The *prima facie* relationship between the size of assets under management and the risk-adjusted performance of South African collective investment schemes

by

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Research dissertation presented for the approval of the University of Cape Town Senate in fulfilment of part of the requirements for the degree of Master of Commerce specialising in Finance (in the field of Financial Management) in approved courses and a minor dissertation. The other part of the requirement for this qualification was the completion of a programme of courses.

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Abstract

There is a plethora of academic literature on the relationship between a collective investment scheme's (or mutual fund) size and its risk-adjusted performance but the research has produced contradictory results with no apparent consensus.

Data from a sample size of 100 (one hundred) collective investment schemes in the Association for Savings and Investments (South Africa) ("**ASISA**"), SA Equity General Fund classification group over a 10 (ten) year period was analysed using regression techniques and ranking analysis to examine whether there was any *prime facie* relationship between the fund size and the risk-adjusted performance of South African collective investment schemes.

The regression analysis found no statistically significant correlation between fund size and risk-adjusted performance. However, the results of the ranking analysis suggested a possible inverted U-Shape relationship between collective investment scheme fund size and risk-adjusted performance. This therefore presents an argument for an optimal fund size range of between R912,267,649.3 and R1,930,696,676 (about 1 – 2 billion Rand) in assets under management to maximise risk-adjusted performance.

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Chapter One: Introduction

A collective investment scheme in South Africa (also referred to as a "mutual fund" or "unit trust" in other countries) is a pooled investment vehicle that is structured to invest across a spread of assets. The asset allocations of a collective investment scheme are either managed by an investment manager (regarded as "active" management) or the portfolio mirrors the components of a market index (regarded as "passive" management).

In March 2014, the South African collective investment scheme industry reached record highs of R1.538 trillion assets under management (AUM) from R661 billion 6 years ago (Financial Services Board, 2014). The industry has grown in South Africa despite being highly regulated by the Financial Services Board ("**FSB**") under the Collective Investment Schemes Control Act, 2002 ("**CISCA**"). The industry also has an element of self-regulation under the auspices of ASISA that represents the industry's interests in its interaction with the FSB.

There are currently four types of South African collective investment schemes available in South Africa under CISCA: (i) collective investment scheme in securities, (ii) collective investment scheme in property, (iii) collective investment scheme in participation bonds and (iv) hedge funds which are deemed collective investment schemes. The predominant type of collective investment scheme in South Africa is the collective investment scheme in securities (defined in section 39 of CISCA as a "*scheme the portfolio of which… consists mainly of securities")* which will form the basis of this paper.

ASISA has developed further classification requirements for collective investment schemes based on the investment style and risk profile. The further classifications aim to improve the investor's understanding of the investment product and to ensure some standardisation as to

the product. Thus the collective investment scheme in securities is further classified by ASISA as a local (a fund that invests at least 70% of its assets in South Africa) or foreign collective investment scheme and by its investment strategy in terms of asset allocation. The ASISA classifications will be used as a basis to select the relevant sample for the study.

The size of a collective investment scheme is measured in terms of its assets under management ("**AUM**") and this is closely monitored by each fund's quarterly reporting of its AUM to ASISA. ASISA collates this data to report the industry AUM to the FSB which the FSB uses to allocate the overall levy on the industry as a whole. Each fund pays its *pro rata* percentage of the overall industry AUM based on its own fund size.

There is some debate and difference amongst collective investment scheme managers as to the measurement of performance of a collective investment scheme fund. There have been attempts at global standardisation such as Global Investment Performance Standards (1999) but this still offers broad guidelines and not concrete formulas. Because of the different theories as to the appropriate measure of performance of a collective investment scheme fund and to limit the scope of this paper, the risk-adjusted measures of performance that are utilised by a number of papers (Hibbert, 2003; Indro *et al*., 1999; Yan, 2008) and in practice by the collective investment scheme managers (Fox & Krige, 2013) shall be utilised. These risk-adjusted performance measures assess the added value of the fund manager above the market risk (or Beta). But more importantly, as referred to by Chen *et al.* (2004), the risk-adjusted measures of performance also accommodate for the differences in investment styles between the funds.

Rationale for the research

The growth of popularity of the collective investment scheme as an investment vehicle in South Africa in recent years (and therefore the increase in the AUM) has prompted debate in the financial media about whether there is an optimal fund size for the performance of these funds and whether these funds should be capped (Cairns, 2013; van Andel, 2014). The debate continues because the relationship between fund size and fund performance has not been resolved in South African financial academic literature or in the financial press (Cairns, 2013; Hibbert, 2003; Pillay, Muller & Ward, 2010).

The research seeks to discover whether there is any *prima facie* relationship between collective investment scheme fund size and risk-adjusted performance. And as a secondary objective whether there is an optimal collective investment scheme fund size that achieves the highest risk-adjusted performance. This type of information would be useful to investors in seeking to find the optimal performance for their investment. It would also provide insight to fund managers to consider potentially capping the size of their funds.

The main philosophy of active management for equity funds is on superior stock selection that will outperform the market. The active manager's investment process includes in-depth company and market research to find opportunities and possible undervalued shares in the market (Chen *et al.*, 2004). However, the research confirms that the majority of active managers constantly underperform the index benchmark (Berk & Green, 2004:1270; Pollet & Wilson, 2008:2941). A recent South African study conducted on collective investment scheme funds over a 10 (ten) year period, found that 80% of collective investment schemes in the SA Equity General category underperformed the relevant benchmark (the FTSE/JSE All Share Index) over this period (SATRIX, 2015). Some investors may require guidance to select those active managers who could outperform the benchmark and deliver superior

returns. A simple indicator that is easy to measure such as the size of a fund would be very useful tool to assist investors in fund selection.

