

South African General Equity Unit Trust Funds:
Fund Performance and Characteristics

Liam Pardoe

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Supervisor: Associate Professor Ryan Kruger
Department of Finance and Tax

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Abstract

We evaluate performance of general equity unit trust funds in South Africa during the period 2010 to 2017 and identify, if any, characteristics of these unit trust funds that are drivers of this performance. Performance is measured using Jensen's Alpha with a sample that has not suffered from the full effects of survivorship bias as many other South African research studies have in past years. We used a Weighted Least Squares regression model, after weighting each funds Jensen's alpha, to determine what characteristics impact the performance of unit trust funds. Our results showed that Beta, Fund Age, Percentage of Top 10 Holdings and Management Fees were all significant in explaining unit trust performance. We found that in the South African general equity unit trust space, funds which take higher risk relative to the market will experience higher levels of performance, younger funds tended to outperform their older counterparts and funds that charge lower management fees will outperform those with higher fees. Funds that on average throughout the period held less Top 10 JSE listed equity stocks tended to outperform those having a larger Top 10 holding exposure. We have thus been able to uncover material performance characteristics that differentiate South African unit trust performance. We have also provided meaningful parameters for investors and investment managers when structuring diversified portfolios, allowing them to improve their ability to provide outperformance consistently over time.

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1. INTRODUCTION

Recent global and local trends in personal finance, asset management and retirement planning have focused on the popular issue of wealth allocation across different asset classes and specific investments. As a result, unit trust investments have become an increasingly effective channel for income flow, capital appreciation, and the benefits derived through diversification for South African investors. However, due to the volatile nature of the South African equity market in recent years paired with the erratic performance of individual funds, the identification of outperforming funds remains an area of controversy. This study provides an examination of unit trust fund performance by analysing a selected sample of general equity unit trust funds and their fund specific characteristics. The purpose of this research is to identify fund specific characteristics that can possibly explain unit trust fund performance.

In the South African Unit Trust space, there have been an increasing number of empirical studies examining the performance and persistence of local unit trusts. A few studies have also looked into the background and structure of the industry as a whole. Several of the most recent studies have found that, in general, unit trust performance results have been varied and that the persistence of this performance has been inconsistent from study to study. Most recently studies have found that investment managers in South Africa are unable to pick future winning funds based on their past performance. Where South Africa falls behind the rest however is in the methodologies used in performance studies, specifically relating to survivorship bias within data samples. These studies will be analysed and discussed in the sections to follow to give an overview and greater understanding of the unit trust industry and financial market in South Africa.

Studies in Malaysia, Sweden, Australia, the United Kingdom and in the United States have attempted to identify the characteristics of unit trust funds which are responsible for performance in particular funds. These studies found many significant fund characteristics that were responsible for performance such as size of the fund, fund fees, expense ratio, fund Beta and manager tenure. However, the specific combination of characteristics varied from study to study. These studies will be examined throughout the paper for guidance in methodology and expectation of results we can expect to find in this study.

This study will aim to extend local research on unit trust performance. Taking guidance from studies in the UK, US and globally the more recently debated issue of survivorship bias will be an important consideration in the study. Increasingly, research studies are taking note of the effects that this bias has on the quality of performance of studies and the accuracy of how the performance measure is reported in these studies.

We conduct this study in an attempt to offer alternate measures and assistance for investors, financial advisors and fund managers in their research and decision processes. We also analyse whether or not the characteristics identified in this study differ from the results found in international research.

1.1. RESEARCH PROBLEM STATEMENT

Much of the South African research in the area of unit trusts has mainly been focused on performance, persistence and a general overview of the industry and funds. The problem with South African research in this area is that most of the work has been done as a broad overview of performance or the market as a whole. There are not as many studies locally, when compared to ones done in offshore markets, which go into detail of unit trust fund performance and the

drivers of this performance. One of the most significant results found is that generally, on average, managers do not have superior skill and cannot select future winning funds based on past performance alone. Internationally, performance has been broken down and analysed to create a list of significant characteristics which are responsible for the performance of mutual funds or unit trusts.

Determining these characteristics may benefit investors and investment managers in identifying which funds to select based on key fund specific characteristics, outside of using past performance as an indicator, that drive performance in the South African market.

1.2. AIMS AND OBJECTIVES

1.2.1. AIMS

The Primary aim of this study is to identify South African fund characteristics which are responsible for equity unit trust fund performance from a representative sample which is free of survivorship bias.

1.2.2. OBJECTIVES

The objective is to calculate risk adjusted returns for all of South Africa's listed equity unit trust funds and identify fund characteristics to determine which characteristics are responsible for South African unit trust performance. This will be done by regressing the risk-adjusted return measure, calculated using Jensen's Modified Alpha, against the selected fund characteristics to determine which variables are significant and can be concluded as responsible for unit trust performance. This will be conducted using a sample of data from the South African equity market with reduced survivorship bias.

In Section 2, we will be discussing prior literature on the performance of the South African unit trust industry with a specific focus on the performance of equity unit trust funds. Additionally, the issue of survivorship bias in data and its effect on mutual fund or unit trust fund performance studies will be examined. Following this, an examination of past studies conducted internationally on the characteristics of fund performance will be presented. Section 3 will provide a brief outline of the data utilised in the study. Section 4 will detail the methodologies followed in analysing the data which leads on to Section 5 which reports the results and discusses the findings of the study. Sections 6 and 7 will briefly touch on some limitations and considerations of the study and finally end with concluding remarks.

2. LITERATURE REVIEW

This section begins by examining the performance environment as well as the persistence of performance in South Africa and the general trend in unit trust fund returns over the market's recent history. Following this, an analysis of previous research regarding the effects, both locally and internationally, on how survivorship bias impacts on unit trust studies will be conducted. We will then review a variety of studies and research based in Europe, Asia and North America examining which characteristics of mutual and unit trust funds were found to be responsible for performance. In addition, the methodologies employed in these studies will be analysed for consideration for application to this study. Additionally, the previous literature reviewed in this section will give clarity on which fund specific characteristics, sample selection methods and methodology should be used in this research study to be implemented for the South African unit trust industry.

2.1. SOUTH AFRICAN PERFORMANCE AND PERSISTENCE OF PERFORMANCE

In South Africa over the past 50 years, many researchers have found varying results and come to different conclusions about the performance and persistence of performance in South African listed unit trusts. Some of the earliest research into South African performance, when the industry was still in its infancy, found that absolute unit trust returns had a positive relationship with fund risk, measured by Beta. Du Plessis (1974) found evidence of this when examining only 2 unit trust funds right at the inception of the industry in South Africa. Kerbel (1974) continued research into fund performance and found that of the 10 available funds at the time, all 10 underperformed the benchmark. However, no risk adjusted returns were used as a performance measure in this study.

Expanding on this, Gilbertson (1976) and Taylor (1977) identifying the limitations in the earlier studies, used risk adjusted performance measures in their study and found that 2 out of 11 funds outperformed and beat the market on a risk-adjusted basis, however their findings were statistically insignificant. They reached the general conclusion that unit trust funds underperformed between 1970 and 1977 in South Africa. In a subsequent study, Gilbertson and Vermaak (1982) again analysed 11 unit trust funds during the period 1974 to 1981 and found similar results of general underperformance. However, on a risk-adjusted basis (using the Treynor, Jensen and Sharpe measures), when comparing performance to three stock market indices, namely the JSE Actuaries All Share Index, Industrial Index and RDM-100 Index, the unit trusts generally outperformed those benchmarks. From these 11 funds, it was found that one of the funds showed evidence of persistent outperformance against the indices or benchmarks chosen. The South African market was now beginning to show evidence of some outperformance and persistence.

Knight and Firer (1989) analysed 10 unit trust funds between 1977 and 1986 and found that, after adjusting for risk, 5 of these funds outperformed relative to the market. This was the first study conducted in South Africa that resulted in evidence showing strong outperformance and contradicted the findings of Gilbertson and Vermaak (1982). The study by Knight and Firer (1989) brought a new aspect to how performance was being presented and explained that the outperformance present in the studies at the time may have been overstated due to management fees not being taken into account. Leading on from this conclusion, Meyer-Pretorius and Woolmarans (2006) took costs into account of the period 1965 to 2005 and found that during the period analysed by Knight and Firer (1989), costs did play a substantial role in the performance. It was shown that without including any costs in their methodology, the unit trusts outperformed. As soon as costs were introduced to their model, all outperformance was

eroded and the general conclusion of underperformance in the South African unit trust market was presented again.

Investigation into performance of South African unit trust funds then took a different approach when Bertolis and Hayes (2014) examined the performance of general equity funds for the period 1994 to 2012 under different market conditions. It was shown that funds underperform during periods of economic downturn and outperform in periods of robust growth, all on a risk-adjusted performance basis. They reported marginal outperformance with no persistence of performance.

Around the late 1990's more studies were conducted in South Africa looking into not just the performance of the funds but more specifically the persistence of the performance. Meyer (1998) examined the persistence of performance over a 10-year period ranging from 1985 to 1995. The study concluded that it may be useful to use past performance as a criterion for unit trust selection. This was contrary, however, to the Efficient Market Hypothesis (EMH) which states that past performance is not a significant determinant of future performance (Ramjee, 2017). Their study showed that certain levels of persistence in performance exist but were not found to be statistically significant. The remainder of the paper found that a repeat winner phenomenon exists over two-year periods for both risk-adjusted and nominal returns. This study was consistent with results found in the USA where the best persistence in performance was found over four-year periods. Meyer concluded that some persistence does exist in the South African unit trust market and could be used as a guide for funds to beat the market in the long run.

Following the trend of studies at the time, Von Wielligh and Smit (2000) found similar findings to Meyer (1998) of some evidence in long run persistence for the period 1988 to 1997. They

uncovered positive persistence in South African performance data, with significant short run persistence in general equity unit trust funds but none for all the other available unit trust portfolios. Their overall conclusion stated that in South Africa the worst performing funds tend to stay as worst performers and the average to top performers tend to switch moving up and down respectively. This showed there was some evidence of short and long-term persistence even amongst the poorer performing equity funds.

