharp Ratio | 0.135 | | | 0.022 | | | 0.067 | | |
| (ii) Selection Return | 0.16% | 2.892 | 0.004 | -0.11% | -1.823 | 0.069 | 0.02% | 0.585 | 0.559 |
| Standard Deviation | 0.89% | | | 0.97% | | | 0.93% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 67.17% | | | 76.20% | | | 85.87% | | |
| Intercept | 0.001 | 2.706 | 0.007 | -0.000 | -0.810 | 0.276 | 0.000 | 0.777 | 0.437 |
| Slope Coefficient | 1.012 | 23.81 | 0.000 | 0.898 | 0.945 | 0.000 | 0.970 | 38.31 | 0.000 |



***(a)*** ***Sector decomposition***




***(b)*** ***Log Cum. Return***

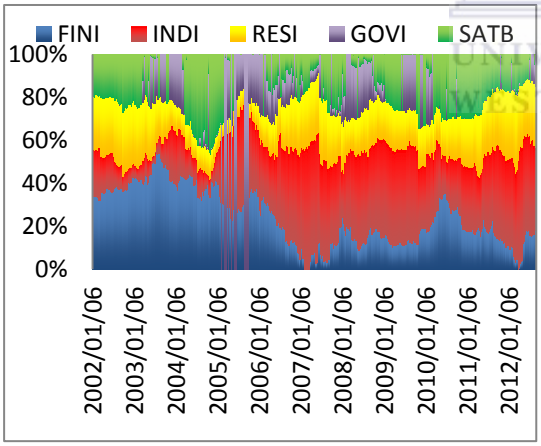


**PRUDENTIAL EQUITY FUND** **(I-Net bridge code: PRUO)**

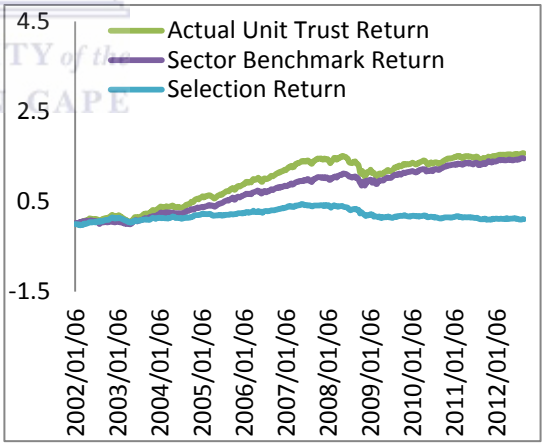
**Description:** The fund will seek to provide broadly based exposure to shares that offer value and medium to long term growth. Shares that offer value are those that are undervalued relative to their sector, earnings potential and growth potential.

| **Inception: 1999/08/01**<br>**Fund value: R 1,722.2m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.54% | 4.688 | 0.000 | 0.20% | 1.428 | 0.154 | 0.37% | 1.055 | 0.000 |
| Standard Deviation | 1.93% | | | 2.38% | | | 2.18% | | |
| Sharp Ration | 0.187 | | | 0.019 | | | 0.094 | | |
| (i) Benchmark Return | 0.35% | 3.567 | 0.000 | 0.18% | 1.330 | 0.184 | 0.27% | 3.166 | 0.001 |
| Standard Deviation | 1.65% | | | 2.29% | | | 2.00% | | |
| Sharp Ratio | 0.104 | | | 0.011 | | | 0.049 | | |
| (ii) Selection Return | 0.19% | 3.242 | 0.001 | 0.02% | 0.407 | 0.684 | 0.11% | 2.682 | 0.008 |
| Standard Deviation | 0.97% | | | 0.87% | | | 0.92% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 74.79% | | | 75.42% | | | 81.99% | | |
| Intercept | 0.001 | 3.116 | 0.002 | 0.000 | 0.810 | 0.276 | 0.001 | 2.772 | 0.437 |
| Slope Coefficient | 1.008 | 28.67 | 0.000 | 0.898 | 29.10 | 0.000 | 0.983 | 50.27 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