Index funds have been gaining increasing popularity in South Africa because of their minimal cost structure offered to investors (SATRIX, 2015) but the prominent academic research on the relationship between fund size and performance has focused on active management (Berk & Green, 2004, Chen *et al.* 2004; Ferreira *et al.*, 2012; Yan, 2008). It should also be noted that the risk-adjusted performance measures are appropriate for measuring the performance of active management style as opposed to the passive management style of index funds (Vanguard, 2009). Therefore index funds will be excluded from the sample for the primary hypothesis.

Overview

The remainder of this paper is organised as follows: Chapter 2 provides an overall review of the current foreign and South African academic literature related to the thesis statement, Chapter 3 presents the research methodology and discusses the data, Chapter 4 presents the results of the study and Chapter 5 concludes.

Chapter Two: Literature Review

The popularity of the collective investment scheme, unit trust or mutual fund as an investment vehicle has resulted in a proliferation of academic papers examining various aspects of this investment with fund performance being a critical factor. A particular focus is the ability of the active fund manager of equity funds to deliver performance in excess of the market returns to justify the expenses of this type of investment instead of the investor holding their own selected portfolio of shares (Berk & Green, 2004; Pollet & Wilson, 2008). The prevalent view is that the investment manager is unskilled and unable to deliver superior performance (Berk & Green, 2004; Pollet & Wilson, 2008), but that the popularity of the investment vehicle persists due to unsophisticated nature of some investors (Berk & Green, 2004; Reuter & Zitzewitz, 2010).

Because investors are primarily interested in fund performance, a number of academic papers have reviewed the relationship between fund performance and independent factors (size, age, family size and investment style) (Chen *et al*., 2004; Dahlquist, Engstrom & Sodelin, 2000; Ferreira *et al*., 2012; Yan, 2008). The results are important to provide investors with useful insight in selecting funds and to investment managers in structuring the funds. There are therefore a number of academic papers and articles in the popular press that focus on the relationship between fund size and fund performance. However, there appears to be no apparent consensus on this relationship and therefore it remains a relevant and popular topic.

The divergent theory on the relationship between collective investment scheme (or mutual fund) size and fund performance generally falls into four categories: (i) there is no correlation between fund size and performance (Cairns, 2013; Hibbert, 2003; van Andel, 2014), (ii) there is a negative correlation between fund size and performance (Chen *et al*., 2004;

Fisher-French, 2013; Yan, 2008), (iii) there is a positive correlation between fund size and performance (Dahlquist, Engstrom & Sodelin, 2000; Elton, Gruber & Blake, 2012) and (iv) there is an inverted u-shape relationship between fund size and performance suggesting an optimal fund size range to maximise performance (Indro *et al*., 1999; Pillay, Muller & Ward, 2010; Tang, Wang & Xu, 2012). The predominant view in foreign academic literature suggests that there is a negative correlation between fund size and risk-adjusted performance. This is in contrast with the prevalent view in South African academic literature and popular press that argues there is no correlation between collective investment scheme fund size and risk-adjusted performance (Cairns, 2013; Hibbert, 2003; van Andel, 2014).

Foreign

No correlation

The Berk and Green (2004) study is the seminal paper on the persistence of mutual fund flows based on past performance regardless of sustained performance levels of active fund managers. The paper argues that investment inflows at performing mutual funds eliminate consistent high returns because active fund managers face increasing diseconomies of scale (Berk & Green, 2004:1271). These diseconomies of scale include increased research and information gathering activities for further investment opportunities and larger trades with increased bid-ask spreads and execution costs (Berk & Green, 2004:1273). Berk and Green (2004) argue, however, that despite the diseconomies of scale of the larger funds, the active manager's investment skill is able to counter those effects resulting in neutral performance results. This paper therefore contradicts popular theory by finding that some highly skilled active managers of popular funds have the ability to outperform benchmarks. Although Berk and Green (2004) refer to the significant diseconomies of scale of larger

funds, their paper argues that investment performance of managers of popular funds cancels the diseconomies of scale and results in no correlation between fund size and performance.

Reuter and Zitzewitz (2010) review the relationship between fund size and the diseconomies of scale of large funds that are referred to in Berk and Green (2004). They use a regression discontinuity design to examine the causal relationship between increase in fund size to diseconomies of scale for almost every U.S. mutual fund between December 1996 and August 2009 (12.75 years). The paper assumes that there is no correlation between manager skill and fund inflows and uses the small inflows impacting the Morningstar database thresholds to review the impact of fund size and diseconomies of scale. The results revealed that the increase in fund size has little impact on diseconomies of scale and thereby on performance (Reuter & Zitzewitz, 2010:23). Reuter and Zitzewitz (2010) argue that mutual funds trade in public equity markets which are extremely efficient and this factor should reduce return to all but highest level of manager skills and also reduce costs of deeper investment with further fund inflows.

Negative Correlation

Ciccotello and Grant (1996) explain that a fund benefits from an increase in size due to the economies of scale offered by larger funds having more resources for research and lower expense ratios. Furthermore, larger investment managers with bigger AUM can also use their bargaining power to negotiate trades at better spreads, given their market position and large trading volume. Ciccotello and Grant's (1996) study ranks equity funds in terms of size and classifies the funds according to their different investment objectives. The results found significant differences in 10 (ten) year returns where funds that performed well continued to attract large inflows and expanded rapidly in size in contrast to poorer performing funds which attracted fewer inflows. The results also found statistically significant negative

relationships between fund size and performance results for smaller funds with aggressive investment styles. The random sample of 20 (twenty) of these aggressive funds revealed that managers of these funds often invest in smaller, less well-known firms to achieve higher growth rates. Ciccotello and Grant (1996) noted that the good performance of these funds then attracts cash inflows which make the consistent achievement of the superior returns in the future increasingly difficult. In contrast, asset growth is easier to manage in funds that have a more moderate mandate.