Similarly, to Von Wielligh and Smit's (2000) study of equity specific unit trusts, Firer et al. (2001) examined the persistence in equity and fixed income unit trusts during the period 1989 to 1999. Research showed evidence of short run persistence of performance. They proposed an investment strategy of selecting superior past performers which may improve portfolio returns particularly in general equity unit trust funds. They concluded that general equity unit trust consistent outperformers over a number of periods could be the best long run investment strategy to implement in South Africa. Firer et al. (2001) went on to extend previous research looking at general equity unit trust performance to a 20-year period. Collinet and Firer (2003) found that performance of equity funds was highly sensitive to the holding period of the fund. There was evidence of a positive weak relationship between past and future fund ranking but this relationship deteriorated over longer periods. This paper supported Firer et al. (2001) in their statement that implementing a strategy of buying the top 10 performing funds in the long run will beat the average return of all other equity unit trusts.

A study by Wessels and Krige (2005) supported the above research as they found a few funds exhibited extraordinary persistence and there was a tendency, in the short term that current performance could be repeated with the top performing funds. Analysing 20 unit trust funds over various sectors from 1998 to 2002 Oldham and Kroeger (2005) found that funds were unable to generate above average returns on a consistent basis. Only four of the twenty funds

generated superior performance for one or more years. They concluded that fund managers in South Africa are not able to generate or sustain any above average returns despite some evidence of short run persistence from their cross-sectional analysis.

This was supported in a more recent study by Nana (2011), who found evidence that, from a sample of 151 South African equity unit trusts; short run persistence is present with no convincing evidence of overall outperformance. This lead to the conclusion that portfolio managers in South Africa, on average, do not show superior skill and hence cannot choose future winners based on past performance alone.

2.2. SURVIVORSHIP BIAS

The majority of mutual fund or unit trust fund studies tackling performance have only selected funds that are in existence for the entire sample period, “survivors”. Research has shown in studies conducted by Carpenter and Lynch (1999), Wermers (1997) and Elton et al. (1996) that this problem in sample selection leads to producing survivorship bias as the funds that are not in existence from the start to the end date are omitted from the respective studies. This is predictably done due to these funds being less successful and failing to attract enough capital investment which does not allow for fund asset growth. These funds would generally be ones which have exhibited poor returns and continuing performance decline.

2.2.2. *GLOBAL RESEARCH AND EVIDENCE*

Early research in the 1970’s conducted by Ball and Watss (1972, 1977, and 1979) along with Salamon and Smith (1979) started recognising the effects of survivorship bias on performance studies and statistical tests. Ball and Watss (1979) found two biases within their sample studies;

their data only contained the largest funds and funds that survived the entire sample period which were sourced from the Standard and Poor's Index. Secondly most researchers at the time eliminated all the firms that were non-survivors and did not have complete data for their full period sample. More recently Brown et al (1992) found that by reducing survivorship bias within their sample there were more implications than just on performance measurement as previously discovered. They concluded that survivorship bias would have a significant impact on post event performance studies and research. Goetzmann and Jorion (1995) ran a simulation of the effect of survivorship bias on dividend yields and their results suggested that the bias impacted the predictive power of dividend yields over longer term horizons. Most of the studies around this area and mutual funds in general are focused in the United Kingdom and United States markets. This is due to having the longest historical market data and access to accurate and quality data. However, the studies below will make it evident that the issue of survivorship bias may be more relevant and severe in less developed markets, South Africa for example, due to the lack of data and history of performance in unit trust funds.

The mutual fund selection procedure of excluding non-surviving and late entering funds was used in research by the following studies; Treynor (1965), Sharpe (1966), Lehmann and Modest (1987), Henriksson (1984), and Connor and Korajczyk (1991). These studies only included funds that were in existence at the beginning and end of the sample. As a result most of these performance studies, if not all, suffered from high levels of survivorship bias due to their method of sample selection and overall methodology.

Several studies that identified this issue and aimed to correct for survivorship bias were Elton et al. (1996), Malkiel (1995), Brown and Goetzmann (1995) and Carhart (1995). Most of these studies' sample data was based on common stock or equity mutual funds so application of this research in our study is extremely important when estimating performance measures of South

African unit trust funds. Using a four-factor model on equally weighted portfolios of surviving and non-surviving funds, Carhart (1995) estimated from results that survivorship bias impacted returns upwards ranging from 3.00% to 5.00% per year. Brown and Goetzmann (1994) and Malkiel (1995) used return data for all the funds in their sample and tracked returns of non-surviving funds until the date of disappearance. Brown and Goetzmann (1994) found that when using raw return data, using only surviving funds over a period of years, the survivorship bias increased the returns used in their performance measure by 150 basis points on their examined equity funds. Brown and Goetzmann (1994) also discovered that there was a much larger spread when the mean returns of the funds were scaled by market capitalisation. In this study they found that generally the smaller funds tended to be more likely to disappear from the market. This study was consistent with research conducted by Grinblatt and Titman (1989) that used a different approach and simulated return data from the disappearing funds to reduce survivorship bias within the sample data. Using quarterly equity holding data they attempted to estimate the effect of survivorship bias. They simulated these returns assuming that the fund held the same equity shares at the beginning of the quarter till the end of the quarter. Annual returns were used that were weighted quarterly and their estimates of survivorship bias for common stock equity mutual funds ranged between 10-30 basis points. Malkiel (1995) also reported a spread of 1.50% in mean returns of the funds under consideration, on average, due to survivorship bias. In line with both studies the survivorship bias they found was relatively larger for the smaller sized mutual funds, consistent with previous work done on the subject. Following a different approach, Elton et al. (1996) tracked yearly returns on the funds in sample that existed at the beginning of the period and included the year of merger on fund disappearance and the subsequent performance post-merger. Their study found that when using bond mutual funds, survivorship bias raises performance by 27 basis points per annum. They

described in their conclusion that they expect this number to be significantly higher for equity mutual funds with the higher variance and risk associated with the underlying equity securities.

Wermers (1997) showed that use of momentum investment strategies has implications for survivorship bias in performance studies. He used a sample free from survivorship bias and found that funds that were the best performers in one year and worst performers in the subsequent year, in the absence of momentum effect in equity returns, are more likely to disappear. The conclusion was that including a selection of non-surviving funds in your sample of data is a lot more representative of the fund pool than previous research showed. The study found an average difference of 20 basis points per year between the sample including non-surviving funds to further support including non-surviving funds in our study's sample.

Carpenter and Lynch (1999) examined the impact of survivorship bias and attrition on measures of performance. They found that when the survival of the fund depends on performance over consecutive periods, survivorship bias creates a reversal effect which dominates performance persistence of these funds in line with the work of Elton et al. (1996). When they included non-survivors in their sample they found that attrition of poorer-performing funds caused their performance and persistence measure to significantly differ from the values in samples with no attrition.

Elton et al. (1996) looked into attrition bias in mutual fund performance studies due to the problems that occur when funds disappear during the sample period. This is mostly due to poor performance of the fund over time leading up to the liquidation or merger of the fund. Other reasons discovered in this study were that funds disappeared due to having insufficiently small total market value and management's decision was that it was no longer worthwhile to pay to maintain the fund. These last two reasons fall back to the key reason of poor performance by the fund. The paper went on to suggest that only studying funds that existed for the entire sample period would bring about survivorship bias

and overstate the calculated performance measure. Elton et al. (1996) stated that correcting for this attrition in performance studies is crucial as we do not want to be presenting biased overstated fund returns and ignoring attrition in these studies may differentially impact our reported returns for funds that have different objectives as the attrition rates for these differing funds may vary. In addition to this they also discovered that when using Jensen's Alpha as a measure of fund performance, when comparing survivor against non-survivor samples, there wasn't much difference. However, to back up previous research the smaller funds in the sample have an alpha value twice as negative as the largest portfolio. This goes on to further justify that the smaller funds are more likely to liquidate or merge, not survive, due to experiencing many consecutive periods of poor performance.

Carhart (1995) researched the performance of an equally-weighted index of common stock funds and found that when using only surviving funds, the bias upwardly impacted the performance measure by 1.00% annually. This was contrary to Elton et al. (1996) as Carhart (1995) showed that a full survivor free sample shows the strongest level of performance while using a survivor-only biased sample gives the weakest level of performance persistence. In a study conducted on the Canadian market by Liang (2000), the influence of survivorship bias on the persistence of Canadian mutual fund performance was compared two different samples of funds; a survivor-only sample and full sample including all funds (including non-survivors). The study showed that the effect of the bias on mutual funds in Canada was nontrivial. It was found that fund size, fund returns and expense ratios were significant predictors of fund attrition. These results were all consistent with previous studies above and in the US market. A major factor arising from the research examined above is the fact that the effect of survivorship bias has a greater impact on longer sample periods of data. Extending further on research results globally mostly based in the US and UK, Goetzmann and Jorion (1999) found

that after examining 39 different markets from 1912 to 1996 the US equity premium of 4.30% is an exception. This gives evidence that the potential effect of survivorship bias is not just limited to mutual funds but any financial performance related topic. Survivorship bias needs to be a primary consideration as part of further studies in performance measurement, especially in emerging markets or new unit trust markets where data quality and availability is an issue and studies with longer sample periods of data.

2.2.1. LOCAL STUDIES

In South Africa there is currently a lack of previous research on the issue of survivorship bias and, relative to other markets, not very much research on the performance of unit trust funds. Meyer (1998) stated in his research study that survivorship bias did not exist over the period as, in his sample study; no fund had ceased to exist. Contrary to Meyer's (1998) findings, Pawley (2002) contradicted these conclusions and showed for the period 1976-2001 in South Africa, survivorship bias was present in performance studies. Pawley (2002) additionally found further evidence of the fact that survivorship bias and length of sample period have an inverse relationship. This is consistent with studies mentioned above and with Carhart (1997) even though that particular study was based in the US market. In a study conducted by Wessels (2004), which compared unit trust performance in South Africa, to a market benchmark, the data was constructed in such a way that all the failed or liquidated funds were excluded from the sample, thus giving rise to survivorship bias within the study. The study found that there could be short term persistence of performance in the sample of funds, although it was stated that these results could have been significantly skewed due to the survivorship bias within the sample. Pawley (2004) analysed the effect that survivorship bias had on unit trust performance during the period 1972 to 2004. Results from this study showed that using a data set which

suffered from survivorship bias led to a difference in results ranging from 23 basis points over a 5 year sample period to 105 basis points over 20 years on fund returns. The effect on performance data was such that the survivorship bias overstated the returns but up to 47% over the 20 year period. After analysing the small amount of local research available on the topic, it is important to be aware from the evidence above the effect that survivorship bias has on performance data studies and will, based on historical research, overstate performance measures within future studies in this area if not recognised and accounted for.

