THE PERSISTENCE OF ACTIVE SHARE AND TRACKING ERROR IN THE CONTEXT OF SOUTH AFRICAN MUTUAL FUNDS

by

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MCOM (FINANCE)

in the

SCHOOL OF ECONOMIC AND BUSINESS SCIENCES

at the

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

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Date of first submission: 29 March 2019
Date of final submission: 25 February 2020

SCHOOL OF ECONOMIC AND BUSINESS SCIENCES

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ABSTRACT

Many active fund managers aim to generate a return in excess of their benchmark (net of fees), i.e. they wish to add alpha to the investment and add excess return. Fund managers aim to earn fees by out-performing a benchmark, typically an index – this is a 'reward' for their expertise and skill. They aim to generate a return that is greater than that of the benchmark that they have set in order to provide their investors with a profit that is greater than their passive counterparts. A comparison with a benchmark indicates actual performance relative to the desired portfolio management strategy. Benchmarks provide a starting point for portfolio holdings; a manager will deviate from these weights and often these securities in order to try and take active positions to earn a greater return. By serving as the starting point, benchmarks are also the control mechanism for active risk as one can measure the active risk of a portfolio by looking at Tracking Error or by looking at Active Share.

This study looks at the persistence of Active Share and Tracking Error in the context of South African mutual funds - a sample of unit trusts, representing approximately 63% of the revised assets under management in the South African general equity fund industry, was selected. It was found that Active Share and Tracking Error are persistent in South Africa – indicating that the Active Share / Tracking Error today is a good indication of the Active Share / Tracking Error tomorrow.

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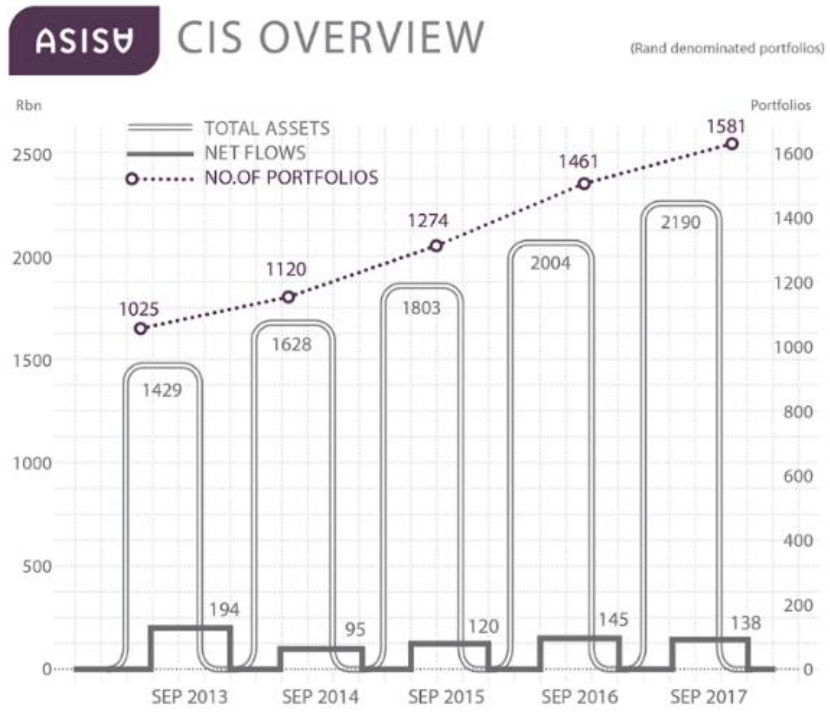
THE PERSISTENCE OF ACTIVE SHARE AND TRACKING ERROR IN THE CONTEXT OF SOUTH AFRICAN MUTUAL FUNDS

1 INTRODUCTION

It can be noted that the importance of the mutual fund industry is growing and is becoming increasingly important. This can be seen in many of the markets around the world, including South Africa. Inflows into actively and passively managed funds confirm that there are strong arguments for both active and passive funds. Looking at an example, it can be seen that in the U.S. - at the end of 2016, the total assets managed by U.S. mutual funds was around $16.3 trillion – around 85% of all US-registered investment company total net assets (Investment Company Institute, 2017).

Looking at South Africa, one can also say that the mutual fund industry has grown. Figure 1 shows this growth in Collective Investment Scheme Funds (Mutual Funds) in South Africa. During 2017, the total assets managed by S.A. mutual funds was around R2.2 trillion. (Association for Savings and Investment SA, 2017).

1.1.1 Figure 1 – Total assets under management in South Africa



Source: Association for Savings and Investment SA, 2017

From the above figure, it can be seen that there is a steady increase in total assets under management in South Africa.

Looking at passive investing - a manager tracks a predetermined index and aims to gain a return that is in line with this specific index. Looking at South Africa, a passive manager may track the ALSI index, simulating a similar portfolio as the ALSI and therefore will incur similar risks to this investment as well as similar returns. The manager does not use any 'skill' as he does not stock pick or take many active bets. The performance fees incurred with passive management are only based on the manager's ability to track the predetermined index i.e. the given benchmark and this is measured by a tracking error.

Looking at active investing – this type of investing aims to provide a return that is higher than that of an index (or the benchmark they are trying to beat). Managers are able to use their skill to take active bets (or active positions) by timing the market and by stock picking - outperforming the index by identifying mispriced assets. The fact that active managers take on this active risk by

deviating from their selected benchmark, they will need to have a measure of how well they are doing. It is vital that investors can see how well their investment is doing, especially if the manager is taking on more risk by taking active positions. The active managers attempt to beat a benchmark that is set to accurately reflect the risks that they have taken – in this way investors can compare their investment to the benchmark, looking at the risk and return of each. Investors give active managers a part of their wealth to manage – it is the job of these active portfolio managers to create a portfolio that will beat the return on the specific predetermined index or benchmark while having a low variance – which is measured by tracking error variance (Alexandera & Baptistab, 2010).

Active management is more costly than passive management. This is due to the fact that the investors need to pay for the manager's abilities and the time and skill used to manage their wealth. This management fee is a fee paid by investors for the many activities required in managing a portfolio. Investors are also typically happy to reward skill – i.e. if a manager produces a return higher than that of a pre-selected benchmark, the investors are happy to pay a reward/incentive fee.

As mentioned, and active manager can only add value to the investment by taking different positions to that in the benchmark – i.e by deviating from the benchmark. It can be said though, that there can be vast differences in the extent to which a manager is "active" – i.e. a manager can take a lot of active bets or can replicate the index more closely. A manager can deviate from their benchmark by investing in different shares, or investing more/less in a specific share that the benchmark does not invest in. In fact, active and passive are not opposites but rather ends of a scale - therefore managers may be situated at various points depending on the active bets/positions that they are willing to take – i.e. how active they are relative to other investments (Dodge and Cox, 2016).

In 2009, Cremers and Petajisto conducted a study of the mutual fund industry which aimed to provide an investor with a measure that would enable them to analyse their investment and to be able to measure active risk more accurately. They determined a measure, Active Share, which allows investors to separate truly active funds and enables these investors to separate these active funds from their passive counterparts. The measure forms the foundation of this research paper.

Muller and Ward (2011) produced the first study investigating Active Share in the South African context. Their sample was composed of 90 Unit Trusts between the years 2006 and 2010. Active Share positions are a mandatory condition for out-performance – as it is clear that the only way a manager can obtain a return higher than the benchmark is by deviating from the benchmark. Muller and Ward (2011) find no evidence, to support the idea that fund managers take good active positions – i.e. managers take on this additional risk (active positions) but are not rewarded for this as they do not earn any extra return for this deviation from their benchmark. Muller and Ward (2011) found no relationship was found between the level of Active Share and a fund's 5-year return.

As mentioned above, active management is more costly than passive management. Because of this, one has seen an increased focus on Active Share – i.e. investors have become aware that savings on fees is a way to better their performance. Investors can track the number of active bets their manager is taking and analyse if these positions have earned them any extra return or not. In this way, Active Share can be a performance-enhancement strategy.

The persistence in active share has not been investigated in South Africa.