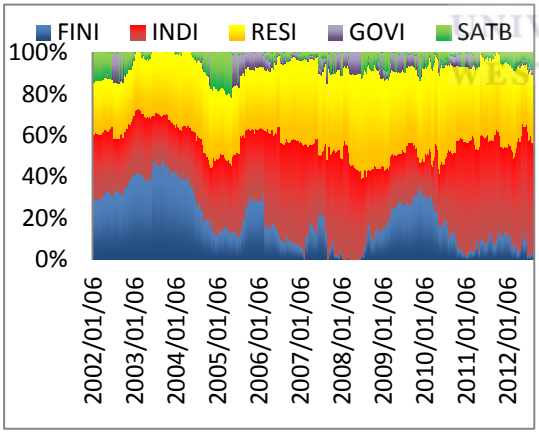


**GRYPHON ALL SHARE TRACKER** **(I-Net bridge code: PTST)**

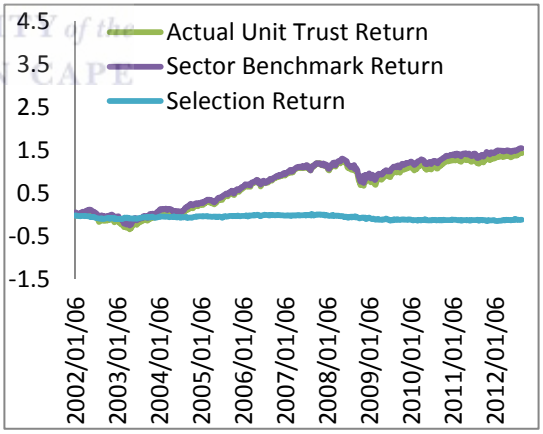
**Description:** The Gryphon All Share Tracker Fund is a passively managed index tracking portfolio, replicating the performance of the South African All Share index. Key Features * the fund is designed to track the performance of the South African All Share index, thereby seeking to generate optimal capital growth over time. * As it is an equity only fund, the risk profile of the fund is higher than that of balanced funds and therefore above average.

| **Inception: 1999/08/01**<br>**Fund value: R 31,80m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.41% | 2.956 | 0.003 | 0.17% | 0.905 | 0.366 | 0.30% | 2.487 | 0.013 |
| Standard Deviation | 2.36% | | | 3.19% | | | 2.81% | | |
| Sharp Ration | 0.100 | | | 0.005 | | | 0.045 | | |
| (i) Benchmark Return | 0.42% | 3.567 | 0.000 | 0.20% | 1.077 | 0.282 | 0.31% | 2.728 | 0.006 |
| Standard Deviation | 2.18% | | | 3.15% | | | 2.71% | | |
| Sharp Ratio | 0.110 | | | 0.014 | | | 0.053 | | |
| (ii) Selection Return | -0.01% | -0.091 | 0.927 | -0.03% | -0.518 | 0.605 | -0.02% | -0.460 | 0.645 |
| Standard Deviation | 0.78% | | | 0.97% | | | 0.89% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 88.82% | | | 90.73% | | | 90.01% | | |
| Intercept | -0.000 | -0.268 | 0.788 | -0.000 | -0.397 | 0.691 | -0.000 | -0.318 | 0.750 |
| Slope Coefficient | 1.020 | 46.93 | 0.000 | 0.965 | 51.91 | 0.000 | 0.983 | 70.72 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