2.3. PERFORMANCE AND FUND CHARACTERISTICS

There has been an increasing number of empirical finance and financial economics research examining mutual fund performance worldwide. Some of the newer existing studies aim to identify and find relationships between mutual fund return performance and their fund specific characteristics. Certain fund characteristics that are hypothesized to have an impact or relationship with fund returns are the size of the fund and the funds return history as presented by Grinblatt and Titman (1998) along with Gorman (1991). Furthermore, whether or not the fund's shareholders pay any form or combination of fees may be relevant, as presented by Veit et al. (1988), Trzcinka and Zweig (1989). Lakonishok (1981) looked into the possibility of the funds expense ratio having an impact on performance returns, while Wharton School (1962) as well as Bogle (1992) hypothesized that portfolio turnover would play a role in determining fund performance. Droms and Walker (1996) suggested that fund wealth, expense ratio and turnover were all inversely related with fund performance. In US-specific research analysis, we find that fund flows, fund fees and current performance may have a large impact on future performance of US mutual funds. This was summarized from studies conducted by Ippolito (1989), Elton, Gruber, Das and Hlavka (1993), Gruber (1996), Carhart (1997), Sirri and Tufano

(1998) and Zheng (1999). In the discussion below we will give a more in-depth analysis of the studies conducted in the recent past, in different markets worldwide, looking into combinations of all the aforementioned factors. Specifically, we will look at developed and emerging market studies to see if any similarities exist in results. Results of these studies, methodology and data samples will be presented in order to assist in the selection criteria for this study in the South African unit trust market.

2.3.1. DEVELOPED MARKETS

Golec (1996) conducted a study on mutual fund manager's characteristics and how they could help explain fund performance, risk and fund fees. His results showed that fund performance, fees and risk were significantly impacted by manager characteristics. The sample selected in this study ran from 1988 – 1990 and included 530 of the 979 mutual funds listed in the UK from Morningstar's mutual fund sourcebook for the period. Funds that did not have the full 3 years of return data history were excluded from the study. This study would have suffered from survivorship bias and the performance measures and results would have most probably been upwardly biased.

The characteristics included in the study were fund yield which was calculated as annual fund income divided by the year-end total fund assets. Fund expense ratio was computed as the percentage of fund assets spent on operating expenses. Management fee was calculated as a percentage of funds' assets paid as management fees. Turnover of the fund was calculated as the percentage of total assets sold during the year. Team size was used and presented as the number of managers who make active investment decisions in the fund. Manager age, fund age, tenure and education are all measured in years with 1990 as the year end. MBA degree was turned into a dummy variable with MBA = 1 and other = 0.

The results reported explained that investors can expect better risk adjusted performance of mutual funds when the fund managers are younger, with MBA degrees and who have had longer tenures at their specific fund. It was also found that funds with low fees and more diversified portfolios outperform their peers. The most significant result of the study and the biggest impacting factor was length of time, manager tenure, that the manager had spent managing his or her fund. Lastly, he found in his study that a larger management fee may signal to investor's superior management and investment skill leading to better overall performance.

In a study conducted by Dahlquist, Engström and Söderlind (2000) looking into the Swedish mutual fund market and the relationship between fund performance and fund attributes, they measured portfolio performance in line with most previous studies using Jensen's alpha computed from a linear regression model run on multiple market benchmarks. The sample period used ranged from 1993 to 1997. The study then went on to use this performance measure to conduct a cross sectional analysis of performance and fund specific attributes in the Swedish market.

The paper stated that Swedish data in this area of research is fairly comprehensive so the study was used to overcome several previous pitfalls in other studies. Their fund attribute data included fund size, fees, trading activity of the fund and they stated that no survivorship bias should exist in their sample as they had all the data for all the funds that fell into their selected sample period. Additional fund attributes which were included in the cross-sectional analysis were past performance, net flows, fund size, fund turnover, and proxies for expenses and trading activity; all of these are computed on an annual basis. Fund size is calculated as the total net asset value (NAV) of each fund's portfolio. Net flows are computed using returns and total NAV to calculate the change in funds' assets beyond dividends and capital gains. Admin

fees, exit and loading fees are all calculated in the study as a percentage of the fund's total assets.

Their results gave different outcomes from earlier studies as they determined performance was driven by smaller equity funds, funds with lower fees, high trading activity and good past fund performance. This contradicted similar US studies which gave evidence that fund net flows, current performance and management fees may predict future performance. Some other results of the study showed that smaller equity funds perform better than larger Swedish funds. Secondly, they found that performance was inversely related to fees stating lower fee fund outperform relative to high fee funds which is consistent with the UK Mutual fund market reported by Golec (1996). This may be down to the fact that high fee funds do generate good performance but not enough to cover their much higher fees. The paper concluded by providing further justification to the above section on survivorship bias as they presented economically significant survivorship bias effects for Swedish equity mutual funds when certain funds were excluded from their model. Lastly, they found that actively managed mutual funds tend to outperform passive funds and found very little persistence in the performance of general equity funds. In the US market, Berkowitz and Kotowitz (2002) found that for fund managers of higher quality there is a positive relationship between fees and performance. However, for the lower quality managers the exact opposite is true as a significant inverse relationship exists.

Kallberg et al. (2000) supported these conclusions on the importance of management. The study further went and analysed 44 real estate mutual funds spanning a period from 1987 – 1998 and discovered that the funds had positive abnormal returns. In addition to this Baks (2002) used a data sample of 2086 managers of equity mutual funds to analyse the importance of managers and how performance relates specifically to the manager of the fund. In his conclusion, he states that fund performance and fund manager performance go hand in hand

and cannot be examined in isolation. Results showed that 50% of mutual fund performance in his sample was due to manager characteristics and the other half to the fund managers' ability. Further evidence to justify Golec's (1996) findings was Chevalier and Ellison (1997) who found that younger fund managers tend to invest in less adventurous portfolios when they begin their career and therefore have a lower risk position than their colleagues. They also found that the younger managers tend to perform better than their elderly peers.

An Australian study implemented by Bertin, Henker and Prather (2004) examined mutual performance using an integrated large data set analysis to construct a list of fund specific characteristics responsible for fund performance. The study provided an extensive analysis of mutual fund performance to follow on from previous research hypotheses on relationships between fund returns and fund explanatory variables. The study was conducted over a period from 1996 to 2000 using 5000 equity mutual trust funds. The study also dealt with the empirical research problem of survivorship bias as they collected time series data for every single fund that was in existence for some length of time in the 5-year sample period. This methodology significantly reduced the effect of survivorship bias on performance in this study but did not completely eliminate it.

Modified Jensen's alpha was used to calculate risk adjusted returns over the sample period to be used as a performance estimate. The explanatory variables used in the study were popularity which included characteristics such as fund size and fund agility. Another factor used was fund growth which included investment objective, diversification level within the fund which is calculated as the percentage of funds holdings invested in the top 10. Cost variables such as expense ratio, relative turnover, and load fees were also included in the analysis. On the management side characteristics such as funds under management, manager tenure and trading activity were calculated.

They found that fund popularity, growth of the fund and general management of the fund explained performance. Furthermore, the significant characteristics found included funds under management; the more time a manager spends focused on a fund the more likely the performance is to be greater. Expense ratio, manager compensation and administration fees were found to have an inverse relationship with performance consistent with previous studies that found that of these erode away a large portion of performance generated from the fund.

Baker, Haslem and Smith (2008) analysed the relationship between 1118 domestic US actively managed equity mutual funds and their fund characteristics from December 2004 to 2006. Using Miller's active alpha, in combination with Jensen's alpha, as performance measures in their regression analysis, they screened out index funds, fund of funds and Exchange Traded Funds (ETFs) so each portfolio only appears once in their analysis.

The characteristics included in their regression model against the performance measure were as follows: Expense ratio class which was calculated as the fund standard deviation of its annual expense ratio; Net assets shown as the natural logarithm of each fund's net assets since they hypothesized that the variable may be non-linearly related to the performance measure; Turnover is just the annual turnover rate for each fund on an annual basis; Beta, obtained from the original performance regressions to represent the systematic risk of each fund and dividend yield which was calculated as the value weighted average dividend yield for all stocks in the fund.

They found that the expense ratio is a significant determinant of performance in the US market. Also funds that are larger in size and those with greater cash holdings perform better than their peers. Mixed results were uncovered regarding turnover, beta and dividend yield as determinant of performance.

Budiono and Martens (2010) researched whether or not investors in the Netherlands can select superior funds using fund characteristics. The study was used as a comparison for how just using past performance as an indicator would be relative to using multiple characteristics in the selection process. Their sample contained survivorship bias free data from 1962 to 2006.

Fund monthly return data was available whereas characteristics data was reported on an annual basis. The performance measure used was just monthly excess returns over the risk-free rate chosen, the one-month Treasury bill rate. Other characteristics used in the study were turnover rate which is the minimum of aggregate sales and purchases of fund securities, alpha which is estimated from the specified regression model, manager ability given by the t-statistic of alpha in the initial regression model, expense ratio calculated as the ratio of all expenses of each fund and total net assets, and fund size which was proxied by the fund's total net assets and fund volatility which is the standard deviation of returns over each 12-month period in the sample.

The study showed that using certain characteristics of funds can significantly predict performance outside of using just past performance as an indicator of future performance. After considering fees they found that past performance, turnover and manager ability produced returns in excess of 8.00% when compared to just basing investment choice on past performance where the returns were reported to be much lower. Alpha values in the sample also increased when including these characteristics showing that there is a way to achieve higher levels of performance when selecting specific fund characteristics. The above-mentioned characteristics increased the sample alpha, total return and Sharpe Ratio in this study.