In line with the above, the following core research questions are posited in this study:

1. Is Active Share persistent in South Africa – i.e. Active Share today is a good indicator of active share tomorrow as posited by (Cremers and Petajisto, 2009)?
    a. This study firstly seeks to investigate the Active Share of each South African mutual fund respectively.
    b. It will be assessed whether these measures are persistent or not – i.e. whether the measure today is a good predictor of the measure tomorrow. This will indicate whether Active Share is persistent in a South African mutual fund context.
2. Is Tracking error persistent in South Africa?
    a. This study firstly seeks to investigate the Tracking Error of each South African mutual fund respectively.
    b. It will be assessed whether these measures are persistent or not – i.e. whether the measure today is a good predictor of the measure tomorrow. This will indicate

whether Tracking Error is persistent in a South African mutual fund context. This study assumes that Tracking Errors are stationary.

To the best of the authors knowledge, this has been a neglected topic in South African literature.

This research paper will continue as follows; Section 2 will provide a historical background and development of benchmarking and Active Share internationally and it will outline the relevant seminal literature as well as provide insight into South African academic work of Active Share, Section 3 will provide insight into how the fund sample was selected as well as outline how each of the tests of persistence will be examined, Section 4 will analyse the results of the tests conducted on the funds and their corresponding benchmarks, and Section 5 will conclude.

2 LITERATURE REVIEW

2.1 MEASURING MUTUAL FUND RETURN PERFORMANCE

The value of active management compared to passive management has been a source of debate for decades – there is evidence available that supports both sides of the argument. Measuring the performance of mutual funds has become a critical component of financial services as investors want to know whether they are being indemnified for the risk that they are acquiring when investing in active shares.

“A Study of Mutual Funds” was the first empirical analysis of the performance of mutual funds undertaken by Friend, Brown, Herma and Vickers (1962). This paper researched over 100 mutual funds. Their results indicated that mutual funds earned an average annual return of 12.4%, while their benchmarks earned a return of 12.6% - this demonstrates that after expenses are taken into consideration, active management can generate lower returns compared to passive management, in this instance a value 0.2% lower was recorded. However, the overall results did not suggest an inefficiency in the industry.

Treynor and Mazuy (1966) researched the performance of over 50 fund managers. They considered the results in terms of the managers ability to time the market. The results suggest that, investors are completely reliant on market fluctuations. In addition to this, it was also established that the returns on the funds did not depend on the ability of managers to time the market – i.e. managers did not add any additional value to the investments by using their abilities to time share price movements. It was found that rates of return were elevated due to the fund managers' ability to identify under-priced industries and companies in other words, managers can add value to an investment by conducting market research on specific shares. A composite portfolio evaluation technique was founded and developed by Jensen (1968). This method focuses on calculating the risk-adjusted returns. Jensen (1968) evaluated the ability of 115 fund managers in determining securities during the period 1945 to 1966. He concluded that, there was minimal evidence that funds were able to perform significantly better than expected, in other words, active management does not add any additional value to the investment. This was because fund managers were not able to predict securities price movements.

Looking at studies in the U.S., it can be concluded that active portfolios generally underperform when comparing them to their benchmark indices. Jensen (1968) and Sharpe (1966) assert that mutual funds under-perform in the market by the amount of expenses they charge the investor. Malkiel's (2003) study used Jensen's Alpha and found that mutual funds (active management) generally underperforms the benchmark. This demonstrates that managers on average do not have the skill to achieve an alpha.

Roll (1977) finds that the only testable hypothesis of asset pricing theory is that the true market portfolio is ex-ante efficient. However, a proper test of this hypothesis poses a significant challenge. Even in tests of this, there are always portfolios which do not reject the hypothesis and that it is practically impossible to know the exact composition of the true market portfolio. Even a small, seemingly trivial misspecification of the proxy's composition can be vitally important in the test and can lead to a wrong conclusion. Roll (1977) believes that the two-parameter asset pricing theory is testable in principle, but it is practically impossible to correctly test the theory.

Beebower, Brinson, and Hood (1986) studied the performance contribution of market timing and security selection. They sampled over 90 large corporate pension funds during the period 1974 to 1983. They found that there was aggregate underperformance during this period – this is consistent with Jensen (1968). Although it was measured differently and during a different time period, it was concluded that strategically altering the investment mix and selecting individual securities should be addressed carefully and systematically as they did not conclude that it produced shares that overperformed.

Gruber (1996) found negative performance in his study of actively managed funds. A sample of 270 mutual funds was used – this sample accounted for a vast majority of the total assets held by common stock funds (77.2%). It was also found that the mutual funds fees are more than the value added – i.e. investors are losing out from the expenses charged. Gruber (1996) established that investors will invest in active funds due to the belief that these funds add value to your investment because of the expertise of management – however as indicated, this is not always the case.

Wermers (2003) investigated whether mutual fund shareholders are compensated for active management in other words he looked at whether investors are compensated when the fund deviates in holdings from that of its benchmark. His sample period was 1975 to 2000 in the U.S. mutual fund industry. He concluded that there is a positive relationship between the level of risk (as measured by tracking error) taken by a mutual fund and the performance of the fund – i.e. when the risk of the fund increases, the performance of the fund is also increased.

The measure of a fund's deviation from its benchmark or activeness has been approached in a variety of ways. A traditional measure used is tracking error.

2.2 LOOKING AT TRACKING ERROR

When measuring the risk of a portfolio, tracking error can be seen as the most common measure.

Standard deviation measures the volatility of return and has become the most used measure of absolute risk in a portfolio. This is shown in the formula below:

$$\sigma = \sqrt{\frac{(X-\bar{X})^2}{n-1}} \quad (1)$$

σ denotes standard deviation where Σ means "sum of", X is a value in the data set, $\bar{X}$ is the mean of the data set, and n is the number of data points in the population.

When looking at the risk of a portfolio, it is important to look at this risk in relation to a benchmark. This is where tracking error becomes an important measure of risk. Tracking error is related to excess return, this is because it is a measure of the standard deviation of a portfolio's excess returns i.e. the standard deviation of the absolute difference between a portfolio's return and the return of the benchmark. This is shown in the formula below:

$$Tracking\ Error = Stdev\,[R_{fund} - R_{index}] \quad (2)$$

This could be re-written as the sum of squared deviations between the funds return and the benchmarks return:

$$Tracking\ Error = \sqrt{\frac{\sum([R_{fund} - R_{index}]^2)}{n-1}} \quad (3)$$

Tracking error has become a go to measure for investors to analyse the risk of their investment, this is because tracking error measures the risk which cannot be credited to the benchmark index risk.

Many investors are focusing on the volatility of tracking error or the variability of the difference between the managers return and the benchmark's return according to Roll (1992). The minimization of tracking error volatility has become a critical criterion for assessing overall

manager performance. Roll (1992) indicated that a low tracking error volatility is sensible for several reasons. This includes the idea that active management would outperform the benchmark every month by a fixed net amount of fees and expenses – this would imply a tracking error of zero. This could enable the sponsor to know that the manager is adding value over that of the benchmark.

Roll (1992) posited the TEV Criterion – Roll (1992) makes a mean-variance analysis of tracking error, and defines the tracking error variance (TEV) criterion, where the tracking error is defined by the square of the difference between the performance of the portfolio and a benchmark. In his seminal paper, Roll (1992) stated that there is a criterion within asset management. This criteria states that if managers have the same beliefs and the same assets to trade, regardless of their specific predetermined benchmark, they will conduct the same trades and take on the same risk.

As stated above, tracking error looks at risk. More specifically the risk of performance – whether the fund outperforms or underperforms its predetermined benchmark. Tracking error looks at the excess returns of a portfolio so it can be seen as an indication of how consistently a portfolio performs. The lower the tracking error, the more closely the portfolio mimics its benchmark's performance – i.e. the fund is invested in the same or in a similar way to the benchmark. A higher tracking error means that the fund has deviated from the benchmark – i.e. the fund's holdings are not the same or not similar to the benchmark's holdings.