Chen *et al.* (2004) found that the increasing fund size erodes the performance of a fund by reviewing data of diversified U.S. equity mutual funds (excluding bond, international and specialised sector funds) from 1962 to 1999 (38 years). Despite the negative correlation, there is arguably a minimum fund size range because the paper excluded funds with less than 15 (fifteen) million dollars in AUM due to the potential of upward bias. Chen *et al.* (2004) found that the effect of fund size on performance was more profound for funds that invest in small cap funds and therefore included liquidity as a factor to explain the negative correlation between size and performance. Although the paper refers to liquidity as a primary explanation for the negative correlation, it also implies that there is a correlation between investment strategy and fund size. The funds that follow an investment strategy that requires liquidity should see an increase in fund size impacting negatively on performance. The paper also proposes that certain organizational diseconomies of scale exist for large funds such as the manager's approval framework for new investment decisions.

Chen *et al.* (2004) also performed a study controlling for fund size and reviewing the relationship with family fund size and performance. Family funds are groups of funds that belong to the same company or investment house but may employ different investment strategies to capture the full spectrum of the market. The results illustrated that an increasing AUM of family fund size resulted in an increased fund performance. The interpretation of the

results was the potential economies of scale available to a large fund family in the form of reduced trading costs and commissions.

Pollet and Wilson (2008) provide evidence that diversification in mutual fund asset allocation is associated with higher monthly risk-adjusted fund returns. The study reviewed all U.S. equity mutual funds from 1975 until 2000 (26 years) and the results indicated diminishing returns to scale. The methodology removed funds in the smallest percentile (below $100 million of total net assets ("**TNA**")) from the sample due to the survivorship bias. This methodology is consistent with the view that there must at least be a minimum TNA for a fund before it begins to exhibit any diseconomies of scale implying that there may be an optimal fund range before that point. Pollet and Wilson (2008) propose that the cause of diminishing returns is the inability to scale investment strategy as the fund size increases. The study found that mutual funds diversify and scale less as they grow and this behaviour offers a possible explanation for the negative correlation between fund size and performance. The study also confirmed the results in Chen *et al.* (2004) that while higher TNA is associated with lower returns, higher family TNA is associated with higher returns.

Edelen and Evans (2007) follow on from Berk and Green (2004) by examining the role of trading costs as a source of diseconomies of scale for mutual funds. The study is based on a review of the annual trading costs of 1706 U.S. equity funds over 10 (ten) years . Edelen and Evans (2007) found that there is cross-sectional variation relating to fund size and that these costs increasingly impact performance as the fund's relative trade size increases. The study distinguished between trading costs and other factors (such as organisational factors) by regressing fund returns on both trade size and fund size. The conclusion reached was that trading costs are the primary source of diminishing returns because managers appear to trade well past the point where their value exceeds the cost of transacting. The paper suggests two possible reasons for the over-trading, namely: (i) flow-induced trading and (ii) the agency costs of the soft commission incentive offered to fund managers to increase

trading. The paper also alludes to various behavioural biases which may encourage over-trading. The paper therefore suggests that an increase in fund size not only directly increases trading costs but also influences the behaviour of the fund managers to increase trading and thereby indirectly also increases the trading costs of the fund.

Yan (2008) used Chen *et al.* (2004) as the basis of the paper and evaluated the effect of fund size on fund performance by examining the relationship between investment style and liquidity. Using a sample of U.S. actively managed equity mutual funds over 10 (ten) years, Yan (2008) conducted a cross-sectional regression analysis to control for other factors that may be correlated to fund size or fund performance. The results indicated a negative correlation between fund size and performance and revealed that liquidity plays a significant role in this correlation. The paper also examined the impact of investment style on fund performance and found significant diseconomies of scale for growth style funds. These funds have flexible investment strategies that are required to respond quickly to market conditions and therefore incur higher trading costs. This is consistent with the theory that larger funds would incur higher trading costs which should be more pronounced with the type of funds investment style. Yan (2008) therefore identified liquidity, investment style and trading costs for larger funds as factors that influenced the negative correlation between fund size and performance.

The Ferreira *et al.* (2012) study reviewed the impact of various factors (including fund size) on performance for a number of U.S equity mutual funds and international equity mutual funds by reviewing a sample size of about 16,316 equity funds in 27 (twenty-seven) countries over a 10 (ten) year period. This paper is distinguishable from other papers in that the sample included funds from a number of countries while the consistent method in other papers was to examine funds from one country (predominantly from the U.S).

The most significant result in the study was the impact of fund size on performance with a negative correlation between fund size and performance in the U.S. domestic equity funds contrasted to the positive correlation between fund size and performance in all other countries. A possible explanation for this difference is that the international funds do not have the same size of AUM as the U.S. domestic funds to experience the negative correlation between fund size and performance. Ferreira *et al.* (2012) noted that although the U.S. equity mutual fund size is on average five times larger than international funds, this in itself does not explain the results. Instead the results indicated that it is the predominant investment style of U.S. domestic equity mutual funds which typically invest in local small and illiquid stocks that exhibit a larger negative correlation with fund size than other investment styles. Ferreira *et al.* (2012) compared this with the international U.S equity mutual funds which have the equivalent fund size to the U.S. domestic equity mutual funds but are not as restricted in their investment choices as the U.S. domestic equity mutual funds. The study did not find evidence of diseconomies of scale for these large international U.S. equity mutual funds.

Ferreira *et al.* (2012) drew conclusions that liquidity is a factor for some large funds which impacts on performance but linked the liquidity to the investment style of the fund. It should be noted that the study does not include any South African collective investment scheme funds within the sample of the international fund categories that were reviewed. Therefore if South Africa were to follow the results from the other countries then there should be a positive correlation between fund size and performance for South African collective investment schemes. However, the investment restrictions that are imposed on South African domestic funds (such as in Board Notice 90 of CISCA) may result in a negative correlation.