Gomes and Lobão (2015) conducted a study using a sample period from 2004 to 2011, which examined the relationship between fund performance and selected attributes in the Portuguese

market. In their study, they looked at 124 equity funds as well as a few bond and money market funds. They used a two-stage model whereby they first calculated a performance measure for each of the funds using Jensen's Alpha and secondly using a multifactor model with panel data regressing Jensen's Alpha against the chosen fund characteristics. Their study aimed to reduce and eliminate survivorship bias as their sample included 30 mutual funds that did not survive the entire period. The characteristics chosen by Gomes and Lobão (2015) were classified as comprehensive and some that had never been used before in Portuguese research.

The eight chosen fund specific characteristics were as follows: fees, costs, net flows, size, historical performance, level of risk, turnover and age. Fund costs are calculated as an overall rate. This was calculated by adding management fees, deposit fees, supervision fees and audit fees for each year in the sample. These costs are then shown as a percentage of average net asset value for the year. Fund size is made up of total assets under management represented by the net asset value (NAV) on the final day of each month. Monthly net fund flows were calculated by the change in net asset value (NAV), assuming that dividends and capital gains were reinvested as done by Dahlquist, Engström and Söderlind (2000). Fund age was calculated on a monthly basis as number of years since inception. Fund risk level was proxied by its risk class on a scale of 1-7 used in the Portuguese market, with 1 being the lowest level rated risk funds. Lastly Portfolio turnover was calculated by the value of purchases and sales in each fund for each year of the sample period. Turnover, just as fund costs, are represented as a percentage of the average annual NAV of each fund. Most of this data was collected from CMVM databases while fees, costs, risk and portfolio turnover annual data was collected from the respective fact sheets and prospectuses of each fund.

Their findings presented that for their different categories of mutual funds considered, fund characteristics are useful for investors and investment managers in the process of choosing

which funds to invest in. In the case of the Portuguese market, in this study they found that older funds generate better returns which contradicted the Malaysian market results shown in a study conducted by Jusoh and See (2012). They also found that larger funds tend to show the best performance relative to the smaller funds in the market. Also funds with good previous past performance and higher costs and lower trading activity show superior performance relative to their peers.

Most recently Berkowitz, Schorno and Shapiro (2017) engaged in a study focusing on mutual fund characteristics associated with periods of extreme performance in the US. They collected their data from Morningstar Principia and their sample therefore did not suffer from any survivorship bias as all the data for each fund in existence from January 1999 to September 2011 was obtained. Their data set analysed 25990 mutual funds. They looked at the following fund characteristics: Expense ratio, alpha, beta, new funds, team size, single manager fund, top 10 holdings, tenure, turnover, cash, fund size and total holdings. Other variables considered in their paper related to performance such as management fees which Volkman and Wohar (1995) showed had a significantly inverse relationship with performance and persistence.

Their study found that funds with extreme performance are generally riskier positioned, have a higher portfolio beta and have fewer overall stock holdings in the fund with a more top 10 stock concentration.

2.3.2. EMERGING MARKETS

Tng (2006) studied unit trust performance in Singapore's market and what factors influenced this performance during a period from 1999 to 2004. The selected characteristics were fund expense ratio recorded as a percentage, risk and fund size given as each fund's net assets under management and asset allocation. Tng (2006) found that mutual fund characteristics can affect

performance and mutual fund returns. The factors found to be significant were asset allocation and the systematic risk of the fund.

Low (2010) conducted research in the Malaysian mutual fund market to examine fund performance and characteristics. The study was made up of 65 unit trust funds from 1999 to 2004. Again, consistent with previous literature, Jensen's alpha is used to measure performance and these alpha values were used in linear regression models against chosen fund characteristics.

Expense ratio in the study was calculated as average net assets paid for management fees, trustee fees, audit fees and administration fees. Portfolio turnover was just each of the individual funds' turnover ratio. Beta was used to represent fund riskiness and was estimated from the regression analysis over the period when calculating the performance measure. Fund age was calculated as the natural log of the funds age at the end of the sample period since fund inception. Fund size was again the natural log of the fund's end of year total net asset value. Fund growth was then calculated as a percentage growth in total funds' assets compared to the previous period. This was done for every fund in the sample. Lastly, fund objective was created as a dummy variable for aggressive funds and then all others.

Results showed that risk-adjusted returns when used as a performance measure are not significantly related to fund age, size and initial service charge. It was found that riskiness of the fund, Beta, and growth in fund size was responsible for performance. Fund growth was found to be significantly inversely related to fund performance stating that as funds grow year on year they may tend to use resources less efficiently leading to declining returns and poor performance.

Arif and Jawaid (2011) investigated the relationship between mutual fund performance and fund managers characteristics using only 14 open ended equity mutual funds in the Pakistani market. The sample period ran from 2005 to 2008. The study was initiated as the Pakistan mutual fund industry hit a period of significant economic growth and aimed to motivated researchers and investors to take more interest in the performance and performance related characteristics of these mutual funds. Linear OLS regression models were used to analyse these effects.

Fund characteristics included were management tenure which was calculated using the number of years within the fund at the end of the sample period, 2008. Manager experience was defined in years and fund size which was presented in total funds asset size at the end of 2008. Management fee was calculated at a percentage of assets spent on operating expense and finally Beta to represent market risk.

Overall the study analysed performance returns against portfolio or fund beta and fees. Their results showed that management fees had a significantly inverse relationship with performance. They concluded that in Pakistan you should avoid equity funds that have high management fees.

Goel, Mani and Sharma (2012) investigated performance related characteristics of open-ended Indian mutual funds. Their study period ranged from 2006 to 2011 using risk adjusted returns as a performance measure as well as asset size and fund expense ratios, as some of the characteristics using 727 Open ended mutual funds were used in their sample. They used CAPM models and Jensen's alpha to calculate risk-adjusted returns instead of just using monthly net asset values of the fund. This was their chosen methodology as they believed that using the later method would not show any risk factor assessment in the performance measure.

The study showed that after using multiple linear regression models for analysis, performance persistence does exist in the Indian market for mutual funds.

The study is similar to those of Wermers (2000), Coval and Moskowitz (1999), Hung and Jan (2003) and Papadamou and Stephanidesz (2004) as they all found that mutual funds' performance could be predicted by their performance persistence, fund asset size and expense ratio. Expense ratio was calculated as the funds 5-year average total expense over net total assets. Fund asset size was taken as the natural logarithm of funds' assets under management at the end of the sample period. This was done as they believed that if mutual funds realise economies of scale then performance should be directly related to the funds size.

Results of the study showed that funds with low expense ratio and larger sized funds have generated much higher risk-adjusted returns than others in their sample. They also stated that in India using past performance of these funds is a good predictor of future performance. Their study was conducted to assist Indian investors and investment managers in fund selection and investment decisions. While the funds' expense ratio was found to be inversely related to fund performance and fund size positively related, it could be said that mutual fund managers should be looking to increase their fund size looking forward into the future and focus on lowering their expense ratios as higher expenses are eating away at performance. These factors should enhance performance of mutual funds. This is a similar finding to Dahlquist, Engström and Söderlind (2000) with their conclusion of higher fund fees eroding fund performance.

Jusoh and See (2012) examined which fund characteristics affect mutual funds in Malaysia by including 69 equity mutual funds in their study over a period of 5 years. Multiple regression analysis was conducted to uncover the effects of risk, fund size and fund age on fund performance. A large concern in this paper was the effect of survivorship bias. This study was

conducted free of survivorship bias as all the funds that ceased to exist or joined the sample late were included in the sample and all data on these funds was obtained. Risk-adjusted returns were again, as in most studies covered in this section, calculated using Jensen's alpha.

Fund characteristics such as fund size, expense ratio and turnover ratio were all reported on an annual basis. These were calculated and collected for each of the 5 years in-sample and an average was calculated at the end of the sample period. Fund age is calculated from the inception of the fund until the end of the sample period and is measured in years. Beta as a measurement for fund risk is obtained from the regression output when calculating Jensen's alpha risk adjusted returns.

Results of the study showed that higher risk funds tend to generate greater returns and funds which spend more money on research, and therefore have higher expense ratios, showed evidence of better overall fund performance. For the Malaysian market the study also revealed that younger funds perform better than older funds. In this study however, it was found that fund size and turnover ratio had no significant impact on mutual fund returns. These results are consistent with the study conducted by Low (2010), also on the Malaysian market.

The methods used in the above studies vary based on the specific data samples and time periods. The general method implemented to calculate returns and risk adjusted returns from the fund's net asset values is using Jensen's Modified Alpha. To determine significance of fund characteristics the studies had varied methods and regressions to obtain their results. Golec (1996) calculated alpha, beta and residual fund return using the Capital Asset Pricing Model (CAPM). Dahlquist, Engstrom and Soderlin (2000) took the Net Asset Value (NAV) of their selected funds using weekly returns and calculated a performance measure using Jensen's Modified Alpha. Similarly, Low (2010) and Bertin, Henker and Prather (2004) implemented

the same methodology but rather used the monthly NAV of the funds again using Jensen's Modified Alpha to generate a risk adjusted performance measure. Alternatively, Budiono and Martens (2010) found their alpha term using a simple linear regression against multiple benchmarks. This was also done by Bertin, Henker and Prather (2004) as they explained using multiple benchmarks would omit incorrect inferences about the relationship between performance and characteristics when compared to using a single factor model. As we are only considering a sample of general equity funds we believe the best method, as used in previous emerging market equity mutual fund studies, to be implemented in our study would be to calculate a performance measure (Jensen's Alpha) using a single factor model with a single selected benchmark to be used as a proxy for the market.

To determine significant characteristics the studies examined used varying regression methods. Bertin, Henker and Prather (2004) used a multiple linear regression and regressed the performance measure on their selected fund characteristics. Low (2010), Budiono and Martens (2010) did the same, again using multiple linear regressions, regressing the alphas of the individual funds on their characteristics. Alternatively, Dahlquist, Engstrom and Soderlin (2000) used panel data in their sample so implemented a panel data weighted least squares (WLS) regression model which weighted their performance measure to correctly adjust for the full effects on the sample period. Philpot and Peterson (2006) examined which individual mutual fund attributes are associated with mutual fund performance. This study added to previous literature in this area as a longitudinal/panel data set was used to examine and study returns and relations over time. This research used a multivariate approach to examine the attributes and relationships all at once using a similar methodology to Jacobs and Levy (1988) that used multiple regression approach on equity listed instruments. Lastly Golec (1996) used a method of three least squares regression in order to achieve greater consistency of their

estimates and to eliminate correlation between the dependent and independent variables in the regression.