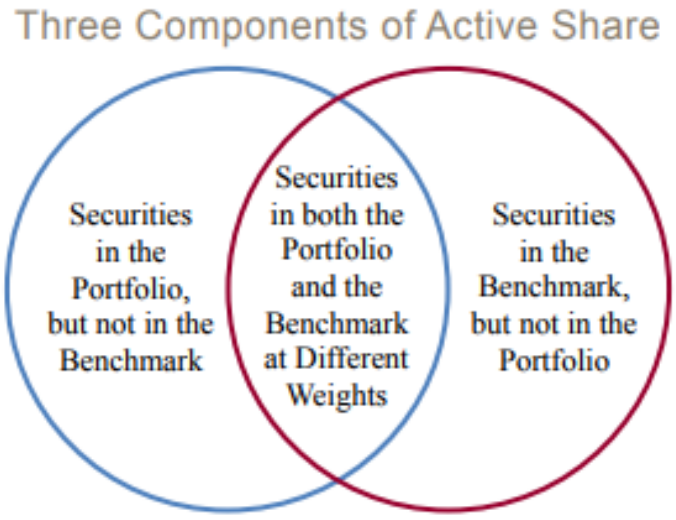
Tracking error is sometimes referred to as "active" risk. Tracking error can be referred to as "active risk" because it measures a decision by the portfolio manager to deviate from the benchmark's holdings and position weights which will affect the return generated (Thomas, Rottschafer and Zvingelis, 2013).

2.3 LOOKING AT ACTIVE SHARE

In 1992, Bailey defines eight criteria for an appropriate benchmark. One of them is **active position** and is defined as the difference between the managed portfolio's and the benchmark portfolio's holdings for a particular security. Positive active positions are associated with an appropriate benchmark and an active manager should hold more positive active positions than negative.

In 2009 Cremers and Petajisto provide an investor with a measure known as Active Share – which is quite similar to the idea above from Bailey (1992). The measurement of active shares looks at how many of the funds' holdings are the same as those in their benchmark indexes – it looks at how closely the funds' holdings replicate or follow the holdings of the benchmark. An actively managed fund can only do its job and outperform its index when some holdings and weightings differ from those of the index – i.e. when they are taking an active position and adding risk to the portfolio. The greater the proportion of Active Share (active bets), the greater the opportunity that a manager can outperform and the greater the funds Active Share.

2.3.1 Figure 2 – Three components of Active Share



Source: Mertens and Calamar (2010)

The formula below (formula 4) shows how active share is calculated.

$$Active\ Share = \frac{1}{2}\sum_{i=1}^{n}\left|w_{fund,i} - w_{index,i}\right| \quad (4)$$

Source: Cremers & Petajisto (2009)

"We can decompose a mutual fund portfolio into a 100% position in the benchmark index, plus a zero-net investment long-short portfolio. The long-short portfolio represents all the active bets the fund has taken. Active Share then measures the size of that long-short position as a fraction of the total portfolio of the fund. We divide the sum of portfolio weight differences by 2 so that a fund that has a zero overlap with its benchmark index gets a 100% Active Share" (Cremers & Petajisto, 2009:3335).

The above formula emphasizes that any difference in portfolio weights contributes to Active Share – this can be from overweighting or underweighting specific shares. This formula does not distinguish between fund positions in the benchmark from fund positions not in the benchmark – this formula does not clearly show that these positions are treated differently. This is specifically a problem when it is noted that any position in a stock outside the benchmark contributes positively to Active Share. Therefore, only positions that are in both the fund and the benchmark can decrease Active Share i.e. only positions that overlap will contribute to a decrease in Active Share. This is better expressed by the following, new alternative formula for Active Share as developed by Cremers (2016):

$$Active\ Share = 100\% - \sum_{i=1}^{N} MIN(w_{fund,i}, w_{benchmark,i})xd\left[w_{fund,i} > 0\right] \quad (5)$$

The above formula (5) is an adjusted formula and now shows that Active Share is only lowered by overlapping positions. This means that Active Share is only decreased when the fund and the index invest in the same position (at the same/different weightings). This formula clearly indicates that only overlapping positions lower Active Share.

As noted, tracking error has been used previously for the measure of active risk in a portfolio. Cremers and Petajisto (2009) argue that tracking error alone is not the best indicator of how actively managed a portfolio is in terms of stock selection. This is because they found that factor

timing can influence tracking error as much as stock selection. Therefore, Active Share can generate a better idea of the degree of active management as it focuses on the composition of the portfolio itself instead of focussing on returns only.

Cremers and Petajisto (2009) found that active bets and fund performance are related – specifically that active bets can predict the performance of the fund. In other words, the funds with the highest Active Share (or funds that take active bets) outperformed their benchmark indices, and the funds with the lowest Active Share (or funds that do not take as many active best), underperformed. The most actively managed funds, with an active share of 80% and above, have outperformed by an average of 1.26% a year, after fees and expenses (Petajisto, 2013).

Petajisto's (2010) study is closely related to Cremers and Petajisto (2009) but takes a different look under different market conditions with a larger sample and a longer time period – the time period was extended by three additional years. This creates a more in-depth study. Weak performance was found across all actively managed funds – indicating that active bets do not always provide to add return to the investor. The only group adding value to investors was found to be 'active stock pickers', which beat their benchmarks. Before fees were taken into consideration, the funds labelled 'stock pickers' had outperformed their benchmarks by over 2% showing significant skill and expertise.

In 2012, Mauboussin analysed Active Share and found that there are two ways to deviate from the benchmark and take active bets. The first is through **stock selection** – this method means that managers buy stocks that are not represented in the index or they buy stocks at a higher/lower weight than that of the benchmark. In this way, they are creating active bets as they are deviating from what the benchmark/index has invested in. The second way to raise active share is through **systematic factor risk** – this is a bet on industries by overweighting or underweighting specific industries. This systematic risk factor is captured nicely by the measure tracking error.

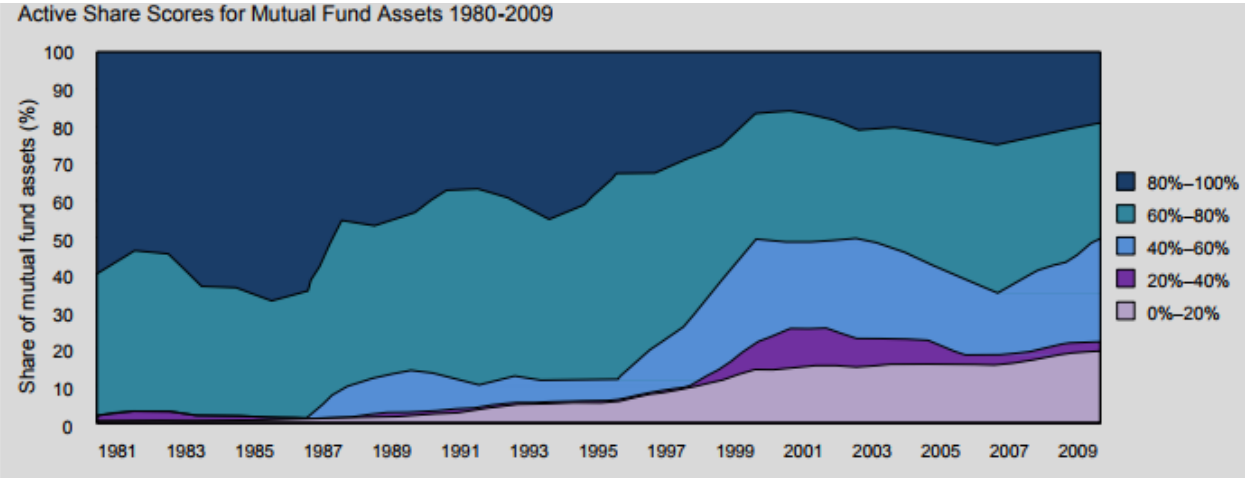
There is a **clear relationship between Active Share and tracking error**. When active share is low, tracking error tends to be low and when active share is high, tracking error tends to be high (Mauboussin 2012).

Petajisto (2013) added six more years of data to their study. It was found that the active stock pickers again outperformed their benchmark indices even after fees and transaction costs – indicating that generating Active Share is effective through stock picking. Using the same database, Frazzini, Friedman, and Pomorski (2016) of AQR Capital Management examined the evidence and the theoretical arguments for Active Share as a predictor of performance. They found that while active share correlates with benchmark returns, it doesn't predict actual fund returns.