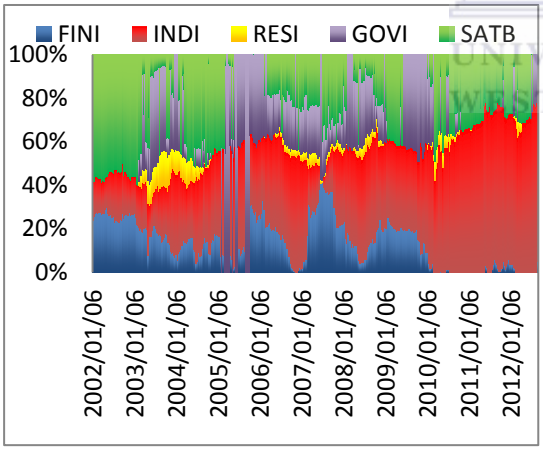


**MOMENTUM INDUSTRIAL FUND** **(I-Net bridge code: RMCF)**

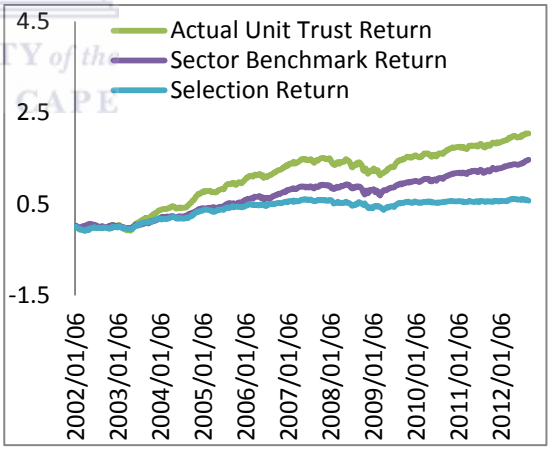
**Description:** The fund's objective is to maximise equity portfolio returns over the FTSE/JSE Industrial index. The performance of the fund relative to this index is a function of the weightings given to individual securities within this sector.

| **Inception: 1998/07/01**<br>**Fund value: R 141,4m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.55% | 5.782 | 0.000 | 0.22% | 1.798 | 0.073 | 0.39% | 4.916 | 0.000 |
| Standard Deviation | 1.58% | | | 2.08% | | | 1.85% | | |
| Sharp Ration | 0.231 | | | 0.032 | | | 0.117 | | |
| (i) Benchmark Return | 0.33% | 4.682 | 0.000 | 0.23% | 2.095 | 0.037 | 0.28% | 4.314 | 0.000 |
| Standard Deviation | 1.16% | | | 1.79% | | | 1.51% | | |
| Sharp Ratio | 0.125 | | | 0.037 | | | 0.070 | | |
| (ii) Selection Return | 0.22% | 3.416 | 0.001 | -0.01% | -0.007 | 0.995 | 0.11% | 2.289 | 0.022 |
| Standard Deviation | 1.18% | | | 1.18% | | | 1.13% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 53.51% | | | 67.89% | | | 62.52% | | |
| Intercept | 0.002 | 3.321 | 0.001 | 0.000 | 0.125 | 0.901 | 0.001 | 2.416 | 0.016 |
| Slope Coefficient | 0.992 | 17.86 | 0.000 | 0.986 | 24.15 | 0.000 | 0.971 | 30.42 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***



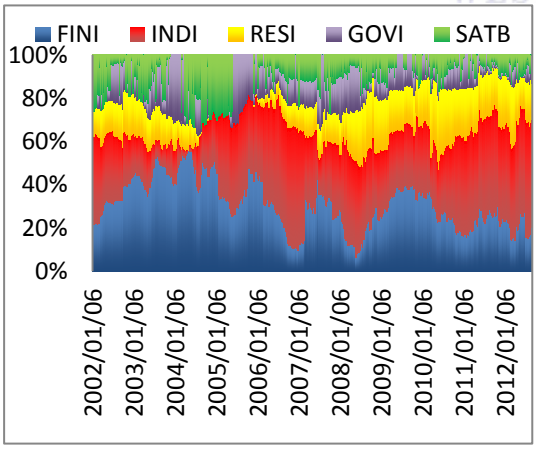
**MOMENTUM EQUITY FUND** **(I Net-bridge code: RMEF)**

**Description:** In selecting securities for the Momentum Equity Fund, the Manager shall seek to achieve an investment medium for investors which shall have as its primary objective to deliver high long term capital growth to investors. The portfolio's investment universe will apart from assets in liquid form, consist of equity - and property securities, as well as preference shares. The portfolio may from time to time invest in financial instruments, in accordance with the provisions of the Act, and the Regulations thereto, as amended from time to time, in order to achieve the portfolio's investment objective. The manager may also include unlisted forward currency, interest rate and exchange rate swap transactions.