2.3.3. SOUTH AFRICAN MARKET

In the more recent past in South Africa there have been a few studies which have conducted research looking into individual unit trust fund characteristics and the effect on performance. Some of these studies will be analysed below in order to be used as a reference for the results of our study as comparables. The studies are still very limited however and the results below should be taken as guidance and areas for further research rather than the South African industry standard.

A study conducted by Hibbert (2003) identified that the unit trust industry in South Africa had experienced, and continues to experience, large exponential growth since the 1980's. The objective of his study was to investigate the relationship between the size of South African unit trust funds and their risk adjusted performance or returns. He also tried to identify whether, if fund size effects fund performance, it would it be possible to identify a size range which a fund falls into that could maximise unit trust returns in South Africa. The data analysed was from the period of 1990 to 1999. He calculated fund size as the total net assets of each fund or assets under management (AUM). The risk-adjusted performance measures used in this study were Jensen's Alpha, Treynor Index and the Sharpe Index. After conducting the regression analysis, it was found that there was no statistical significance or relationship between risk adjusted performance and fund size for the 10-year period. He also found no basis for which a range of fund sizes exist that achieve superior returns.

More recently Griffiths (2010) conducted a study which aimed to collect a set of data related to unit trust fund characteristics in South Africa with an extensive focus on fund expenses. The

study examined expense ratios, net asset values, total net assets and fund annualised returns. It showed that there were no significant relationships between unit trust fund performance and fund expenses and therefore expense ratios in South Africa. In addition to the study conducted by Griffiths (2010), Wright (2015) analysed African and South African mutual funds, focussing on fees charged, expense ratio and fund size. The aim of the paper was to test the existence of any relationship between the above mentioned characteristics relative to those that were well established in international research. The main data used in the study was total expense ratios for the selected funds, fund net asset values, total net assets and mean expense ratios for the sample period. The paper's results reported weak evidence between level of development in financial markets and fund expense ratios.

3. DATA

3.1. DATA COLLECTION

To perform the specified methodology for this study, data from a number of sources was required to be collected. These sources included Morningstar Direct, the Reserve Bank of South Africa and Bloomberg. This study is concerned with monthly returns data for the all of the South African General Equity Unit Trust funds, as classified under the Association for Savings & Investment South Africa (ASISA) South Africa EQ General category, for an 8-year period running from 01 January 2010 to 31 December 2017. Excess monthly returns are calculated as the funds' monthly total return above or below the specified monthly risk-free returns. Fund-specific characteristics were also collected from Morningstar Direct as well as from individual fund prospectus and fact sheets over the sample period on an annual basis for each year in the sample. Some data and characteristics for certain funds were not obtainable from Morningstar South Africa or from historical fund fact sheets - these funds were chosen to be excluded from our analysis. This will be explained in more detail in the sections that follow along with the methods used in calculating each of these funds' characteristics. The source of other returns such as monthly benchmark returns using the JSE/AllShare Total Return Index and JSE/AllShare SWIX Total Return Index and the risk free rate (3 Month South African JIBAR) data was collected from the South African Reserve Bank website and Morningstar Direct.

3.2. SAMPLE SELECTION

Table 1:
Breakdown of Sample Selection

	SA General Equity Unit Trust Funds
Sample initially considered	305
No return data observations in period under consideration	(8)
Sample used in performance measure calculation	297
Excluded from sample on the basis of unobtainable characteristic data	(51)
Final sample used in performance and characteristic regression	246

The source of our South African general equity unit trust data, including returns, performance information and fund characteristics, was Morningstar Direct. As mentioned above, the data was collected over the entire period running from 2010 to 2017. Initially for the entire sample period there were 305 South African General Equity unit trust funds in existence. This was then reduced to 297 funds as there were 8 funds which had no returns data in the sample period. These funds had become obsolete or ceased to exist before 01 January 2010. The reduced sample includes funds which have at least one monthly return in the entire sample period. This is done to try and reduce the effects of survivorship bias on our performance measure and overall research study. The methodology and justification is explained in Section 4 of the paper.

3.3. SURVIVORSHIP BIAS

As mentioned earlier in this paper a well-documented problem in the empirical finance research field is that of survivorship bias. We have uncovered, based on past research, that survivorship bias in mutual and unit trust fund studies may result in our calculated performance measure being overstated. This is due to losing return data on funds that are classified as non-survivors and funds that joined the market during the sample period. Our study aims to tackle this issue and reduce survivorship bias in the following ways. Firstly, we chose to include all the funds

in existence for the 8-year period, as long as they had at least one month of return data or were in existence in the sample period for at least one month. This was constructed over the period 01 January 2010 to 31 December 2017. What this allows us to do is build a model sample of all the unit trust funds and their characteristics for the entire period. Consequently, this significantly reduces survivorship bias in our sample as the entire sample would be inclusive of funds that are survivors and non-survivors that may have gone through liquidation or merger later in the sample period. We also include the funds that joined the unit trust market in South Africa at a date within the sample period. Funds that were incepted during the 8-year period were therefore also included in the sample.

In choosing this method we understand that certain fund data from the original 305 equity unit trust funds will be excluded from our model due to unobtainable data and quality of data restrictions. However we do believe that this method, although not eliminating survivorship bias entirely, will significantly reduce the bias as well as extend research on unit trust performance methodology as previously conducted in the South African marketplace, where the impact of survivorship bias in their studies was ignored.

After the process was completed we had a list of funds for the entire sample period from 2010 to 2017.

3.4. RISK FREE RATE

The risk free rate used in our study is the 3-month South African Johannesburg Interbank Acceptance Rate (JIBAR) as used by Brink (2004) in a South African unit trust performance study. The risk-free rate was sourced from the South African Reserve Bank website. The data was collected for the entire sample period from 01 January 2010 to 31 December 2017. The

risk-free rate is used to calculate excess returns for all the unit trust funds as well as the benchmark monthly returns, as detailed in Section 4.

3.5. BENCHMARK DATA

The market is defined by an index. Hence, an appropriate index or performance benchmark must be selected when calculating the beta of unit trust funds. Since this study exclusively includes funds invested primarily in South African equity securities, the chosen benchmark for our research study is the FTSE/JSE Total Return All Share Index (ALSI). This is in line with another unit trust performance study conducted in South Africa by Malefo, Hsieh and Hodnett (2016). We have chosen to use the Total Return version as this includes dividends and capital gains in the return data. This is done as we want to compare total returns of our funds to the benchmark rather than price movement returns alone. The monthly benchmark data is used, in excess of the above-mentioned risk-free rate, in our first regression analysis and Jensen's alpha method as a measure of the market portfolio or benchmark return measure. This return data was collected over the sample period 01 January 2010 to 31 December 2017. The use of a benchmark index is of great importance for fund managers when illustrating and measuring performance; such graphical illustration is often the only way for investors to form an opinion of the fund performance and results. This fact could result in an incentive for mutual fund managers to choose a low performance benchmark which is not appropriate from an investor point of view. Hence, for this study we have chosen the FTSE/JSE Total Return ALSI.

3.6. UNIT TRUST DATA & FUND CHARACTERISTICS

Using the Morningstar South Africa Direct database, the following information was extracted for all of the South African General Equity Unit Trust funds for the period 01 January 2010 to 31 December 2017:

- Monthly return data, end of the month total return.
- Fund inception date and fund obsolescence date, only for those funds who liquidated or ceased to exist at some point in the sample period.
- End of the month total net assets or assets under management (AUM) month end.
- Fund net flows reported monthly at month end.
- Percentage of asset holdings in the top 10 (quarterly figures).
- Annual report net expense ratio reported annually on 31st of December for each year.
- Longest manager tenure since fund inception.
- Fund manager history, namely if the fund had multiple managers, their start and end management dates.
- Fund of Fund classification.
- Management fees, given as an annual figure on 31 December for each year.

The above collected fund information and data will be used extensively throughout our methodology and used to calculate the specific fund characteristics. The selected characteristics chosen to be included in this study are as follows:

- Beta; which represents the riskiness of the specific fund relative to the market or benchmark.

- Fund Size; which is the total net assets (TNA) or assets under management (AUM) of each fund in the sample.
- Expense Ratio, is the total percentage of each fund assets used for administrative, management, advertising (12b-1), and all other expenses. An expense ratio of 1% per annum means that each year 1% of the fund's total assets will be used to cover expenses. These are reported annually for each of the funds in our sample.
- Percentage of Top 10 Holdings, showing out of the total funds holdings, updated quarterly, what percentage of total holdings were made up of JSE Top10 listed equity stocks.
- Fund Age, being how long the fund has been in existence in the South African unit trust fund market. Measured from date of inception to obsolete date or end of our sample period.
- Management Fees, also known as hiring costs to invest in the fund and is the charge levied by an investment manager for managing the unit trust fund. The management fee is intended to compensate the managers for their time and expertise for selecting stocks and managing the portfolio. This cost is usually on average between 0.50% and 2.00% of total funds' assets or assets under management.
- Fund of Funds, is also known as a multi-manager investment. It is an investment strategy in which a unit trust or mutual fund invests in other unit trust funds rather than investing into equity, bonds or other securities. In previous studies fund of funds have been excluded due to the chance of double counting as some funds may be invested in other funds within the sample. However in South Africa fund of funds are largely evident in the unit trust market place and are quite a popular unit trust investment and management style. Over the period considered in this study these funds may have a

significant impact on performance so we choose to include this characteristic in our study.

- Manager Tenure is just the length of time the current fund manager, or managers', have been in control of the running and management of that fund

The methodology and calculation of these characteristics as well as their inclusion in our chosen regression analysis will be covered in Section 4 below.