Cremers and Petajisto's (2009) research on Active Share had two findings that were of importance. The first was that mutual funds with high Active Share exhibited higher returns – i.e. Active Share and returns are positiviely related. When a manager takes on more active bets and their Active Share increases, they will have a better chance of gaining higher returns. It was also found that Active Share was shown to a good predictor for performance – this was shown in the fact that as the level of a manager's Active Share increased so too did the manager's future relative returns. Subsequent research by Cremers, Ferreira, Matos and Starks (2014) confirmed that this relationship also held true with equity funds outside the U.S.

The second finding from Cremers and Petajisto (2009) was that the percentage of U.S. equity mutual fund assets that were being managed by high Active Share managers appears to have significantly declined.

2.3.2 Figure 3 – Active Share Scores for Mutual Fund Assets



Source: Petajisto (2013)

Historically, high Active Share funds outperform their reported benchmarks (Frazzini, Friedman and Pomorski, 2015). Investors may prefer to invest in funds with a higher Active Share because they have interpreted these findings to mean that higher Active Share funds will have higher returns and vice versa. They believe that investors have been better off by selecting funds with a higher Active Share because of this belief (Frazzini, Friedman and Pomorski, 2015).

Frazzini, Friedman and Pomorski (2015) find no significant statistical evidence that high and low Active Share funds have returns that are different from each other – i.e. they do not find a relationship between Active Share and performance. They conclude that Active Share does not reliably predict performance.

(Frazzini, Friedman and Pomorski, 2015) show that Active Share may not be useful for predicting outperformance, but it can be useful for evaluating costs. The authors believe that fees and costs incurred from investing in active portfolios should be in line with the active risk or active bets taken.

(Frazzini, Friedman and Pomorski, 2015) find that their conclusions do not support an emphasis on Active Share as a tool for selecting managers or as an appropriate guideline for institutional

portfolios. Active Share is a measure of active risk, and simply taking on more risk is unlikely to lead to outperformance just by itself.

However, numerous studies show managers with high Active Share strategies are more likely to generate higher returns over the long-run. Funds with a high Active Share have greater potential to generate returns that are greater than that of the index, this is because they have taken additional risk. But it can also be noted, that there can actually be a positive or negative difference between the performance of the fund and the performance of the index. This is due to the fact that additional active bets or active risk has been taken. Research indicates that several managers have, in fact, generated outperformance by their active management (Dodge and Cox, 2016).

Cremers (2016) conducted a study over the period 1990-2015 in the retail U.S. equity mutual fund space. Three main results were found:

1. Funds with low Active Share and relatively high fees underperform. This indicates that investors in funds with low Active Share should carefully monitor the amount they pay.
2. The only funds which were classed as 'active stock pickers' were successful in the long-term.
3. Small cap funds tend to have higher Active Shares and better performance. This suggests that small cap managers have better stock picking opportunities in general.

Cremers (2016) conclude that Active Share matters for investors as it allows investors to differentiate between funds that do or do not engage in stock picking. It was found that there is no evidence that high Active Share funds have underperformed on average in the long-term.

2.3.3 Active Share vs Tracking Error

The main conceptual difference between Active Share and tracking error is that tracking error puts significantly more weight on correlated active bets - bets on systematic factors. This makes tracking error a reasonable proxy for factor timing. Active Share puts equal weight on all active bets, regardless of whether the risk in such bets is largely diversified away in a portfolio. Thus, it serves as a reasonable proxy for stock selection

There is a clear relationship between active share and tracking error. When active share is low, tracking error tends to be low and when active share is high, tracking error tends to be high. But the data show some amount of variation. For example, funds with tracking error of 4-6 percent can have active shares of 30 percent to 100 percent, while active shares in the 70-80 percent range can be associated with tracking errors between 2 and 14 percent. This range of values for each measure of active management shows why it is important to distinguish between the two (Mauboussin, 2012). Active Share does not require any assumptions about the portfolios, and it is an extremely simple and intuitive measure with a convenient economic interpretation.

Tracking error is intuitively appealing as it is a composite percentage measure of the bet size taken at the stock level relative to an index. Tracking error volatility serves well as a measure of factor bets while Active Share is a good gauge of stock selection. Higher Active Share, like tracking error volatility, should be interpreted as having the potential to generate a wider band of excess return outcomes, both positive and negative. Portfolios can be highly active with low tracking error if Active Share is high.

Active Share is best used in conjunction with tracking error. Together, they provide a more complete picture. Together they can show the degree to which a portfolio is actively managed and the extent to which the manager is paying attention to the allocation of the portfolio's active risk. Like higher Active Share, higher tracking error volatility should also be interpreted as having the potential to generate a wider band of excess return outcomes, both positive and negative.

2.4 LOOKING AT SOUTH AFRICA

"The unit trust industry in South Africa started as a single fund in June 1965. This fund was established to offer the ordinary investors a convenient investment product which allowed assets to be managed professionally, spread risk across a broad portfolio of shares, provided the investor with the ability to liquidate the investment at short notice, required low initial investment amounts, and ensured tax effectiveness and low cost, compared to other products available at the time" (Oldert 2005:30).

"By June 2005, there were 567-unit trusts, with total assets valued at more than R345 billion. In contrast to single equity funds, the unit trust industry has grown to include money market funds, gilt funds, many specialist equity funds, international funds, funds of funds, wrap funds and index funds. The two main factors that led to this explosion of funds were increased consumer sophistication about what consumers demand from different investment products on the one hand, and inevitable product differentiation on the part of management companies on the other" (Oldert 2005:33).

The table below shows the different benchmarks or indices available in South Africa and a brief description of each.

2.4.1 Table 1 – Benchmarks in South Africa

Benchmark	**Description**
All-Share Index (ALSI)	The All-Share Index is made up in line with the FTSE Global Classification system based on the free float index methodology. The ALSI constitutes more than 150 companies that are listed on the JSE. In South Africa, it is the largest index size-wise and in terms of its overall value.
Shareholder Weighted Index (SWIX)	The SWIX removes the foreign holdings of some shares and therefore is a closer representation of what local investors hold. The SWIX Index is arrived at by excluding the shares, held by foreigners, in dual-listed companies. The SWIX is a specific type of weighting based on the percentage of free-float held by SA investors based on the share register maintained by STRATE.
Capped Index (CAPI)	The construction of the CAPI follows the ALSI construction methodology and only differs with regards to the capping of weightings to 10%. Any share which constitutes more than 10% of the index is capped at 10%. This will affect the remaining shares and any, which as a result, exceed 10% are capped at 10%.

Down-weighted resources benchmarks (RESI)	This index is a customized benchmark used by South African fund managers to avoid being overweight in resources shares since many of the large cap companies are resource based. Companies in the resources sector have their weighting lowered to between 50% to 80% of their actual weighting.

Adapted from Kruger and van Rensburg (2008)

In emerging markets, the JSE is one of the largest exchanges. It is a market which suffers from high concentration. The FTSE/JSE All-Share Index (ALSI) captures approximately 99% of the value of tradable ordinary shares in South Africa.

The Johannesburg Stock Exchange (JSE) is characterized by a few large cap companies that dominate the market and other companies where there is a concentration of holdings and lack of liquidity. (Kruger and van Rensburg, 2008). It also suffers from the volatility associated with Naspers as it has become Naspers heavy.

If a market index is composed of a few large cap stocks which lead to a concentrated index, then it is not a suitable benchmark. This is because fund managers have a limited choice and therefore they essentially become passive managers as opposed to active managers who have a large number of similarly large companies to choose from (Strongin, Petsch and Sharenow, 2000).

In their paper, Kruger and Van Rensburg (2008), tested the levels of concentration for the ALSI, the SWIX, the CAPI, the RESI and the FINDI (Financial and Industrial indices) and they found that the ALSI was in fact, counter-intuitively, the most concentrated.

The higher the allowable **active bet sizes**, the less competitive a long-only fund manager can be. A concentrated benchmark/investment environment such as the ALSI can make this competition problem worse. If long-only fund managers are allowed to take overweight bets, they become less competitive. This is because the ALSI is so concentrated and so a fund manager's choice is limited.

Bradfield and Kgomari (2004) determined that the universe of General Equity funds was less concentrated than the ALSI by one and a half times. They also find that the investment advantages offered by diversification are limited in respect of the JSE because share performance tends to be highly correlated.