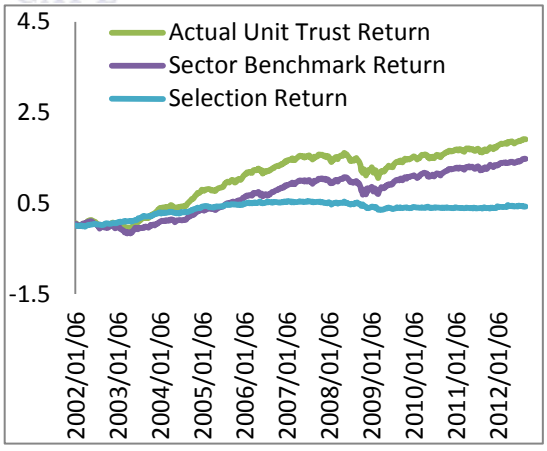
| **Inception: 1987/11/16**<br>**Fund value: R 2,707.8m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.57% | 5.134 | 0.000 | 0.17% | 1.038 | 0.299 | 0.37% | 3.765 | 0.000 |
| Standard Deviation | 1.86% | | | 2.70% | | | 2.32% | | |
| Sharp Ration | 0.210 | | | 0.004 | | | 0.087 | | |
| (i) Benchmark Return | 0.38% | 4.682 | 0.000 | 0.20% | 1.339 | 0.182 | 0.29% | 3.186 | 0.001 |
| Standard Deviation | 1.68% | | | 2.52% | | | 2.14% | | |
| Sharp Ratio | 0.116 | | | 0.018 | | | 0.056 | | |
| (ii) Selection Return | 0.20% | 3.640 | 0.000 | -0.03% | -0.534 | 0.593 | 0.08% | 1.929 | 0.054 |
| Standard Deviation | 0.91% | | | 1.08% | | | 1.00% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 85.86% | | | 75.42% | | | 81.53% | | |
| Intercept | 0.001 | 2.281 | 0.023 | 0.000 | 0.810 | 0.419 | 0.001 | 2.046 | 0.041 |
| Slope Coefficient | 1.048 | 27.88 | 0.000 | 0.898 | 29.10 | 0.000 | 0.980 | 49.51 | 0.000 |



***(a)*** ***Sector decomposition***




***(b)*** ***Log Cum. Return***

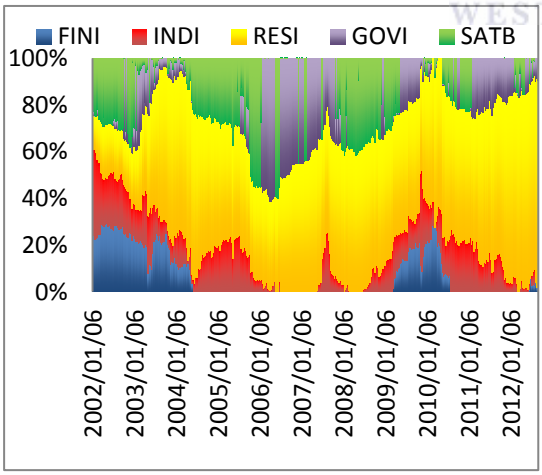


**SIM RESOURCES FUND** **(I Net-bridge code: SNFT)**

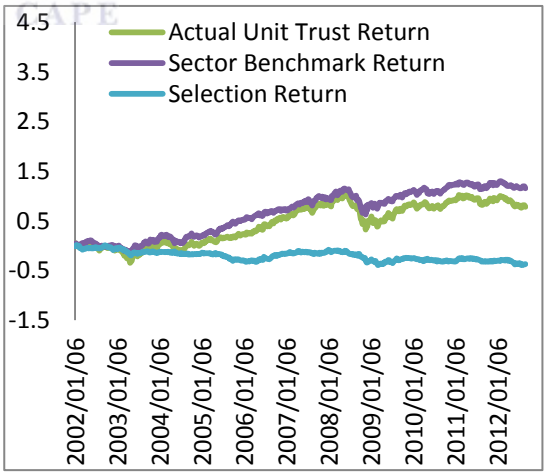
**Description:** This specialist fund focus on maximum capital growth by taking advantage of changing resources cycles by investing in companies engaged in exploration, mining, distribution and processing of metals, minerals, energy, chemicals, forestry and other resources. The fund will appeal to the knowledgeable investor who is prepared to take on calculated risk.