4. METHODOLOGY

4.1. JENSEN'S ALPHA

Jensen (1968) created his model, the Capital Asset Pricing Model (CAPM), extending work previously done by Sharpe (1964), Lintner (1965) and Treynor (1965). The major issue Jensen had with original studies mentioned above was understanding and measuring risk. CAPM states that the expected return an investor should see on any portfolio or security should exceed the risk free rate of return by an amount which is proportional to the systematic risk (as measured by beta), of that portfolio or security relative to any selected market benchmark portfolio. This is shown by equation 1 below.

$$E(R_j) = R_f + \beta_j[E(R_M) - R_f] \quad [1]$$

Where:

$E(R_j)$ = one period expected return for fund j .

R_f = one period risk free interest rate.

$\beta_j = \frac{\text{cov}(R_j, R_M)}{\sigma^2(R_M)}$ = measure of systematic risk.

$E(R_M)$ = one period expected market portfolio/benchmark return.

This single period CAPM model introduced by Sharpe, Lintner and Treynor could be extended into a multiperiod world, Jensen explained, where investors are allowed to have heterogeneous horizon periods and the trading of securities takes place continuously over time.

Jensen's alpha is shown by the following equation:

$$R_{jt} - R_{ft} = \alpha_j + \beta_j(R_{Mt} - R_{ft}) + u_{jt} \quad [2]$$

Where:

α_j = Jensen's fund specific alpha which is the intercept and performance measure.

R_{jt} = total return for unit trust fund j for month t .

R_{ft} = risk free rate for month t , given as South African 3 month JIBAR.

β_j = measure of systematic risk of unit trust fund, j , relative to the market risk premium.

R_{Mt}

= total return of the market portfolio for month, t , given as the JSE ALSI Total Return Index.

u_{jt} = regression error term or residual.

Jensen's alpha measures the average return of the specific unit trust fund over and above that predicted by the CAPM model in equation [1], given a unit trust fund beta and average market return. Theory states that a positive alpha value denotes a unit trust fund or security whose returns are greater than those implied by the fund specific level of systematic risk leading to superior performance of that fund. Similarly, a negative alpha value for any fund shows inferior fund performance. This Jensen's Alpha for each fund is used as our study's performance measure consistent with previous literature covered in Section 2 of this paper.

4.2. FIRST STAGE REGRESSION

Using the methodology mentioned above to calculate our performance measure, Jensen's Alpha, we first set out all of our nominal total returns for each of the 297 funds over the 96 month period as well as our selected benchmark nominal total returns. As per Gomes and Lobão (2015) in their study of the Portuguese market, the first step of our method was to calculate excess returns as specified in equation [2] for both fund returns and the benchmark returns. These returns were calculated in excess of the risk-free rate, South African 3 month JIBAR. This is a 12-month rate which is divided by 4 to approximate a quarterly rate consistent with the rest of the data. This is then used in the equations below:

$$ExR_{jt} = (R_{jt} - R_{ft}) \quad [3]$$

Where:

ExR_{jt} = The excess monthly return for month, t, for each fund, j.

R_{jt} = total return for unit trust fund j for month t.

R_{ft} = risk free rate for month t, given as South African 3 month JIBAR.

$$ExR_{Mt} = (R_{Mt} - R_{ft}) \quad [4]$$

Where:

ExR_{jt} = The excess monthly return for month, t, for the market portfolio/benchmark, M.

R_{Mt}
= total return of the market portfolio for month, t, given as the JSE ALSI Total Return Index.

R_{ft} = risk free rate for month t, given as South African 3 month JIBAR.

Using the equation above we calculated excess fund returns for each month that each fund had return data, as well as calculating excess returns for each months' return data of the benchmark. These would be used in our first regression in order to calculate Jensen's alpha and the fund-specific Beta for each of the funds using equation [2].

For each of the 297 funds in the sample, their excess monthly return observations were matched with the benchmark excess monthly returns. Our independent variable, *Excess Monthly Fund Returns* was used in the above regression equation and regressed against our dependant variable, *Excess Monthly Benchmark Returns*. This regression was run for each of the 297 funds in sample. Each of the regression outputs gave a Jensen's alpha value, our fund specific performance measure for each fund over each specific period, and the fund specific beta, a measure of risk relative to the market portfolio.

4.3. FUND WEIGHTS

Following this first stage regression, we created another variable called fund weights. The formula for this calculation is as follows:

$$Weight_j = \frac{\text{number of monthly returns present in the sample period}}{\text{number of months in the total sample period}} \times 100 \quad [5]$$

The reason for this is that due to procedure to reduce survivorship bias, many of the funds included in the initial first regression and Jensen's Alpha calculation may have had very few observations or returns data relative to the whole sample period. As previously mentioned the quality of data throughout the sample may vary due to not having only funds that have returns for the full sample period. Therefore one of the common assumptions underlying most process modelling methods, including linear and nonlinear least squares regression, is that each data point provides equally precise information about the deterministic part of the total process variation. In other words, the standard deviation of the error term from our first stage regression is constant over all values of the predictor or explanatory variables. We have recognised that this is not the case with our data and therefore this assumption clearly does not hold and is violated. Weighted least squares can often be used to maximize the efficiency of parameter estimation in cases such as we have with the data in this study. This is done by attempting to give each data point its proper amount of influence over the parameter estimates. In order to achieve this we use the above weights to adjust our calculated alphas in order to run a Weighted Least Squares (WLS) regression in the second part of our model to determine the impact of fund specific characteristics on the performance of that fund. This follows methodology used

in a study conducted by Dahlquist, Engström and Söderlind (2000) that used the same technique to estimate their performance alphas over their sample period. We therefore calculated an adjusted alpha variable to be used in the second stage WLS regression after the first stage regression.

Adjusted Alpha is calculated as shown by equation [6] below:

$$\alpha'_j = \alpha_j \times weight_j \quad [6]$$

Where:

α'_j = *weight adjusted alpha for each fund, j.*

α_j = *Jensen's fund specific alpha calculated from equation [2].*

$weight_j$ = *each funds relative observation weight over the entire sample, equation [5].*

4.4. FUND CHARACTERISTICS

The fund characteristics mentioned below were selected based on previous literature and research as covered in Section 2 of this paper. These are the specific characteristics identified as being relevant to the South African unit trust market and equity space and lastly based on the availability of data and past data on Morningstar South Africa. The methodology behind calculating these characteristics to be used in our WLS regression in the second stage of our analysis will be explained below.

4.4.1. FUND BETA

As mentioned in Section 3, Fund Beta is used to measure the riskiness of the fund relative to the selected benchmark (the JSE ALSI Total Return index). In order to calculate fund specific beta for the period under consideration we used the regression model from equation [2] in

which we calculated our performance measure. We extrapolated each of the beta coefficients for each fund from the 297 regressions to create a new variable, *Beta*, which includes 297 values or risk coefficients for each fund in the sample to be used in our second stage WLS regression. This method is consistent with methodology used in previous research studies by Golec (1996) and Low (2010).

4.4.2. *FUND SIZE*

To calculate fund size for each of the 297 funds we used the total net assets (TNA) or assets under management (AUM) of each fund at the end of the period, 31 December 2017. For the funds that went obsolete or ceased to exist at some point in the sample period we used the values from the end of the month of the last period of reported monthly return for that fund. For example, if a fund liquidated or went obsolete in the middle of month x, the previous month-end TNA or AUM would have been used as a measure of fund size. We understand this may not be accurate, however this is our closest estimate based on the availability of data for this study. A similar methodology was implemented by Budiono and Martens (2010) and Arif and Jawaid (2011). Through this process we created the variable, *FundSize*, to be included in our final stage regression analysis.

4.4.3. *EXPENSE RATIO*

In order to represent explanatory expense ratio variable, we took the funds reported net expense ratio for the year, downloaded from Morningstar South Africa, for each fund and calculated the average Net Expense ratio over the entire period. If a fund had gone obsolete or liquidated in the middle of the year the reported net expense ratio would be from the last day the fund was in operation. Under these circumstances we used the net expense ratio over the period that the

fund had been in the sample. For funds that joined the sample in later years we calculated the average from the reported net expense ratio figure for the fund on the 31st of December of year of inception until the end of the period or until the fund became obsolete. This method created an average net expense ratio, expressed as a percentage, for each of the 297 funds in our sample generating the variable, *ExpenseRatio*. This follows the methodology used in emerging market studies by Goel, Mani and Sharma (2012) and Jusoh and See (2012).

4.4.4. *PERCENTAGE OF TOP 10 HOLDINGS*

The next characteristic we needed to calculate was the average percentage of top 10 assets held by each fund over the sample period, or for the period that they existed within the 8 years of our model. The figures used to calculate this were reported as quarterly figures that showed each funds' percentage of top 10 JSE listed equity securities held in the fund. For funds that existed over the entire sample period we calculated an average holding over the period to get percentage value for each fund. For the funds that became obsolete within the period under consideration the average was calculated up until the latest quarter updated percentage holding before the fund became obsolete. We generated a variable named, *Top10*, which is to be included in our final regression analysis. This methodology was similar to that followed by Bertin, Henker and Prather (2004) and Berkowitz, Schorno and Shapiro (2017) in their mutual fund characteristics studies.

4.4.5. *FUND AGE*

Each funds age is calculated from the date of the funds inception until the end of our sample period, 31 December 2017. For funds that became obsolete during the sample period we calculated fund age from the funds' inception date until the obsolete date. All of these figures

were shown as age in years. First, we calculated the monthly age of each fund and divided this by 12 to get a more accurate representation of fund age as certain funds were only in existence for less than 1 year. This was done in line with research done by Jusoh and See (2012). Using this methodology, we created the variable, *FundAge*, to be used in our second stage regression.

4.4.6. MANAGEMENT FEES

Management fees were calculated in a similar method to that of our variable, *ExpenseRatio*. We took the annual reported end of year management fee and took an average fee over the sample period. Again, for the funds that had gone obsolete or liquidated in the middle of the year the reported management fee would be from the last day that the fund was in operation. In many cases this fee was rolled over from the previous year's end of year figure. Under these circumstances we calculated an average management fee over the period that the fund had been in the sample. For funds that joined the sample in later years we calculated the average from the reported management fee figure for the fund on the 31st of December of year of inception until the end of the period or until the fund became obsolete. The methodology used created an average management fee, expressed as a percentage, for each one of the 297 funds in our sample generating the variable, *Fees*. This follows a similar methodology used by Gomes and Lobão (2015).