The general trend amongst the academic papers that concluded that there is a negative correlation between fund size and performance explained this by referring to liquidity,

investment style (which is linked to liquidity) and trading costs. In contrast, this paper also identified a positive correlation between family fund size and performance. It is very important to note that all the other academic papers in this section refer to the U.S domestic equity mutual fund market, but as cautioned by Ferreira *et al*. (2012) the relationship between fund size and risk-adjusted performance of every other countries' funds were very different from the U.S domestic equity mutual funds.

Positive Correlation

Dahlquist, Engstrom and Soderland (2000) examined equity, bond and money market funds in Sweden over a 5 (five) year period (1993-1997) and found a weak, positive yet statistically significant relationship between size and performance for the bond and money market funds. This was in contrast to the results for equity funds. They explained this difference by referring to the relative size of the Swedish equity mutual funds in relation to the equity market in Sweden. The bond and money market funds were relatively smaller in the relation to the market and therefore could adopt more dynamic trading strategies that could result in out-performance (Dahlquist, Engstrom & Soderland, 2000:419). The results of this paper in respect of the relationship between the equity funds and the size of the equity market could have important consequences for a review of South African equity collective investment schemes. This paper also re-enforces the theory raised in other papers that there is a link between the investment strategy of the fund and its performance.

Elton, Gruber and Blake (2012) examine U.S domestic mutual funds over a 10 (ten) year period including all common stock funds. The results revealed a weak positive correlation between Alpha (a risk-adjusted performance measure) and fund size. The results also indicated that expense ratios and management fees declined in respect of increasing fund size and positive performance. The paper notes the apparent conflict between these results to those of Berk and Green (2004) citing that for the Berk and Green's (2004) results to hold

the diseconomies of scale of large funds would have to be significant enough to offset the decreasing expense ratios. Elton, Gruber and Blake (2012) therefore suggest that the persistence of performance of the funds may be due to a large fund's ability to access superior traders or analysts. They also refer to the link between family funds' flows and performance and the family funds ability to access superior investment opportunities. Although the paper excludes a number of different funds from the sample size including international, index, lifestyle, flexible funds etc. it does not limit the sample exclusively to equity funds and includes funds with substantial investment in bonds. The methodology tries to compensate for this by incorporating models that include bond-index returns as a factor but this would only be relevant if the study separated the funds by investment style and not by size.

Inverted U-Shape relationship

Indro *et al*.'s (1999) research on 683 (six hundred and eighty-three) actively managed U.S. equity mutual funds over a 3 (three) year period (1993-1995) found an inverted U-Shape relationship between fund size and performance indicating an optimal mutual fund size range. Funds must meet a minimum size to obtain the benefits of economies of scale of the fixed costs (acquiring and trading information) and reduced brokerage commission. Their regression analysis of net assets size against the costs of acquiring and trading information indicated a minimum fund size where the return is sufficient to justify an active investment strategy. But the paper also noted that there are also diminishing marginal returns when the fund exceeds its optimal size. Indro *et al.* (1999:79) noted that because mutual fund returns deduct expenses the high negative correlation expenses this suggests that the larger funds overinvest in information. Transaction costs also increase because "*the purchase and sale of large blocks of stock exacerbate the liquidity and informational asymmetry problem for market makers and increase the bid-ask spread*" (Indro *et al.*, 1999:75).

As with the Cicotello *et al*. (1996) paper, the Indro *et al.* (1999) study also investigated the impact of investment styles between three different styles: value, growth and blend. The research found that the coefficients associated with mutual fund size are larger in magnitude and significance for growth style funds than for value or blend style funds. The results indicated that value funds should have a smaller optional fund size range ($493-$510 million) than growth funds ($1.4-$1.5 billion) possibly because value funds tend to overinvest in information when making investment selections compared to growth funds.

Tang, Wang and Xu (2010) investigated the impact of economy of scale and liquidity on the relationship between fund size and performance on Chinese mutual funds. The first Chinese mutual fund, Hua An Chuang Xin, launched in September 2001 and since then the Chinese mutual fund industry has grown rapidly. The sample of the study included open-ended equity mutual funds for 7 (seven) years (2004 - 2010) and recorded an inverted U-Shape relationship between fund size and performance using what the paper refers to as a "portfolio approach" (but is regarded as a ranking analysis by other studies) (Tang, Wang & Xu, 2010:233). The funds initially benefit from certain economies of scale but, consistent with other studies, the funds experience diseconomies of scale beyond a certain size. The results reflected an optimal fund size range to maximise performance of RMB 2–3 billion (about R3.74 – R5.61 billion Rand).[1]

South African

In South Africa, market research, academia and the popular press have been divided on whether there is a *prima facie* relationship between a collective investment scheme fund size and performance (Cairns, 2013; Fisher-French, 2013; Hibbert, 2003; Pillay, Muller & Ward, 2010; van Andel, 2014).

[1] Based on Chinese Yan to South African Rand Exchange rate on 18 February 2015 of 1:1.87.

Hibbert (2003) found no statistically significant evidence to suggest a relationship between fund size and risk-adjusted performance and therefore no ideal fund size range where performance is maximised. The paper noted that such findings suggest that the Johannesburg Stock Exchange (JSE) is efficient to the extent that active fund managers cannot gain an advantage in respect of returns by manipulating the fund size. Hibbert (2003) also investigated the relationship between fund size and transaction costs and found no correlation between fund size and expense ratios. Hibbert (2003) postulated that the economies of scale available to large funds may be negated by the higher transaction costs applied to large funds to fill larger deal orders. The methodology used by Hibbert (2003), however, did not restrict the sample size to one investment style (or only equity funds) and therefore could not isolate the impact of investment style on performance.