Muller and Ward (2011) produced the first study investigating Active Share in the South African context. Their sample was composed of 90 Unit Trusts between the years 2006 and 2010. They also looked at Active Share over a longer period and found that it has decreased from a high of 50.5% in 1989 to 13.8% in 2010. Muller and Ward (2011) studied the level of Active Share and compared it to a fund's 5-year return and could not determine that they were related. Therefore, they could find no evidence that the active positions taken by fund managers were of any benefit nor could they conclude that higher Active Share led to better returns.

The research of Cremers and Petajisto (2009) demonstarted that the levels of Active Share held by a fund tended to be similar year to year. Funds are ranked each year in terms of their Active Share. If one calculates the average Active Share within each decile, one finds that they do not change significantly from year to year. The one-year results show that funds in the top decile falls from 10 to 9.67 and the bottom decile rises from 1 to 1.27. Even over five years, the top decile rank falls only to 8.88 from 10 while the bottom decile rank rises to 2.08 from 1. **So therefore, Active Share this year is a very good predictor of Active Share next year and thereafter**.

Over the last few years, investors have become more aware of the effect that fees have on the overall performance of their portfolio. Fund managers have to justify their fees by stock picking. Investors can get an idea to what extent their fund manager has picked stocks by looking at how the composition of the fund differs from the benchmark. They can thus determine whether the fees are justified or whether they would be better off in a passive solution which only captures beta returns. The persistence in active share has not been investigated in South Africa.

3 DATA AND METHODOLOGY

3.1 Sampling and data collection

A variety of datasets are required for the study. Benchmark index constituent data was obtained directly from the JSE from January 2013 until December 2017.

Fund Data was obtained from ProfileData – funds share holdings and fund net asset value prices. Returns have been calculated using the closing and opening net asset value price.

The population of local general equity unit trust funds was obtained from the ASISA website.

Using the domestic equity general category as the population, the following filters were applied:

1. Funds were sorted according to their size, and were selected for the following fund size range: all funds over R5bn were taken as a sample of large funds (12 funds in total) and all funds over R500m but less than R1bn were taken as a sample of small funds (18 funds in total);
2. All Index funds were excluded as they strive for a low Active Share and this could distort the findings;
3. All institutional funds[1] were excluded - this is because the holdings data is not publicly available, and, in some instances, institutions may affect the holdings that these funds invest in;
4. All funds that do not have a mandate to produce an alpha in relation to an index benchmark were excluded (such as high dividend yield funds); and
5. All funds which used an ASISA Category Average as their benchmark were also excluded as this provides difficulty in calculating active share.

[1] Institutional funds are designed to be held, not by retail investors, but rather held by institutions such as pension funds. The holdings of these funds will be determined by the client (the institution) and the fund manager and need not be disclosed to the public as the public cannot invest in these funds.

A sample of 19 funds was selected for testing. The sample represents approximately 63% of the revised assets under management – after all five filters were applied to the data. **Although a small sample has been selected, the funds make up a large portion of the unit trust market.**

3.1.1 Table 2 – Sample of funds for the study

Manager	Fund Name	SIZE (R mil)	Benchmark
> 5bn			
Allan gray	Allan gray equity fund	42913.66	ASISA Category Average
Old mutual	Old mutual investors fund	14278.32	ASISA Category Average
Nedgroup	Nedgroup investments rainmaker fund	14245.44	ASISA Category Average
Foord	**Foord equity fund**	**10781.91**	**FTSE/JSE ALSI**
Stanlib	**Stanlib multi-manager SA equity**	**9860.64**	**FTSE/JSE Capped SWIX**
Investec	Investec equity fund	8739.23	87.5% (SWIX CAPI) + 12.5% (ACWI)
Sanlam	**Sanlam investment management general equity**	**7984.61**	**FTSE/JSE ALSI**
Coronation	Coronation equity fund	7761.52	87.5% SA equity, 12.5% International equity
Prescient	**Fairtree equity prescient fund**	**7407.61**	**FTSE/JSE Capped SWIX**
Oasis crescent	Oasis crescent equity fund	5916.45	ASISA Category Average - Shari'ah
Prudential	Prudential dividend maximiser fund	5063.89	ASISA Category Average
PSG	PSG wealth creator fund of funds	5011.44	ASISA Category Average
1bn < > 500m			

Boutique collective investments	**Visio BCI SA equity fund**	**953.5**	**FTSE/JSE CAPI**
Discovery	Discovery dynamic equity fund	918.28	N/A
Sanlam	**First avenue Sanlam collective investments equity fund**	**875.52**	**FTSE/JSE SWIX**
Boutique collective investments	**BCI best blend specialist equity fund**	**856.39**	**FTSE/JSE SWIX**
Stanlib	**Stanlib value fund**	**821.74**	**FTSE/JSE ALSI**
Ci collective investments	**Analytics ci managed equity fund**	**808.27**	**FTSE/JSE ALSI**
Boutique collective investments	**Visio BCI general equity fund**	**760.11**	**FTSE/JSE SWIX**
Absa	**Absa smart alpha equity fund**	**759.33**	**FTSE/JSE SWIX**
Prime	**Mazi capital prime equity fund**	**747.1**	**FTSE/JSE SWIX**
Prescient	**Aylett equity prescient fund**	**717.28**	**FTSE/JSE ALSI**
Kagiso	Kagiso Islamic equity fund	711.16	ASISA Category Average - Shari'ah
Met ci	**Perpetua met equity fund**	**690.81**	**FTSE/JSE SWIX**
Ashburton	**Ashburton equity fund**	**646.78**	**FTSE/JSE ALSI**
Personal trust	**Personal trust SA equity fund**	**637.82**	**FTSE/JSE ALSI**
PSG	PSG multi-management equity fund of funds	635.48	ASISA Category Average
Sanlam	**Denker Sanlam collective investments SA equity fund**	**603.56**	**FTSE/JSE Capped SWIX**
Met CI	**Met general equity fund**	**528.68**	**FTSE/JSE ALSI (weighted)**
Old mutual	**Old mutual managed alpha equity fund**	**507.91**	**FTSE/JSE Capped SWIX**

Count	**19**
> 5bn	**4**
1bn < > 500m	**15**

The data needed to calculate Active Share are the fund sector or shareholdings at quarterly periods. This data was obtained from ProfileData. The table below details what data was attainable:

3.1.2 Table 3 – Data restraints and availability

Manager	Fund Name	Comment
Absa	Absa smart alpha equity fund	Data only available from q3 2015
Ashburton	Ashburton equity fund	Available
Boutique collective investments	Visio BCI SA equity fund	Data only available from q2 2017
Boutique collective investments	BCI best blend specialist equity fund	Data only available from q1 2014
Boutique collective investments	Visio BCI general equity fund	Data only available from q1 2014
CI collective investments	Analytics CI managed equity fund	Available
Foord	Foord equity fund	Available
Met CI	Perpetua met equity fund	Closed (merged into a Sanlam fund)
Met CI	Met general equity fund	Now the first avenue sci focused quality equity fund
Old mutual	Old mutual managed alpha equity fund	Available
Personal trust	Personal trust SA equity fund	Available
Prescient	Fairtree equity prescient fund	Available
Prescient	Aylett equity prescient fund	Available
Prime	Mazi capital prime equity fund	Available
Sanlam	Sanlam investment management general equity	Available
Sanlam	First avenue Sanlam collective investments equity fund	Available
Sanlam	Denker Sanlam collective investments SA equity fund	Data only available from q2 2017
Stanlib	Stanlib multi-manager SA equity	Not available
Stanlib	Stanlib value fund	Closed (merged into the Stanlib equity fund)

3.1.3 Hypotheses

In line with the existing literature by Cremers & Petajisto (2009), which has previously not been tested in South Africa, the following null hypotheses are posited in this study:

1. Active Share is persistent in South Africa – i.e. Active Share today is a good indicator of active share tomorrow as posited by (Cremers & Petajisto, 2009).
2. Tracking error is persistent in South Africa, but less persistent than Active Share as posited by (Cremers & Petajisto, 2009).

3.2 Description of overall research design

The testing and methodology in this study follows the historical methodology of Cremers & Petajisto (2009).