4.4.7. FUND OF FUNDS

The fund of funds variable was calculated based on the data downloaded from Morningstar. The raw data showed yes or no answers to the question whether the fund was a fund of funds. We converted this to create a dummy variable, *FoF*, which would be represented as a 1 if they

are a fund of funds and a regular unit trust fund would be represented as a 0. This is in line with methodology used in studies by Golec (1996) and Low (2010).

4.4.8. *MANAGER TENURE*

Manager tenure is calculated to show how long the current fund manager for each specific fund has been in charge of that fund. We used the manager history data downloaded from Morningstar South Africa to determine this variable. *Tenure*, measured in a similar method to that of fund age is calculated from the date of the manager's starting date as the fund manager until the end of our sample period, 31 December 2017. For funds that became obsolete during the sample period we calculated manager tenure from the day the manager started until the fund closed, or to the fund's obsolete date. If there were multiple managers over the funds existence we used the most recent manager to calculate the tenure for that fund. All of these figures were shown as age in years. First we calculated the tenure of each fund manager in months and divided through by 12 to get a more accurate representation as some of the managers and funds were only around for less than 1 year. This methodology is consistent with our past literature research and studies conducted by Golec (1996), Bertin, Henker and Prather (2004), Arif and Jawaid (2011) and Berkowitz, Schorno and Shapiro (2017).

4.5. SECOND STAGE WLS REGRESSION MODEL

The Jensen's alphas obtained from the earlier regression output in our first stage of this methodology are generated variables that contain measurement errors, as we have identified and explained above. While this does not affect the consistency of the estimators of our regression coefficients, it introduces heteroscedasticity since the different alphas are measured with varying degrees of precision due to the fluctuating time periods of return observations

through the entire sample period. This means that ordinary least squares (OLS) is an inefficient method to use to analyse the effect of characteristics on these alpha values and that the traditional estimates of the standard errors could be misleading. Therefore, we use a weighted least squares (WLS) approach, as used by Dahlquist, Engström and Söderlind (2000) in their study, where each observation is weighted by the formula used in equation [5] above. Optimizing the weighted fitting criterion to find the parameter estimates allows the weights to determine the contribution of each fund's return observation to the final parameter estimates, this method was also used in a study conducted by Heckman (2006) that examined mutual fund returns according to their country fund allocation. It is important to note that the weight for each observation is given relative to the weights of the other observations; so different sets of absolute weights can have identical effects. The advantage of using this weighted least squares regression method is that it is an efficient method to use when dealing with small data sets, which we have. It also has the ability to provide different types of easily interpretable statistical intervals for estimation and prediction. In addition to this, as discussed in the sections above, the main advantage that weighted least squares enjoys over other methods is the ability to handle regression in which the data point or observations throughout the sample are of a varying quality and accuracy. If the standard deviation of the random errors in the sample data is not constant across all levels of the explanatory variables, in this case our chosen characteristics, using weighted least squares with weight adjusted independent variable yields the most precise parameter estimates possible in regression estimation.

We use our adjusted alpha values from equation [6] as the independent variable against our dependant explanatory characteristics in the following regression:

$$\alpha'_j = \beta_0 + \beta_1 Beta_j + \beta_2 FundSize_j + \beta_3 ExpenseRatio_j + \beta_4 Top10_j + \beta_5 FundAge_j + \beta_6 Fees_j + \beta_7 FoF_j + \beta_8 Tenure_j + \epsilon_j \quad [7]$$

Where:

α'_j = weight adjusted Jensen's Alpha, performance measure, for fund, j.

$Beta_j$ = fund, j, calculated measure of risk.

$FundSize_j$ = fund, j, calculated size of the fund.

$ExpenseRatio_j$ = fund, j, calculated average expense ratio.

$Top10_j$ = fund, j, calculated average top 10 assets.

$FundAge_j$ = fund, j, calculated fund age.

$Fees_j$ = fund, j, calculated management fees measure.

FoF_j = fund, j, dummy variable for Fund of Funds (1 = FoF).

$Tenure_j$ = fund, j, calculated manager tenure.

The section to follow below will analyse the above regression model and discuss the results that were obtained relating to fund performance and fund specific characteristics.

5. RESULTS

In section 5 we will analyse the results of our final regression and summarize the findings of our paper in examining the effect that unit trust characteristics in South Africa have on fund performance. First, we present an analysis of the descriptive statistics of our sample to give an overall view of fund performance and the funds characteristics. Finally reporting the findings of our final regression, an analysis will be conducted in an attempt to explain and identify which fund characteristics affect South African General Equity unit trust performance over the period of 01 January 2010 to 31 December 2017.

5.1. DESCRIPTIVE STATISTICS

Table 2 below presents a breakdown of the descriptive statistics for the South African general equity unit trust fund characteristics calculated. Looking at the below table, *Table 2*, we see that over the entire period ranging from 01 January 2010 to 31 December 2017, using Jensen's Alpha as a performance measure, that on average the funds in sample underperformed the benchmark of the FTSE/JSE ALSI Total Return Index. This is shown by the mean coefficient of Jensen's alpha being -0.18. In our sample, when the funds were ranked on their calculated Jensen's alpha, only 13.00% of the funds showed positive Jensen's alpha and thus outperformance. This underperformance of general equity funds is to be expected as over the sample period the South African stock market struggled. Additionally, the rand weakness and economic outlook in South Africa had a huge impact on equity returns in the market after the

Table 2:
Descriptive Statistics

	Mean	Standard Error	Median	Standard Deviation	Kurtosis	Skewness	Range	Minimum	Maximum	N
Jensen's Alpha	-0,18	0,01	-0,14	0,18	1,95	-1,15	1,02	-0,83	0,19	246
Beta	0,82	0,01	0,83	0,16	7,92	0,30	1,64	0,22	1,86	246
FundSize	381528504,67	124994517,13	37924171,86	1960462397,29	168,87	12,26	28221030108,18	105,61	28221030213,79	246
Expense Ratio	1,53	0,05	1,49	0,73	1,59	0,75	4,35	0,04	4,39	246
Top10	56,60	0,98	54,58	15,32	1,64	1,22	71,06	29,04	100,10	246
FundAge	6,98	0,41	5,00	6,37	1,22	1,23	29,00	-	29,00	246
Fees	1,20	0,03	1,14	0,55	0,37	0,22	3,14	-	3,14	246
FoF	0,07	0,02	0,00	0,26	8,95	3,30	1,00	-	-	246
Manager Tenure	5,64	0,29	4,25	4,62	2,65	1,38	29,33	-	29,33	246

end of the 2015 financial year. It was only after the fourth quarter of 2017 that we began to see rand strength come back into the market and observed positive equity returns. Overall, we see that over our sample period, on average, our selection of equity unit trust funds, shown again by Jensen's alpha, have underperformed by 18.00%. The best performing fund achieved an alpha of 0.19 over the entire period. Looking at Beta we can see from our select sample that the average fund in our study had a market risk position lower than the chosen benchmark and was taking on less risk relative to the market shown by an average fund Beta of 0.82. The average expense ratio of the sample of funds expense ratio is 1.53% and management fee of 1.20%, with an extremely high maximum fee of 3.14%. Of the 246 funds in our sample, on average the funds held 56.60% of top 10 JSE listed stocks across the period. In terms of fund age the average fund in the South African general equity unit trust space during the sample period had an age of 6.98 years with the average manager tenure being 5.64 years, showing that in general most funds don't change their investment managers often and fund managers remain managing their specific funds for long periods at a time.

5.2. FUND CHARACTERISTICS

Given the possible interrelationships between the characteristics and their effect on fund performance in our study, *Table 3* below presents pairwise correlations for all of our fund characteristics variables used.

From *Table 3* below we can see that we can expect funds with higher expense ratios to have higher management fees as these variables exhibit a strong positive correlation. This would lead us to believe that funds that spend more on research would have a higher expense ratio

Table 3:

Pairwise Correlation of Characteristic Variables

	<i>Beta</i>	<i>FundSize</i>	<i>ExpenseRatio</i>	<i>Top10</i>	<i>FundAge</i>	<i>Fees</i>	<i>FoF</i>	<i>Tenure</i>
<i>Beta</i>	1							
<i>FundSize</i>	-0,03	1						
<i>ExpenseRatio</i>	-0,20	0,07	1					
<i>Top10</i>	0,07	0,01	0,23	1				
<i>FundAge</i>	-0,07	0,26	0,14	0,22	1			
<i>Fees</i>	-0,12	-0,01	0,54	0,04	0,22	1		
<i>FoF</i>	-0,05	-0,04	0,30	0,74	0,13	-0,03	1	
<i>Tenure</i>	-0,09	0,19	0,14	0,13	0,54	0,25	0,06	1

and would require a larger fee in order to cover those fund expenses. We also see a strong positive correlation between fund of funds and top 10 holdings. We can also see from the preliminary analysis that older funds tend to have longer manager tenures and therefore keep the same fund manager for longer period of time. Although some of these correlations are significant and could lead to multicollinearity issues within the sample, a future area for work would be to remove some of the variables that are insignificant, such as Fund of Funds, and re assess the impact of the explanatory variables within the regression model. As we are using this to predict which characteristics can explain alpha in South African Equity unit trusts we are not too concerned with some of the higher correlations as these can be expected due to the nature of the characteristics and fund construction.

Table 4 below presents a summary of the regression results of our Jensen's alpha measure, measured at a 1.00% significance level, for risk adjusted returns on our various fund

Table 4:

Regression Summary

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0,2100	0,08	-2,75	0,0064885
<i>Beta</i>	0,3406	0,07	5,17	0,000000502464*
<i>FundSize</i>	0,0000	0,00	1,47	0,1436646
<i>ExpenseRatio</i>	0,0069	0,02	0,38	0,7048675
<i>Top10</i>	-0,0018	0,00	-1,79	0,075105586*
<i>FundAge</i>	-0,0060	0,00	-3,07	0,002410193*
<i>Fees</i>	-0,0935	0,02	-3,97	0,0000942581*
<i>FoF</i>	0,0605	0,06	0,99	0,3252621
<i>Tenure</i>	-0,0015	0,00	-0,55	0,5814864
F Value = 11,57		Prob > F = 0,000001	Adjusted R ² = 0,2565	N = 246

characteristic variables when using a weighted least squares regression as explained in Section 4.