| **Inception: 1998/01/10**<br>**Fund value: R 59.90m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.29% | 1.999 | 0.046 | 0.08% | 1.384 | 0.701 | 0.18% | 1.473 | 0.141 |
| Standard Deviation | 2.42% | | | 3.40% | | | 2.95% | | |
| Sharp Ration | 0.045 | | | -0.023 | | | 0.005 | | |
| (i) Benchmark Return | 0.33% | 2.681 | 0.008 | 0.16% | 1.339 | 0.182 | 0.24% | 2.183 | 0.295 |
| Standard Deviation | 2.04% | | | 3.09% | | | 2.64% | | |
| Sharp Ratio | 0.072 | | | -0.000 | | | 0.028 | | |
| (ii) Selection Return | -0.04% | 3.640 | 0.000 | -0.03% | -0.534 | 0.593 | 0.08% | 1.929 | 0.054 |
| Standard Deviation | 1.26% | | | 1.37% | | | 1.32% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 72.83% | | | 83.74% | | | 80.09% | | |
| Intercept | -0.000 | -0.545 | 0.586 | -0.000 | -0.963 | 0.336 | -0.001 | -1.071 | 0.285 |
| Slope Coefficient | 1.013 | 27.25 | 0.000 | 1.006 | 37.71 | 0.000 | 0.008 | 47.25 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

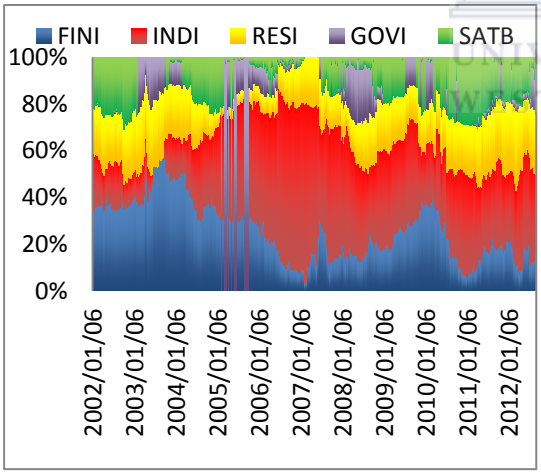


**SIM GENERAL EQUITY - R** **(I-Net bridge code: SNTR)**

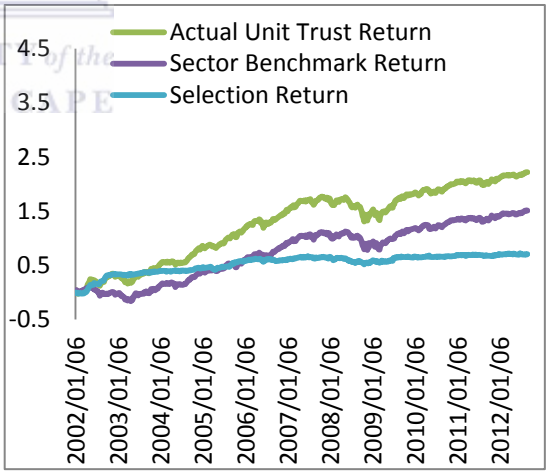
**Description:** This fund seeks maximum capital growth over the long term by investing in selected shares across all industry sectors of the JSE that are undervalued relative to realistic growth prospects. The trust can also invest in foreign markets.