Pillay, Muller and Ward (2010) constructed hypothetical portfolios of collective investment schemes of varying sizes, using historical data for 18 (eighteen) years (1991 - 2008). Each portfolio consisted of 40 (forty) randomly selected stocks of the top 160 JSE listed shares in terms of market capitalisation. The paper concluded by finding a negative correlation between the collective investment scheme fund size and performance with liquidity being cited as a contributing factor. The paper also implied that there is an optimal fund size range with performance affected for fund sizes greater than about R5 billion (five billion Rand) and recommended that at this size larger fund managers should switch to a passive investment strategy (Pillay, Muller & Ward, 2010:1). This recommendation is for a much smaller optimal fund size than the U.S. equity funds but could be indicative of the smaller South African equity investment market. The construction of hypothetical portfolios, however, removes the possible behavioural effects of a larger fund that have been cited by other academic studies to explain the negative correlation between fund size and performance. It is therefore important to examine the historical results of actual collective investment schemes to incorporate any fund behaviours that are attributable to fund size that may impact on performance.

It is also important to note the recommendation made by Pillay, Muller & Ward (2010) that at the point when an actively managed fund becomes too large and experiences diseconomies of scale, it should switch to a passively managed investment strategy. This recommendation will form the basis of a supplementary analysis to the primary hypothesis to determine whether there is any *prima face* relationship between the index fund size and the appropriate performance measures for index funds. It should, however, not impact on the sample or results of the primary hypothesis.

Conclusion

In summary, there is still a debate in academic literature and the popular press regarding the *prima facie* relationship between collective investment scheme (or mutual fund) size and risk-adjusted performance. The predominant view from foreign academic literature is that there is a negative correlation between fund size and performance with a number of reasons advanced for the relationship. There is consistency in the academic literature with respect to the link between fund size, performance and other factors (liquidity and investment style, family fund size and trading costs) which will be important components of any review of this relationship.

There is more support in South African popular press and some academic literature for no correlation between fund size and risk-adjusted performance. The majority of the studies in the available academic literature are based on U.S. domestic equity mutual funds and therefore as cautioned by Ferreira *et al.* (2012), the review of the South African collective investment scheme market may produce different results. This disparity in the results also requires a critical review of the methodology used to ensure accurate and robust results.

Chapter Three: Data and Methodology

Sample selection

The size of the sample of South African collective investment schemes will be limited based on the following criteria:

1. Collective investment scheme in securities. There are four different types of collective investment schemes as defined under CISCA: collective investment scheme in securities, collective investment scheme in property, collective investment scheme in participation bonds and hedge funds. A collective investment scheme in securities as defined in section 39 by CISCA "*consists… mainly of securities*". The collective investment scheme in securities' asset allocation is prescribed under Board Notice 90 of CISCA and therefore limiting the sample to the same type of collective investment scheme fund (the collective investment scheme in securities) limits the impact of such regulations on the performance of the fund.
2. ASISA SA Equity General collective investment scheme fund. All funds in the sample must be members of ASISA and in the SA Equity General classification as described below. This category will ensure that the funds in the sample subscribe to a similar investment style.
    a. South African collective investment scheme. ASISA classifies a "*South African collective investment scheme*" as collective investment portfolios that invest at least 70% of their assets in South African markets (ASISA, 2014:7). These collective investment portfolios may invest a maximum of 25% of their assets outside of South Africa plus an additional 5% of their assets in Africa excluding South Africa (ASISA, 2014:8).
    b. Equity collective investment scheme. It is preferable to limit the scope of the review to a fund style in order to remove the impact of fund style on performance.

Most of the research in this area has also selected equity funds (Chen *et al*., 2004; Indro *et al*., 1999; Pollet & Wilson, 2008; Yan, 2008) presumably because of this reason but it also follows through into performance criteria from the perspective of the risk profile and the benchmarks of the fund. ASISA classifies an "*equity collective investment scheme*" as a "*portfolio which invests a minimum of 80% of the market value of the portfolios in equities and generally seeks maximum capital appreciation as their primary goal*" (ASISA, 2014:10).

c. Equity General collective investment scheme: This further refines the investment style selection but is the broadest category under the "equity" classification. ASISA defines the "*Equity General*" collective investment scheme as portfolios (ASISA, 2014:10):

> *"that invest in selected shares across all industry groups as well as across the range of large, mid and smaller cap shares. While the managers of these portfolios may subscribe to different investment styles or approaches, their intent is to produce a risk/return profile that is comparable with the risk/return profile of the overall JSE equities market. The portfolios in this category offer medium to long-term capital growth as their primary investment objective."*

The funds are also measured against the same South African benchmark namely**:** FTSE/JSE All Share index (J203T) (ASISA, 2014:10).

3. Active Fund Management. The research examines the relationship between AUM and risk-adjusted performance. Because index tracking funds are passively managed, only tracking the benchmark performance, the scope of the review is limited to active fund management. This is also an approach followed by other studies (Indro *et al*., 1999:75; Yan, 2008:745). The "index" funds can be excluded from the sample as is evident from where "index" is included in the fund name as required by ASISA but the type of fund can also be confirmed further by a review of the fund fact sheet.
4. Incubator funds have been excluded. An approach taken by another study is that funds with less than 18 (eighteen) months in existence have tendency for upward bias and therefore these funds have been excluded from the sample (Yan, 2008:745). Any funds

that have an inception date of less than 18 months after the sample selection period will be excluded from the study.

5. Fund of funds or multi-managers have been excluded. The fund of funds or multi-manager funds invest in underlying collective investment scheme funds of other managers and therefore to avoid duplication of the same AUM and performance results of the underlying funds, these funds have been excluded from the sample.

Data sources

The Morningstar database will be used to obtain information on the quarterly fund risk-adjusted performance measures of the collective investment schemes within the sample. The rolling calendar averages shall be used as computed on a quarterly basis. There are only 4 (four) funds in the sample where the data has not been supplied to Morningstar in this case the funds will be excluded from the sample. The 4 (four) funds are listed below:

- Abax Equity Prescient Fund
- GTC Active Equity Fund
- GTC Value Fund
- Truffle Institutional Equity Fund

The ASISA database will be used for the quarterly AUM information for each of the collective investment scheme's within the sample.

Further information on the funds, if required, will be obtained from fund fact sheets which are publically available on the asset managers' websites.