As shown in the summary table above, the selected fund characteristics explain about 26.00% of the variation, with a significant F-Value, in our sample risk adjusted returns generated from the 246 South African general equity unit trust funds.

5.2.1. *FUND BETA*

We find that the coefficient for *Beta* is significantly and positively related to risk adjusted returns, and therefore fund performance. The results indicate that riskier unit trust funds, or funds who take on more risk relative to the positioning of the market index or benchmark, are able to generate higher returns. This shows that higher returns commensurate for the risk level taken on by the funds allocation and holdings leading to greater overall fund performance. This indicates that in the South African general equity unit trust space investors and investment managers should be looking for funds who take on more risk. In other words, funds whose asset allocation deviate away from that of the benchmark and take on additional risk in order to achieve higher returns. Fund managers could use this to restructure their fund asset allocation and exposure to increase their risk relative to the FTSE/JSE ALSI Index in order to generate higher fund returns and overall fund performance. These results are similar to those found in studies by Low (2010) and Berkowitz, Schorno and Shapiro (2017) where they uncovered that funds that have a higher portfolio Beta and are riskier positioned, with the given fund mandate and objective, generate higher extreme returns.

5.2.2. *FUND SIZE*

We find that the coefficient for *FundSize* is not significantly different from zero and therefore does not explain any of the selected funds risk adjusted returns and overall fund performance. These results contradict previous studies which were conducted in emerging market mutual fund industries. In Malaysia, Low (2010) found that fund size was a significant characteristic in explaining fund performance. Goel, Mani and Sharma (2012) found that fund size was significantly and positively related to fund performance in the Indian market. In South Africa, however, our results are consistent with a study conducted by Hibbert (2003) where it was reported that there was no statistical significance or relationship between risk adjusted performance and fund size.

5.2.3. *EXPENSE RATIO*

The results show that *ExpenseRatio* is not significant in explaining risk adjusted returns and fund performance in our sample of unit trust funds. This is consistent with the market notion that, in general, fund managers are successful in using available resources and offsetting their fund expenses through acting on net market information. Ippolito (1989) stated that since risk adjusted returns are measured net of expenses, fund managers who use their resources efficiently should be able to generate returns high enough to offset these expenses and we should expect fund expense ratios to not be significantly different from zero. Our results differ from that of developed market studies whereby Baker, Haslem and Smith (2008) found that a funds expense ratio is significant in explaining fund performance in the United States. Golec (1996) found similar results and reported that expense ratio and fund performance has a significant inverse relationship. In South Africa however Griffiths (2010) found that there were

no significant relationships between unit trust fund performance and expenses - this is consistent with the findings of our study.

5.2.4. *PERCENTAGE OF TOP 10 HOLDINGS*

We find that our *Top10* characteristic variable from the regression output is significantly and inversely related to risk-adjusted returns in the model and thus fund performance. This is an indication that over the sample period, funds that held less of the top 10 listed JSE stocks in their total fund holdings would have achieved higher returns and performed better. This is consistent over the sample period under consideration as the South African stock market and equity securities have underperformed for most of the period and these instruments started to recover and bounce back only late in 2017. This indicated that fund managers needed to move away from investing in South African top 10 stocks and seek value and opportunity in other publicly listed companies to generate higher returns. Investors should therefore be looking for fund managers and funds that have objectives and styles that stray away from the top listed stocks, as these should yield higher returns and better fund performance. This rebuts the findings of Collinet and Firer (2003) and Firer et al. (2001) that implementing a strategy of buying the top 10 performing funds in the long run will beat the average return of all other equity unit trusts. Our study also contradicts Berkowitz, Schorno and Shapiro (2017) who found in developed markets funds with higher concentration of top 10 assets in their holdings will experience, on average, more extreme performance.

5.2.5. *FUND AGE*

We find that *FundAge* is inversely and significantly related to risk adjusted returns and fund performance in our model. The coefficient shows that in our sample over the 8 years, younger

funds outperformed their older counterparts. This could be down to younger funds being a part of new management companies with exciting styles, managers and investment objectives. Younger or newer funds in the market also have a greater incentive to generate higher returns in order to grow and expand and not fall away or liquidate. We have seen from our research in this study that this is a huge factor in the South African industry - funds who cannot perform well in order to grow their asset base and investment do not survive. On the other hand this could also indicate that younger funds take on more risk to generate these high returns which may lead to liquidation, whereas the older funds, who we assumed to have extremely large market capitalisation and assets under management, do not require extreme returns to continue and thus perform worse on average over the period than the younger funds in our sample. In similar emerging market studies, Low (2010) reported results that showed risk-adjusted returns when used as a performance measure were not significantly related to fund age. However, these results are consistent with the findings in a more recent emerging markets study conducted by Jusoh and See (2012).

5.2.6. *MANAGEMENT FEES*

Our summary table shows a strong significant inverse relationship between *Fees*, and our risk-adjusted performance measure. This indicates that funds who charge lower management fees tend to perform better than those with higher management fees. This is consistent with the notion of fees eroding performance, especially in our study where, outperformance and market conditions being difficult, any outperformance or higher returns would be eroded by funds fees if they are set too high. We can see evidence of this from *Table 2* where the average fund management fee is at 1.20% and the highest being over 3.00%. In order to generate better returns and fund performance perhaps managers should be looking to reduce their fees, as

currently lower fee funds tend to perform better as the erosion of returns from these fees is less significant. This may also infer that in South Africa high management fee charging funds do generate good performance but not enough to cover their much higher fees and therefore are shown to underperform. Golec (1996) found similar results in the United Kingdom. His study reported that funds with lower overall fees tend to outperform the rest and show significantly greater performance over the period. These results are also consistent with the findings of Volkman and Wohar (1995) Dahlquist, Engström and Söderlind (2000), Bertin, Henker and Prather (2004), Arif and Jawaid (2011) and Goel, Mani and Sharma (2012).

5.2.7. *FUND OF FUNDS*

Contrary to our earlier belief our results show that fund of funds is not significantly different from zero and has no relationship with risk adjusted returns in our model and cannot explain fund performance for our sample of unit trust funds considered

5.2.8. *MANAGER TENURE*

Results show that there is no significant relationship between manager tenure, *Tenure*, and fund performance in our sample. This indicates that the length of time a manager has spent managing that specific fund has no direct impact on the returns generated and overall performance of the fund. These findings are in line with previous studies such as Bertin, Henker and Prather (2004) where no significant relationship existed. Most recently, Berkowitz, Schorno and Shapiro (2017) again tried to identify if manager tenure had any relationship with risk adjusted returns and they found again found that there is no significant impact. Only Golec (1996) found evidence of a relationship in the UK market that managers with longer tenures at their current fund generally lead to better fund performance.

6. LIMITATIONS AND CONSIDERATIONS

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

We have discussed earlier some potential biases in data set considering sample selection issues, the weighting of alpha values and uneven observations of fund returns and certain funds who were only in the sample for a small number of months. Suitability of benchmark is another concern we have considering the investment opportunities and style of general equity funds in South Africa. Most of the funds in our sample would have similar asset allocation and holdings considering the availability of quality equity stocks in South Africa over the period. In our first regression calculation using the FTSE/JSE ALSI TR Index as the benchmark may restrict the accuracy of our alpha values as most of the funds would have similar holdings to that of the benchmark. We also need to consider abnormal market conditions that the South African market experienced nearer the end of our sample in the last quarter of 2017. Steinhoff, EOH and ABL all had a huge knock down effect on the South African stock market and this needs to be highlighted and recognised when viewing the results of this study.

Another consideration when reviewing the results is that of mean reversion. It is a very important concept to consider with the results as a fund in our sample that has a positive alpha might subsequently become a negative alpha fund in the period that follow just as a function of mean reversion. We also need to consider in the South African equity space if actively managed portfolios actually differ much from the passive index funds and from each other. We mentioned previously the issue of these funds being extremely similar in construction, exposure and allocation. Our results could show evidence of these funds exhibiting herd-like

behaviour; in other words, are these funds actively reweighting and working on the asset allocation to vary away from other portfolios and funds in the market or are they all just buying a large percentage holding in Naspers, for example, and sitting back as more of a passive investment approach.

Some fund characteristics that may have been overlooked or excluded from our study that could be used in future research could be number of employees all with a direct contribution to the running of the fund, the nature of the fund's corporate culture, fund growth and fund investment objectives.

7. CONCLUSION

This study examines the South African general equity unit trust funds and their performance over the period 01 January 2010 to 31 December 2017. We examined the effect that selected fund characteristics have on overall fund performance. Since unit trust investment, and the industry as a whole, has become more popular in South Africa and has continued to grow, it would be of interest for both investors and investment managers to know how fund performance relates to fund specific fundamental characteristics. The characteristics considered for our original sample of 297 funds were fund specific beta as a measure of risk, fund size, fund specific expense ratio, percentage of top 10 holdings, fund age, management fees, fund of funds and manager tenure. Our sample period ran from 01 January 2010 to 31 December 2017 and we calculated a risk adjusted performance measure for each fund over the period. Our paper implements Jensen's model to calculate an overall performance measure and our performance measures for our end sample 246 funds were regressed in a Weighted Least Squares regression model against the above mentioned fund characteristics.

Our results indicate that expense ratio, fund size fund of funds and manager tenure are not significantly related to fund risk adjusted returns. Fund beta was found to have a positive significant relationship with fund performance and indicates that funds who take a riskier position relative to the market will be rewarded with greater returns. Top10 was found to be inversely related to risk adjusted returns and shows over the period that funds that held less of top 10 listed assets performed better than those who were top 10 stocks overweight. Fund age was also significantly and inversely related to fund performance and our results show that younger funds tend to outperform the older funds in the market. Lastly, the most significant result found was one which agrees with most of the literature covered in that management fees

were significantly related to risk adjusted returns and performance. The results show that funds with lower fees tend to present greater levels of performance and this is conclusive with the notion of higher fees erode away a large portion of unit trust fund returns.

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