| Inception: 1967/05/30<br>Fund value: R 3,310.1m | Sub period 1<br>(6 Jan 2002 to May 2007) | | | Sub period 2<br>(7 May 2007 to 2 Sep 2012) | | | Overall periods<br>(6 Jan 2002 to 2 Sep 2012) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.63% | 4.986 | 0.000 | 0.22% | 1.440 | 0.150 | 0.43% | 4.257 | 0.000 |
| Standard Deviation | 2.11% | | | 2.59% | | | 2.36% | | |
| Sharp Ration | 0.212 | | | 0.025 | | | 0.109 | | |
| (i) Benchmark Return | 0.40% | 3.595 | 0.000 | 0.19% | 1.341 | 0.181 | 0.30% | 3.245 | 0.001 |
| Standard Deviation | 1.82% | | | 2.40% | | | 2.14% | | |
| Sharp Ratio | 0.116 | | | 0.015 | | | 0.058 | | |
| (ii) Selection Return | 0.24% | 3.826 | 0.638 | 0.03% | 0.471 | 0.638 | 0.13% | 2.992 | 0.003 |
| Standard Deviation | 1.03% | | | 1.06% | | | 1.05% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 76.23% | | | 83.25% | | | 80.34% | | |
| Intercept | 0.002 | 3.698 | 0.000 | 0.000 | 0.526 | 0.598 | 0.001 | 3.012 | 0.003 |
| Slope Coefficient | 1.006 | 29.81 | 0.000 | 0.981 | 37.05 | 0.000 | 0.992 | 47.69 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

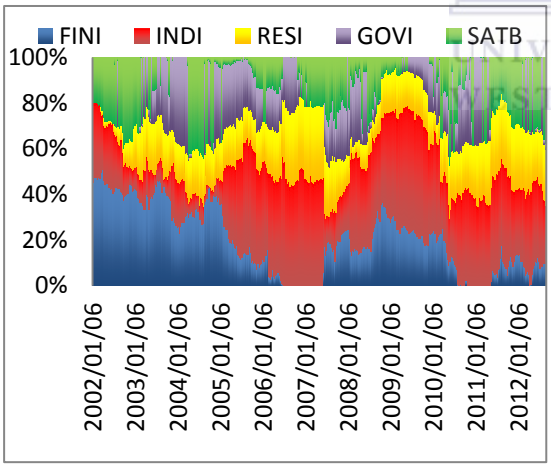


**PSG EQUITY FUND** **(I-Net bridge code: SPGG)**

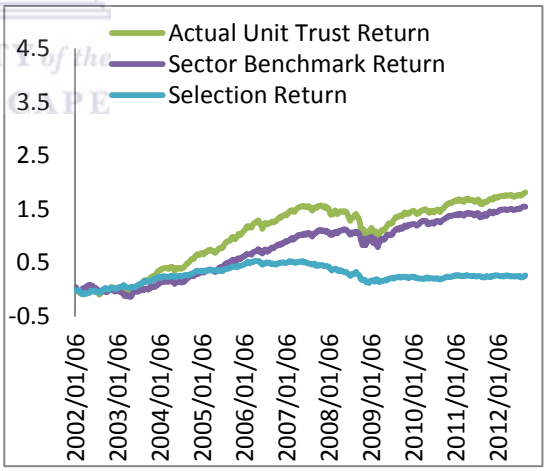
**Description:** The PSG Equity Fund is a general fund and the manager in selecting securities for the portfolio, will seek to offer investors long-term capital growth and earn a higher total rate of return than that of the South African equity market as represented by the All Share Index including income, without assuming a greater risk.