Research design

Regression analysis

Regression analysis is used to investigate the relationship between dependent and independent variables and is also reflected in a number of studies (Dahlquist, Engstrom & Soderland, 2000; Hibbert, 2003; Indro *et al.,* 1999). The purpose of the study would thus be to review the relationship between the independent variable (the AUM) against which the dependent variables (the measures of risk-adjusted performance) are regressed.

The coefficient of determination (R^2) measures the proportion of the total variability of the dependant variable (risk-adjusted return) that is "explained" by the regression line. The R^2 is only relevant, however, to the extent that the t-statistic indicates that it is significantly different from zero at the 95% confidence level (where $t > 2$). The t-statistic is used by both Hibbert (2003) and Yan (2008).

The Durbin-Watson statistic has been calculated to determine the extent to which the data exhibits serial correlation (Hibbert, 2003). The Durban-Watson test reveals the amount of autocorrelation between residuals of statistical regression analysis. The Durban-Watson statistic is always between 0 and 4 with a value approaching 2 meaning that there is no autocorrelation in the sample. In contrast a value approaching 0 indicates positive autocorrelation and a value closer to 4 indicates negative autocorrelation. If the residuals are correlated, then the standard error of the coefficients is underestimated and the results can appear to be significant when they may not be.

The period chosen over which to analyse the data is 10 (ten) years (from 1 January 2005 – 31 December 2014). This is consistent with the prevalent data selection methods that review

data from funds over a ten (10) year period (Edelen & Evans, 2007; Elton, Gruber & Blake (2012); Ferreira *et al.,* 2012; Hibbert, 2003; Yan, 2008). The methodology shall follow the approach used in Indro *et al.* (1999) and compute the averages of the variables over the relevant time period for the regression analysis. The ages of the funds in the sample vary and therefore this approach reduces any impact of more data variables from the older funds in the regression analysis.

For the independent variable, AUM, Chen *et al.* (2004) and Indro *et al.* (1999) used the natural logarithm of the total net assets variable (TNA) which is analogous to the AUM in South Africa. The theory is that the logarithm of the AUM should be used due to issues of scaling in respect of the different fund sizes.

In respect of the dependent variables, risk-adjusted performance, the most commonly used measures in the collective investment scheme industry and by some of the other studies are the Sharpe ratio, Treynor, Jensen's Alpha and Information Ratio (Hibbert, 2003; Indro et al., 1999; Yan, 2008). The different risk-adjusted performance measures are considered below as well as their appropriateness for the review.

Sharpe ratio

Sharpe's ratio measures the excess return that a portfolio provides over a risk-free rate (accepted to rate of return on cash) (Kidd, 2011). Sharpe's risk adjusted performance measure is easily understood as a reward-to-risk ratio and is represented by the following equation (Kidd, 2011):

$$S = \frac{R_p - R_f}{Q_p}$$

R_p = average excess portfolio return

R_f = risk-free or cash return

Q_p = actual standard deviation of the portfolio returns

The Sharpe ratio is recommended to compare funds across different categories because the standard deviation calculation does not depend on a fund's benchmark (Morningstar, 2009). This is not relevant for this study's sample because the funds are utilising the same or similar benchmark, namely, FTSE/JSE All Share index (J203T). However, this provides an appropriate way of normalising returns so they can be compared per unit of risk taken by the portfolio to achieve those returns. Furthermore Sharpe recommended using shorter measurement periods (monthly) and then annualising the data (Kidd, 2011). The study shall procure performance measures on a quarterly basis to be consistent with the quarterly AUM periods and then average the data over the 10 (ten) year period. It is therefore debatable whether such a performance measure is appropriate for the review. For the purposes of the analysis, the Sharpe ratio figures shall be used for the sample funds because it is regarded as the industry standard for measuring funds (Kidd, 2011:1) but the results of this analysis will be subject to the appropriate level of caution.

Information Ratio

The Information Ratio developed from the Sharpe ratio as users began utilising benchmarks in the place of the risk-free rate (Kidd, 2011). The Information Ratio measures the ratio of returns in excess of the benchmark by portfolios against the excess risk that was assumed by the manager to achieve those returns. Effectively, it is the amount of active return per unit of active risk. A high Information Ratio indicates a high active return of the manager given the amount of excess risk taken. The Information Ratio is represented by the following equation (Kidd, 2011):

$$IR = \frac{R_P - R_b}{Q_{p-\beta}}$$

R_P = annualised return of the portfolio

R_b = annualised return of benchmark

$Q_{p-\beta}$ = standard deviation of the difference in returns between the portfolio and its benchmark (also known as “tracking error”)

The Information Ratio is “*highly dependent on the time period under measurement and the chosen benchmark indices*” (Kidd, 2011:2). The study uses a 10 (ten) year time period across all funds which should be a sufficient period of time to eliminate the influence of the time period (such as short-term market fluctuations). In contrast to the Sharpe ratio, the Information Ratio is based on longer periods and can be used to indicate a consistency in an investment manager’s skill (Kidd, 2011:2).

The funds in the sample are all in the same asset class and have the same benchmark index (FTSE/JSE All Share index (J203T)). It is also noted that the benchmark indices do not incorporate transaction costs and therefore the Information Ratio will be understated by the impact of transaction costs (Kidd, 2011). However, this should not be a factor in this sample because all of the funds use the same benchmark therefore the effect on the Information Ratio should be the same.

The Information Ratio is appropriate to measure manager performance and is most useful when comparing managers within the same investment styles (Kidd, 2011). Therefore despite the potential deficiencies regarding the understating of transaction costs, the Information Ratio shall be utilised in the study.