3.2.1 Calculating Active Share

Benchmark index constituent data was obtained directly from the JSE. Although each fund in the sample has a single benchmark, the benchmarks used by the individual funds differ. Each fund is required to report a benchmark index in its prospectus; however, this information is not part of any publicly available mutual fund database and does not exist for all funds. These *self-declared benchmarks might even lead to a bias*: some funds could intentionally pick a misleading benchmark to increase their chances of beating the benchmark (Sensoy, 2009).

$$Active\ Share = \frac{1}{2}\sum_{i=1}^{n}\left|w_{fund,i} - w_{index,i}\right|$$

3.2.2 Calculating Tracking Error

Tracking error is calculated as the standard deviation of the difference between the funds return and the return of its benchmark. A low tracking error would suggest that the fund's holdings are very similar to its benchmark and a high tracking error would suggest that the fund's holdings are very different to that of its benchmark.

$$Tracking\ Error = \ Stdev\ [R_{fund} \ - \ R_{index}]$$

Tracking error measures, the volatility of a fund which cannot be attributed to its benchmark index.

4 RESULTS

4.1 ALSI BENCHMARKED FUNDS RESULTS – ACTIVE SECTOR/SHARE AND TRACKING ERROR

4.1.1 Table 4 – ALSI Benchmarked Funds Results

	AVERAGE ACTIVE SECTOR/ SHARE OVER SAMPLE (Quarterly)	**AVERAGE TRACKING ERROR OVER SAMPLE (Monthly)**	**AVERAGE PERFORMANCE OVER SAMPLE (Monthly)**
FOORD EQUITY FUND	38.31%	0.805%	0.643%
SANLAM INVESTMENT MANAGEMENT GENERAL EQUITY FUND	49.70%	0.578%	0.737%
STANLIB VALUE FUND	*Fund Closed – it merged into the Stanlib Equity Fund. Data was not accessible.*		
ANALYTICS CI MANAGED EQUITY FUND	49.24%	0.571%	0.627%
AYLETT EQUITY PRESCIENT FUND	50.37%	1.092%	0.827%
ASHBURTON EQUITY FUND	49.85%	0.786%	0.684%
PERSONAL TRUST SA EQUITY FUND	50.10%	0.857%	0.181%
MET GENERAL EQUITY FUND	*Fund Closed – it is now the First Avenue SCI Focused Quality Equity Fund. Data was not accessible.*		

As seen from the above table, the fund with the highest active share was the Aylett Equity Prescient Fund – it is interesting to note that this fund also had the highest average tracking error over the sample as well as the highest average performance. The fund with the lowest active share was the Foord Equity Fund – this fund did not have the lowest average tracking error or the lowest average performance over the sample period.

4.2 SWIX BENCHMARKED FUNDS RESULTS – ACTIVE SECTOR/SHARE AND TRACKING ERROR

4.2.1 Table 5 – SWIX Benchmarked Funds Results

	AVERAGE ACTIVE SECTOR/ SHARE OVER SAMPLE (Quarterly)	**AVERAGE TRACKING ERROR OVER SAMPLE (Monthly)**	**AVERAGE PERFORMANCE OVER SAMPLE (Monthly)**
STANLIB MULTI-MANAGER SA EQUITY	*Fund data was not accessible.*		
FAIRTREE EQUITY PRESCIENT FUND	49.79%	0.709%	1.126%
FIRST AVENUE SANLAM COLLECTIVE INVESTMENTS EQUITY FUND	50.12%	0.856%	0.637%
BCI BEST BLEND SPECIALIST EQUITY FUND	49.37%	0.720%	0.467%
VISIO BCI GENERAL EQUITY FUND	52.83%	0.728%	0.331%
ABSA SMART ALPHA EQUITY FUND	38.07%	0.419%	0.027%
MAZI CAPITAL PRIME EQUITY FUND	50.08%	0.744%	0.914%
PERPETUA MET EQUITY FUND	*Fund Closed – it is now a Sanlam Fund. Data was not accessible.*		
DENKER SANLAM COLLECTIVE INVESTMENTS SA EQUITY FUND	50.05%	1.249%	-0.324%
OLD MUTUAL MANAGED ALPHA EQUITY FUND	50.12%	0.611%	0.851%

As seen from the above table, the fund with the highest active share was the Viscio BCI General Equity Fund – it is interesting to note that this fund did not have the highest average tracking error over the sample, nor did it have the highest average performance. The fund with the lowest active

share was the Absa Smart Alpha Equity Fund – this fund also had the lowest average tracking error but did not have the lowest average performance over the sample period.

4.3 CAPI BENCHMARKED FUNDS RESULTS – ACTIVE SECTOR/SHARE AND TRACKING ERROR

4.3.1 Table 6 – CAPI Benchmarked Funds Results

	AVERAGE ACTIVE SECTOR/ SHARE OVER SAMPLE (Quarterly)	AVERAGE TRACKING ERROR OVER SAMPLE (Monthly)	AVERAGE PERFORMANCE OVER SAMPLE (Monthly)
VISIO BCI SA EQUITY FUND	60.65%	1.005%	1.328%

4.4 SUMMARY OF RESULTS

4.4.1 Table 7 – Active Share Results

Sample Funds		2013				2014				2015				2016				2017			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
ALSI Benchmarked Funds	Foord Equity Fund	37.51	39.98	38.89	34.85	36	35.38	36.05	35.74	40.47	41.29	NA	43.55	36.90	35.94	41.27	37.42	Data Issues – N/A			
	Sanlam Investment Management General Equity Fund	49.69	49.72	49.71	49.67	49.76	49.66	49.66	49.71	49.69	49.7	49.67	49.71	49.7	49.74	49.75	49.73	49.71	49.71	49.63	49.66
	Stanlib Value Fund	Fund Closed – it merged into the Stanlib Equity Fund. Data was not accessible.																			
	Analytics CI Managed Equity Fund	N/A			49.67	49.97	40.26	49.69	49.92	49.67	50.08	49.75	49.59	49.66	49.59	49.64	49.66	49.62	49.76	49.61	49.61

							Aylett Equity Prescient Fund	Ashburton Equity Fund	Personal Trust SA Equity Fund	MET General Equity Fund	Stanlib Multi-Manager SA Equity	Fairtree Equity Prescient Fund	First Avenue Sanlam Collective Investments Equity Fund	BCI Best Blend Specialist Equity Fund	Visio BCI General Equity Fund	Absa Smart Alpha Equity Fund
			N/A	49.91	50.24	Fund Closed – it is now the First Avenue SCI Focused Quality Equity Fund. Data was not accessible.	Fund data was not accessible.	49.89	50.24	Data Issues – N/A	Data Issues – N/A	Data Issues – N/A
			53.43	49.87	50.22			49.84	50.23			
			50.16	49.87	50.24			49.83	51.8			
			50.2	49.86	50.24			49.75	50.1			
			50.19	49.86	50.21			49.78	50.08	52.24		
			50.18	49.85	50.29			49.76	50.07	49.75		
			50.18	49.85	50.28			49.79	50.05	50.15		
			50.14	49.86	49.86			49.74	50.06	49.76		
			50.2	49.88	49.87			49.78	49.96	50.21		
			50.19	49.8	49.87			49.74	49.93	50.02		
			50.32	49.8	49.85			49.94	49.96	49.74		49.31
			50.25	49.78	49.86			49.93	49.99	49.83		50.17
			50.24	49.81	51.67			48.75	50	49.87		35.94
			50.23	49.84	49.89			50	49.98	49.75		32.32
			50.17	49.88	49.99			49.86	50.01	49.84		30.89
			50.17	49.86	49.98			49.96	50.04	50.91		31.42
			49.97	49.86	49.95			49.91	49.98	49.72		36.17
			50.01	49.88	49.95			49.88	50	49.69	49.22	32.55
			49.98	49.86	49.82			49.82	50	50.08	51.30	28.85
			49.97	49.88	49.81			49.76	49.93	38.39	57.97	29.76