| **Inception: 1997/12/31**<br>**Fund value: R 766.32m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.58% | 5.035 | 0.000 | 0.13% | 0.825 | 0.410 | 0.35% | 3.626 | 0.000 |
| Standard Deviation | 1.19% | | | 2.61% | | | 2.30% | | |
| Sharp Ration | 0.206 | | | -0.011 | | | 0.080 | | |
| (i) Benchmark Return | 0.38% | 3.888 | 0.000 | 0.21% | 1.518 | 0.130 | 0.30% | 3.458 | 0.001 |
| Standard Deviation | 1.64% | | | 2.34% | | | 2.02% | | |
| Sharp Ratio | 0.122 | | | 0.024 | | | 0.063 | | |
| (ii) Selection Return | 0.19% | 2.961 | 0.003 | -0.08% | -1.209 | 0.227 | 0.05% | 1.139 | 0.255 |
| Standard Deviation | 1.09% | | | 1.16% | | | 1.13% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 67.75% | | | 80.18% | | | 75.61% | | |
| Intercept | 0.002 | 3.139 | 0.002 | -0.000 | 0.810 | 0.234 | 0.000 | 1.210 | 0.226 |
| Slope Coefficient | 0.956 | 24.03 | 0.000 | 0.997 | 33.42 | 0.000 | 0.986 | 41.48 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

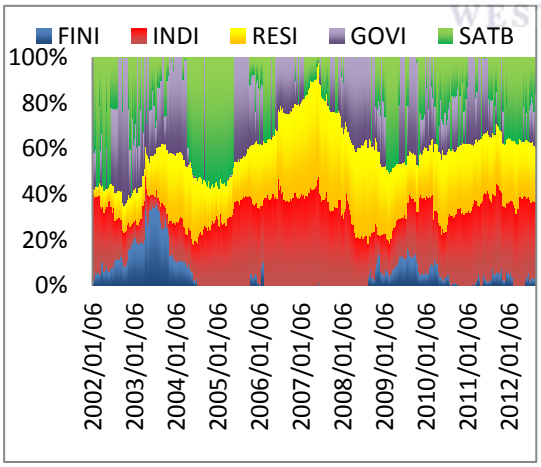


**OLD MUTUAL ALBARAKA EQUITY FUND (I-Net bridge code: STPF)**

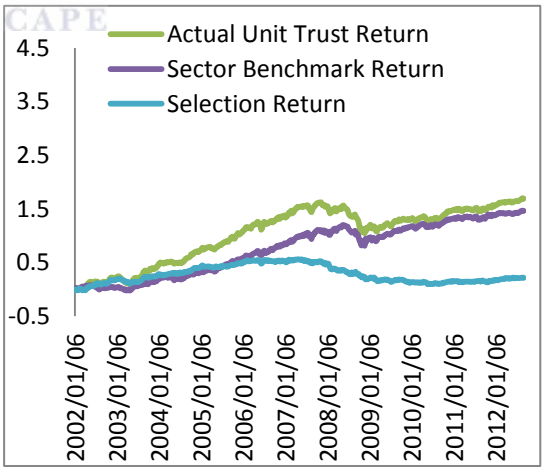
**Description:** The FuturegrowthAlbaraka Equity Fund is a Shari'ah compliant fund which provides investors with cost-effective access to a broad spectrum of JSE listed investments. The Fund is strictly managed in accordance with Shari'ah Law and therefore does not invest in shares that have an association with alcohol, gambling, non-halaal foodstuffs or interest-bearing instruments. The Fund is exposed to the movements and sensitivities of the equity market. The Fund also assumes mandate risk as its mandate precludes investments in non-Shari'ah compliant shares including financial shares and interest-bearing instruments.

| Inception: 1992/06/01<br>Fund value: R 1,174.2m | Sub period 1<br>(6 Jan 2002 to May 2007) | | | Sub period 2<br>(7 May 2007 to 2 Sep 2012) | | | Overall periods<br>(6 Jan 2002 to 2 Sep 2012) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.57% | 5.077 | 0.000 | 0.08% | 0.582 | 0.561 | 0.32% | 3.626 | 0.000 |
| Standard Deviation | 1.88% | | | 2.24% | | | 2.08% | | |
| Sharp Ration | 0.207 | | | -0.036 | | | 0.075 | | |
| (i) Benchmark Return | 0.37% | 3.233 | 0.000 | 0.19% | 1.443 | 0.150 | 0.28% | 3.535 | 0.000 |
| Standard Deviation | 1.42% | | | 2.23% | | | 1.87% | | |
| Sharp Ratio | 0.130 | | | 0.015 | | | 0.059 | | |
| (ii) Selection Return | 0.20% | 3.233 | 0.001 | -0.01% | -1.704 | 0.090 | 0.04% | 0.966 | 0.335 |
| Standard Deviation | 1.05% | | | 1.12% | | | 1.10% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 68.98% | | | 76.30% | | | 72.23% | | |
| Intercept | 0.002 | 2.613 | 0.009 | -0.000 | -1.387 | 0.167 | 0.000 | 1.287 | 0.198 |
| Slope Coefficient | 1.095 | 24.82 | 0.000 | 0.877 | 29.81 | 0.000 | 0.944 | 37.99 | 0.000 |