Treynor's measure

Treynor's measure is used for investment objectives that result in specialised funds that are not well diversified (Pareto, n.d.). Thus Treynor uses the systemic risk of a portfolio that avoids penalising mangers for taking positions that may be required in terms of a fund's investment restrictions. A systemic risk is the risk that cannot be reduced by diversification. Treynor's ratio is therefore viewed as a complimentary performance measure to the Sharpe ratio because it measures standard deviation of returns to calculate risk and evaluates the diversification of the portfolios (Pareto, n.d.). Treynor's risk measure adjusts return by only the market or benchmark risk exposure of the portfolio. The Treynor ratio is represented by the following equation (Scholz & Wilkens, 2005:58):

$$TR = \frac{\mu_i - R_f}{\beta_i}$$

μ_i = average return of the fund i

R_f = risk-free interest rate

β_i = market risk of fund i (Beta)

As discussed, the collective investment scheme in securities is subject to the asset allocation restrictions of Board Notice 90 of CISCA and the ASISA classification restrictions. The collective investment scheme in securities is also closely monitored by their trustees for any breaches in the mandates. It therefore would be appropriate to use the Treynor measure for the purposes of a risk-adjusted performance measure for the sample.

Jensen's Alpha

Jensen's Alpha represents the relative outperformance of a fund to the market in terms of the Capital Asset Pricing Model ("**CAPM**"). The CAPM separates the excess return (total

return less the risk-free return) from systematic (or market return reflected as Beta) and unsystematic return. An investment manager should therefore not be compensated for achieving above-market performance by taking on systematic risk (measured by Beta). The equation for Jensen's Alpha is represented by the following equation (Bertolis & Hayes, 2014:91):

$$\alpha_{ij} = R_{ij} - [R_{fj} + \beta_{iM} (R_{Mj} - R_{fi})]$$

α_{ij} = Jensen's Alpha for unit trust i in month j

R_{ij} = the return on unit trust i at month j

R_{fj} = the risk-free rate of return at month j which is the return on a 10-year zero coupon South African government bond

β_{iM} = the sensitivity of the unit trust relative to the market throughout the period under investigation, which is $\beta_{iM} = \frac{Cov\ (R_{i,}\ R_m}{Var\ (R_m}$

R_{Mj} = the return on the market at month j which uses the FTSE/JSE All Share Index as proxy

Morningstar's (2009) calculation of Alpha conforms to the Jensen's alpha equation and therefore will be used in the study:

$$\propto_{ij} = R^e - \beta B^e$$

α_{ij} = alpha for unit trust i in month j

R^e = average monthly excess return of the portfolio

βB^e = average monthly excess return of benchmark index

Morningstar notes that the calculation of Alpha has limitations, for example, a negative Alpha can result from the expenses that are present in the fund figures but are not present in the

figures of the comparison index or benchmark (Morningstar, 2009). The Alpha calculation is also dependent on the assumption that the Beta is correct (Morningstar, 2009). Beta is a measure of the portfolio's risk generated by market movements. For equity funds whose performance is linked to market movements, this beta is significant. However, regardless of its potential limitations, Alpha should still be used as one of the more traditional and popular performance measures for collective investment schemes (Bertolis & Hayes, 2014).

In summary, the following risk-adjusted performance measures will be utilised: the Sharpe ratio, Information Ratio, Treynor measure and Alpha.

Ranking analysis

A popular methodology used in a number of studies is the ranking of funds into five different quintiles based on the size of the fund (AUM) (Chen *et al*., 2004; Hibbert, 2003; Indro *et al*.; 2009; Pollet & Wilson, 2008; Yan, 2009). This is calculated by taking the average size (in terms of AUM) of each of the quintiles and comparing the average dependent variables of risk-adjusted performance generated relative to each collective investment scheme's size ranking.

However, there are some limitations to the ranking analysis that should be addressed. Fund size might be correlated with other fund characteristics such as fund age or turnover, and it may be these characteristics that are driving performance. This can be accommodated by including these external factors as part of the analysis. The factors identified in the Chen *et al.* (2004) paper include fund age (AGE), total expense ratios (TERs) and family fund size (LOGFAMSIZE) and as set out below:

- Fund age will take the age of the fund at the end of the analysis period on 31 December 2014.

- LOGFAMSIZE is the log of one plus the cumulative AUM of the other funds in the fund's family (i.e. the AUM of a fund's family excluding its own AUM) but this shall be restricted to the fund's family within the sample.
- The TER is a percentage of the fund's net annual costs that is paid for operating expenses and management fees. The typical fees that are included are accounting, administrator, advisor, auditor, board of directors, custodial, distribution, legal, organisational, professional, registration, shareholder reporting, sub-advisor and transfer agency (Morningstar, 2015). The TER does not reflect the fund's brokerage costs or investor sales charges (Morningstar, 2015). In contrast to a gross expense ratio, the net expense ratio also reflects fee waivers in effect during the time period. Fund expenses (net of waivers and reimbursements) are subtracted from the fund's assets on a daily basis which causes the expense ratio to be accrued evenly with minimal impact on the fund's AUM. (Morningstar, 2015). The fund's expenses are usually paid on a daily basis. The TER on the Morningstar database is taken as the annual report net expense ratio which reflects the actual fees charged during a particular year. These figures are only available on an annual basis and the average of such figures across the time period shall be taken for each fund. The general theory is that the TER should decrease as the fund sizes increases due to the economies of scale (Benz, 2011).

In addition, a basic regression analysis shall be conducted against each fund characteristic as independent variables and the risk-adjusted performance measures as dependent variables to review any correlation between these characteristics and the risk-adjusted performance measures.

Comparative analysis with index funds

The criteria for the sample selection excluded index funds because the sample selection followed the methodology used in the academic literature. An index fund is designed to reconstruct the behaviour of a selected market index and therefore the primary risk associated with investment in the fund is the market risk (Vanguard, 2009). The literature review also revealed the recommendation that if a larger fund experienced diseconomies of scale, a passive investment strategy should be followed (Pillay, Muller & Ward, 2010:1). Therefore it may be worth considering the validity of this option to the fund manager by exploring if there is any *prima facie* relationship between the index fund size and the appropriate measures of performance.