SWIX Benchmarked Funds

	Mazi Capital Prime Equity Fund	49.92	49.92	49.89	49.87	52.89	49.92	49.93	50.85	49.89	49.87	49.82	49.81	49.86	49.9	49.83	49.91	49.87	49.9	49.83	49.85
	Perpetua MET Equity Fund	Fund Closed – it is now a Sanlam Fund. Data was not accessible.																			
	Denker Sanlam Collective Investments SA Equity Fund	Data Issues – N/A																	50.17	50	49.99
	Old Mutual Managed Alpha Equity Fund	49.86	49.87	49.87	49.86	54	49.88	49.87	49.86	49.81	49.64	49.84	49.85	49.86	49.88	49.91	49.93	49.93	49.99	50.76	49.88
CAPI Benchmarked Funds	**Viscio BCI SA Equity Fund**	Data Issues – N/A																	58.18	57.76	66.02

4.4.2 Table 8 – Tracking Error Results

Sample Funds		**2013**				**2014**				**2015**				**2016**				**2017**			
		Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
ALSI Benchmarked Funds	**Foord Equity Fund**	1.196	1.455	0.496	0.716	0.768	0.307	0.618	2.99	0.382	0.881	0.492	0.467	0.298	0.86	0.873	0.456	Data Issues – N/A			
	Sanlam Investment Management General Equity Fund	0.749	0.601	0.304	0.635	0.281	0.168	0.777	0.572	0.813	0.234	0.434	0.571	0.414	0.759	1.003	0.401	0.594	0.275	1.163	0.867

	Stanlib Value Fund	Fund Closed – it merged into the Stanlib Equity Fund. Data was not accessible.																							
	Analytics CI Managed Equity Fund	N/A			0.728	0.393	0.402	0.444	0.323	0.402	0.264	1.187	0.732	0.669	0.808	0.279	0.394	0.858	0.178	0.727	0.646				
	Aylett Equity Prescient Fund	1.773	1.068	0.489	0.309	0.99	0.467	0.819	0.639	0.592	1.375	1.023	1.123	0.934	0.942	1.168	1.792	0.721	2.053	1.915	1.88				
	Ashburton Equity Fund	0.626	1.535	0.603	0.576	1.218	0.286	1.513	1.438	0.657	0.339	0.254	0.478	0.686	0.942	0.575	0.314	0.839	0.522	1.191	1.079				
	Personal Trust SA Equity Fund	0.639	2.39	0.715	0.762	1.299	0.488	1.133	1.234	0.659	0.426	0.636	0.833	0.507	0.681	0.661	0.465	0.883	0.723	1.234	0.695				
	MET General Equity Fund	Fund Closed – it is now the First Avenue SCI Focused Quality Equity Fund. Data was not accessible.																							
SWIX Benchmarked Funds	**Stanlib Multi-Manager SA Equity**	Fund data was not accessible.																							
	Fairtree Equity Prescient Fund	0.415	0.301	0.449	0.459	0.488	0.263	0.207	0.67	1.045	0.708	0.523	0.606	1.412	0.94	0.857	1.023	1.593	0.969	0.632	0.519				
	First Avenue Sanlam Collective Investments Equity Fund	0.259	1.089	1.475	0.478	0.608	0.468	0.883	1.314	0.493	0.521	0.66	0.549	0.838	1.383	1.107	0.594	0.664	0.399	1.473	1.665				
	BCI Best Blend Specialist Equity Fund	Data Issues – N/A				0.381	0.247	0.875	0.503	0.32	0.589	0.767	1.29	0.511	0.700	0.823	0.306	1.044	0.874	1.576	0.381				

	Viscio BCI General Equity Fund	Data Issues – N/A																	0.436	1.168	1.094
	Absa Smart Alpha Equity Fund	Data Issues – N/A										0.265	0.379	0.523	0.415	0.511	0.388	0.164	0.393	0.825	0.299
	Mazi Capital Prime Equity Fund	0.944	0.873	0.477	0.694	0.873	0.454	0.46	0.928	1.011	1.033	1.016	1.243	0.975	1.146	0.773	0.317	0.454	0.454	0.447	0.367
	Perpetua MET Equity Fund	Fund Closed – it is now a Sanlam Fund. Data was not accessible.																			
	Denker Sanlam Collective Investments SA Equity Fund	Data Issues – N/A																		1.178	1.328
	Old Mutual Managed Alpha Equity Fund	0.568	0.857	0.747	0.419	0.488	0.28	0.623	0.802	1.12	0.368	0.488	0.347	0.507	0.5	0.468	0.249	0.556	0.129	0.98	1.702
CAPI Benchmarked Funds	**Viscio BCI SA Equity Fund**	Data Issues – N/A																		1.179	0.832

4.5 SIGNIFICANCE TESTING

For the significance testing, a two-tailed t-test was done – this is because a t-test's statistical significance indicates whether the difference between two groups' averages most likely reflects a "real" difference or not.

4.5.1 Table 9 – Hypothesis test summary

Hypothesis	Summary	Type
$Null = \mu_1 = \mu_2$ $p - value \geq 0.05$	The null hypothesis assumes equal values – this would indicate that there is no "real" difference between the two group's averages. For this study, that would mean that the average active share / tracking error this year is not statistically different from the average active share / tracking error next year.	Null
$Alternate = \mu_1 \neq \mu_2$ $p - value < 0.05$	The alternate hypothesis assumes unequal values – this would indicate that there is a "real" difference between the two group's averages – either a positive or a negative difference. For this study, that would mean that the average active share / tracking error this year is statistically different from the average active share / tracking error next year.	Alternate

4.5.2 Table 10 – Active Share Significance Test Results

Sample Funds		2013 2014	2014 2015	2015 2016	2016 2017
ALSI Benchmarked Funds	**Foord Equity Fund**	0.122	**0.001**	0.058	N/A
	Sanlam Investment Management General Equity Fund	1.000	0.851	**0.034**	0.058
	Stanlib Value Fund	Fund Closed – it merged into the Stanlib Equity Fund. Data was not accessible.			
	Analytics CI Managed Equity Fund	N/A	0.373	0.261	0.767
	Aylett Equity Prescient Fund	N/A	0.077	0.328	**0.00005**
	Ashburton Equity Fund	0.097	0.124	0.270	0.209
	Personal Trust SA Equity Fund	0.489	**0.026**	0.272	0.291
	MET General Equity Fund	Fund Closed – it is now the First Avenue SCI Focused Quality Equity Fund. Data was not accessible.			
SWIX Benchmarked Funds	**Stanlib Multi-Manager SA Equity**	Fund data was not accessible.			
	Fairtree Equity Prescient Fund	0.101	0.178	0.524	0.531
	First Avenue Sanlam Collective Investments Equity Fund	0.239	**0.0003**	**0.035**	0.198
	BCI Best Blend Specialist Equity Fund	N/A	0.419	0.644	0.319

	Viscio BCI General Equity Fund	Fund data was not accessible.			
	Absa Smart Alpha Equity Fund	N/A	N/A	N/A	0.700
	Mazi Capital Prime Equity Fund	0.204	0.184	0.343	0.618
	Perpetua MET Equity Fund	Fund Closed – it is now a Sanlam Fund. Data was not accessible.			
	Denker Sanlam Collective Investments SA Equity Fund	Fund data was not accessible.			
	Old Mutual Managed Alpha Equity Fund	0.354	0.321	0.076	0.284
CAPI Benchmarked Funds	**Viscio BCI SA Equity Fund**	Fund data was not accessible.			

As seen from the above table, the null hypothesis was not rejected for the majority of the sample periods. This would indicate equal average values for the majority of the sample period – this indicates that there is no "real" difference between the average active share between years.

The average active share this year is not statistically different from the average active share next year.