***(a) Sector decomposition***




***(b) Log Cum. Return***

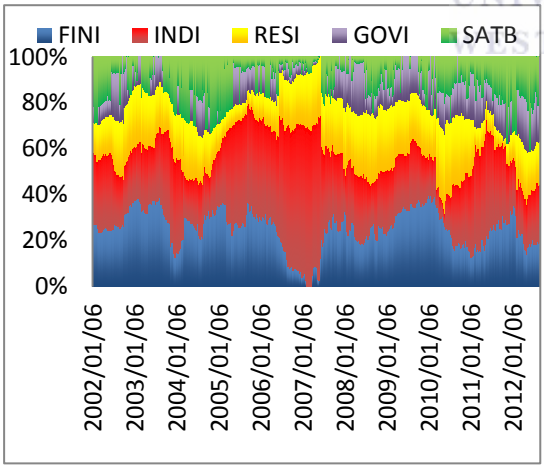


**IP EQUITY FUND** **(I Net-bridge code: TREF)**

**Description:** Investment Objectives to achieve long-term capital growth and top half performance in its peer group. The fund is managed in a conservative manner and a long-term horizon is adopted when investment decisions are take. We aim to identify undervalued shares which we feel will unlock value over the long-term. Nature of the IP Equity Fund is a pure equity fund suitable for those investors wishing to benefit from the higher growth rates available from equities over time. The fund is actively managed in accordance with our house view.

| **Inception: 1999/02/23**<br>**Fund value: R 20.50m** | **Sub period 1**<br>**(6 Jan 2002 to May 2007)** | | | **Sub period 2**<br>**(7 May 2007 to 2 Sep 2012)** | | | **Overall periods**<br>**(6 Jan 2002 to 2 Sep 2012)** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Performance attribution** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| Fun Returns | 0.49% | 3.919 | 0.000 | 0.00% | 0.041 | 0.967 | 0.25% | 2.505 | 0.013 |
| Standard Deviation | 0.49% | | | 2.56% | | | 2.35% | | |
| Sharp Ration | 0.063 | | | -0.059 | | | 0.034 | | |
| (i) Benchmark Return | 0.40% | 3.705 | 0.000 | 0.19% | 1.339 | 0.182 | 0.30% | 3.333 | 0.000 |
| Standard Deviation | 1.81% | | | 2.40% | | | 2.13% | | |
| Sharp Ratio | 0.122 | | | 0.017 | | | 0.061 | | |
| (ii) Selection Return | 0.09% | 1.523 | 0.129 | -0.19% | -3.186 | 0.002 | -0.05% | -1.205 | 0.229 |
| Standard Deviation | 0.98% | | | 1.01% | | | 1.01% | | |
| **Regression Fund Return** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** | **values** | **t-stats** | ***p*-value** |
| R Squared | 77.87% | | | 84.40% | | | 81.57% | | |
| Intercept | 0.000 | 1.344 | 0.179 | -0.002 | -3.098 | 0.002 | -0.000 | -1.164 | 0.244 |
| Slope Coefficient | 1.021 | 31.22 | 0.000 | 0.898 | 38.65 | 0.000 | 0.996 | 49.56 | 0.000 |

***(a)*** ***Sector decomposition***




***(b)*** ***Log Cum. Return***