4.5.3 Table 11 – Tracking Error Significance Test Results

Sample Funds		2013 2014	2014 2015	2015 2016	2016 2017
ALSI Benchmarked Funds	**Foord Equity Fund**	0.764	0.362	0.729	0.115
	Sanlam Investment Management General Equity Fund	0.492	0.742	0.515	0.748
	Stanlib Value Fund	Fund Closed – it merged into the Stanlib Equity Fund. Data was not accessible.			
	Analytics CI Managed Equity Fund	**0.029**	0.262	0.665	0.747
	Aylett Equity Prescient Fund	0.623	0.182	0.512	0.285
	Ashburton Equity Fund	0.476	0.061	0.256	0.207
	Personal Trust SA Equity Fund	0.855	0.098	0.568	0.065
	MET General Equity Fund	Fund Closed – it is now the First Avenue SCI Focused Quality Equity Fund. Data was not accessible.			
SWIX Benchmarked Funds	**Stanlib Multi-Manager SA Equity**	Fund data was not accessible.			
	Fairtree Equity Prescient Fund	0.993	0.092	0.091	0.649
	First Avenue Sanlam Collective Investments Equity Fund	0.984	0.2162	0.050	0.849
	BCI Best Blend Specialist Equity Fund	N/A	0.830	0.183	0.714

	Viscio BCI General Equity Fund	Fund data was not accessible.			
	Absa Smart Alpha Equity Fund	N/A		0.090	0.799
	Mazi Capital Prime Equity Fund	0.694	**0.030**	0.196	0.084
	Perpetua MET Equity Fund	Fund Closed – it is now a Sanlam Fund. Data was not accessible.			
	Denker Sanlam Collective Investments SA Equity Fund	Fund data was not accessible.			
	Old Mutual Managed Alpha Equity Fund	0.523	0.884	0.466	0.273
CAPI Benchmarked Funds	**Viscio BCI SA Equity Fund**	Fund data was not accessible.			

As seen from the above table, the null hypothesis was not rejected for the majority of the sample periods. This would indicate equal average values for the majority of the sample period – this indicates that there is no "real" difference between the average tracking error between years.

The average tracking error this year is not statistically different from the average tracking error next year.

4.6 ARE THE RESULTS PERSISTENT?

4.6.1 Is Active Share/Sector Persistent in South Africa?

Following the methodology in Cremers and Petajisto (2009) - for each decile, the average active share/sector is calculated.

Over five years, the top active share rises from 58.18% to 66.02% and the bottom active share falls from 37.51 to 29.76.

4.6.2 Is Tracking Error Persistent in South Africa?

Following the methodology in Cremers and Petajisto (2009) - for each decile, the average tracking error is calculated based on their standard deviation measure.

Tracking error ranks are also found to be persistent but somewhat less so: five years later the top decile has risen from 1.397 to 3, and the bottom decile has fallen from 1.234 to 0.120.

5 CONCLUSION

The aim of this paper was to determine whether Active Share and tracking error are persistent in the South African mutual fund industry. In order for these measures to be persistent, the measure today needs to be a good indication of the measure tomorrow – i.e. the Active Share / tracking error today needs to be a good indication of the Active Share / tracking error tomorrow. From the sample chosen, it can be seen that both Active Share and tracking error are considered persistent. Some funds couldn't be analysed accurately due to the lack of available data (especially since this study concentrated on South Africa) and so that can be seen as a limitation to the results obtained throughout this paper.

The results of each of the tests performed is summarised in the table below:

5.1.1 Table 12 – Summary of Results

Question	Hypothesis	Test	Result and Significance
Is active share persistent?	$Null = \mu_1 = \mu_2$ $p - value \geq 0.05$	T-test	The average active share this year is not statistically different from the average active share next year.
Is tracking error persistent?	$Alternate = \mu_1 \neq \mu_2$ $p - value < 0.05$	T-test	The average tracking error this year is not statistically different from the average tracking error next year.

Tracking error is a measure of the volatility of portfolio return around a benchmark index, whereas Active Share measures the deviation of portfolio holdings from the holdings of the benchmark index. - placing equal weight on all active bets.

Both of these measures are found to be persistent in South Africa - Active Share/Tracking Error today is a good indicator of active share/tracking error tomorrow. This can be seen from the two tests performed. The first test was done in line with the methodology of Cremers and Petajisto (2009) and the second test (t-test) was done for robustness.

It can be concluded that if there is no mechanism within the fund whereby the actual asset allocation matches the asset allocation of the benchmark, then the benchmark becomes irrelevant. This is because the fund manager can achieve outcomes by taking more or less risk than the benchmark implies and therefore would have not set an appropriate benchmark in which to be compared. Fund managers have different views on what a good benchmark is and how performance should be measured, however, there does need to be a universal standard in which benchmarks can be assessed.

6 REFERENCES

Alexander, G. J., and Baptista, A. M. (2013). Active Portfolio Management with benchmarking: A frontier based on alpha. *Journal of Banking & Finance*, 34, 2185-2197.

Bailey, J.V. (1992). Are manager universes acceptable performance benchmarks? *Journal of Portfolio Management, 18*(3), 9-13.

Beebower, G. L., Brinson, G. P., & Hood, L. R. (1986). Determinants of Portfolio Determinants Performance. *Financial Analysts Journal*, 42(4), 39-44.

Bradfield, D. & Kgomari, W. 2004. Concentration – should we be mindful of it? Cadiz Financial Strategists. Unpublished.

Cremers, M. (2016). Active Share and the Three Pillars of Active Management: Skill, Conviction and Opportunity. *Financial Analysts Journal*, 73(2):61-79.

Cremers, M., Ferreira, M.A., Matos, P., & Starks, L. (2013). The Mutual Fund Industry Worldwide: Explicit and Closet Indexing, Fees, and Performance. Working paper, Yale University, 2011, 1-34.

Cremers, M., & Petajisto, A. (2009). How Active Is Your Fund Manager? A New Measure That Predicts Performance. *Review of financial studies*, 1-30.

Dodge & Cox. (2016, October). *Understanding the Case for Active Management.* Retrieved from dodgeandcox: https://dodgeandcox.com/index.asp

Frazzini, A., Friedman, J., and Pomorski, L. (2016). *Deactivating Active Share.* Retrieved from AQR Capital Management, LLC: https://www.aqr.com/

Friend, Brown, Herma and Vickers. (1962). A Study of Mutual Funds.

Gruber, M. J. (1996). Another Puzzle: The Growth in Actively Managed Mutual Funds. *The Journal of Finance, 51*(3), 783-810.

Jensen, M. C. (1968). The Performance of Mutual Funds in The Period 1945-1964. *Journal of Finance*, 389-416.

Kruger, R., & Van Rensburg, P. (2008). Evaluating and Constructing Equity Benchmarks in the South African Portfolio Management Context. *Investment Analysts Journal , 67*, 5-18.

Malkiel, B. G. (2003). Passive Investment Strategies and Efficient Markets. *European Financial Management*, 9(1), 1-10.

Mauboussin, M. J. . (2012). The True Measures of Success. *Harvard Business Review*.

Mertens, D., & Calamar, A. (2010). Are Investors Playing it too Safe? [Online]. Retrieved from http://www.jenseninvestment.com/mutualfund/pdfs/white%20paper_12%20final%20web.pdf.

Muller, C., and Ward, M. (2011). Active Share on The JSE. *Investment Analyst Journal, 74*, 19-28.

Oldert, N. (ed.). 2005. Profile's unit trusts & collective investments. Johannesburg: Profile Media.

Petajisto, A. (2010). Active Share and Mutual Fund Performance. *Financial Analysts Journal*, 69(4), 1- 62.

Petajisto, A. (2013). Active Share and Mutual Fund Performance. *Financial Analysts Journal, 69*(4), 73-93.

Roll, R. (1977). A Critique of the Asset Pricing Theory's Tests . *The Journal of Financial Economics , 4*, 129-176.

Roll, R. (1992). A Mean/Variance Analysis of Tracking error. *The Journal of Portfolio Management*, 13-22.

Sensoy, B. A. (2009). Performance Evaluation and Self-Designated Benchmark Indexes in the Mutual Fund Industry. *The Journal of Financial Economics*.

Sharpe, W. F. (1966). Mutual Fund Performance. *Journal of Business*, 119-138.

Strongin, S., Petsch, M., and Sharenow, G. (2000). Beating Benchmarks. *The Journal of Portfolio Management*, 26(4):11-27.

Thomas, Rottschafer and Zvingelis. (2013). *A Tracking Error Primer*. Retrieved from Envestnet: http://www.envestnet.com/

Treynor J. and K. Mazuy. (1966). Can Mutual Funds Outguess the Market. *Haward Business Review*, 131-136.

Wermers, R. (2003). Are Mutual Fund Shareholders Compensated for Active Management "Bets"?. Working paper, University of Maryland (April), 1-16.