Sample selection of index funds

The size of the sample of South African collective investment scheme's index funds will be limited based on the following criteria:

1. Collective investment scheme in securities.
2. ASISA SA Equity General collective investment scheme Fund.
3. Passive Fund Management or Index/ETF funds: This is generally evident from the name where "index" or "ETF" is included in the fund name as required by ASISA and can also be confirmed further by a review of the fund fact sheet.
4. Incubator funds excluded. An approach taken by previous studies is that funds with less than 18 months in existence have tendency for upward bias and therefore these funds have been excluded from the sample (Yan, 2008:745). Any funds that have an inception date of less than 18 months after the sample selection period will be excluded from the study.

5. The same 10 (ten) year period as the active manager funds will be under examination (1 January 2005- 31 December 2014).
6. No data available on the Morningstar database: The performance results for the following three index funds were not available on the Morningstar database and therefore were excluded from the sample under review:
    a. Ci Equity Index A
    b. Grinrod DivTrax ETF
    c. Grinrod LowVolTrax ETF

The two most popular performance measures for the index funds are the Tracking Error and the Excess Return (Mead, 1989).

Tracking Error

The Tracking Error is used to measure how closely an index fund tracks the benchmark performance. The Tracking Error that is measured after the fact is called an “ex post” or “realised” track error and is most useful to measure performance of the index funds. The Tracking Error is represented by the following equation (Meade, 1989:872).

$$TE = \sqrt{\frac{\sum_{i=1}^{n}(R_p - R_b)^2}{N-1}}$$

R_p = active return of the fund

R_b = return of the benchmark

N = number of return periods

Excess Return

Excess return, which can be positive or negative, is calculated to determine a fund's benchmark or index outperformance with a similar level of risk. It is calculated as the fund's net asset value (NAV) total return minus the benchmark's total return The Excess return is represented by the following equation (Silber, n.d:3):

$$ER = R_{it} - \beta_{it} (R_m - R_f)$$

R_{it} = the return for fund i in month t

β_{it} = the Beta for fund i in month t

R_m = market return

R_f = risk-free rate of return

It should be noted that the Excess Return is also used to measure the risk-adjusted return and is closely associated with Alpha, but fund managers have recommended using it as an appropriate measure for index funds (Vanguard, 2009). Because a fund's total return includes fund expenses, Excess Return typically is negative for index funds (Vanguard, 2009).

For the purposes of consistency, only the index funds that would have been in the sample but were only excluded for the basis of being index funds will be included in the new sample for the comparative analysis. Then a simple regression analysis between the fund size (the Log of the fund size) and the performance measure of the Tracking Error would be calculated to determine if there is any correlation between fund size and performance for index funds. A small ranking analysis could also be done ranking the index fund sizes against the Tracking Error as a performance measure.

It should be noted that the performance measures used for index funds (the Tracking Error and Excess Return) are different from the risk-adjusted performance measures (Sharpe, Information Ratio, Treynor and Alpha) and therefore it would be very difficult to draw strong conclusions about the comparisons between the results for active and for index funds.

Limitations in the data

Survivorship bias

Survivorship bias occurs when a fund is terminated or merged into another fund. When a fund is dissolved, the proceeds are distributed to the investors. The fund ceases to exist and its historical performance is no longer considered in the calculation of bias category averages. However, in circumstances where there is a failing fund, most collective investment scheme funds are merged into another fund. Therefore most collective investment scheme funds show a potentially upward survivorship bias in the sense that failing funds are not dissolved but are merged into pre-existing funds (Dahlquist & Sodelind, 2000; Elton, Gruber & Blake, 1999). In addition, the funds that have been terminated may potentially be excluded from the database. This leads to an overstatement of performance within the industry (Elton, Gruber & Blake, 1999).

Fortunately, the Morningstar database automatically provides for survivorship bias. Morningstar calendar year category averages address the effect of survivorship-bias by including obsolete funds in the population for calculating the category average during the historical year when those funds were alive. The calculation is simply the average of the calendar year returns for all funds (active and obsolete) in a given category. For example, Morningstar calculates a calendar year return for 1997 for the large-growth classification by

doing an average of the 1997 calendar year returns for all funds that were assigned to the large-growth category as of 12/31/1997. This can include currently obsolete funds that were active during the 1997 calendar year.

Incomplete data

Although there is full access to all of the data available on the Morningstar and the ASISA databases, not all of the information is publically available or sent to Morningstar. For example, as noted in the sample selection, some of the funds within the sample selection do not send Morningstar their performance data (or any other data) and therefore it is impossible for Morningstar to provide such information. The 4 (four) funds are listed below:

- Abax Equity Prescient Fund
- GTC Active Equity Fund
- GTC Value Fund
- Truffle Institutional Equity Fund

Where information has not been made readily available from ASISA or from the Morningstar database an attempt has been made to find publically available fund fact sheets for the relevant funds that might provide such information. However, due to the potential conflict of interest that may present itself from a competitor collective investment scheme manager, it is impossible for such information to be requested directly from the investment scheme manager if it is not publically available.

Therefore the method used has been to process the results and calculations based on all of the publically available data.

Chapter Four: Results

This chapter focuses on the tests of the primary hypothesis that there exists a statistically significant relationship between the size of the assets under management and the risk-adjusted performance of South African collective investment schemes.

The sample size was selected based on the criteria set out in the methodology and also based on the available data in the Morningstar and ASISA databases. The selection therefore included a sample size of 100 (one hundred) collective investment schemes for the review.

Regression analysis

The approach was first to conduct a regression analysis to test the hypothesis across the entire sample. The quarterly data was averaged and each dependent variable (performance data) was regressed against the independent variable (fund size or AUM) as the approach followed by Indro *et al.* (1999).

Risk-adjusted performance	R 2	R2 adjusted	T-stat	Durban Watson
Alpha	0.0014	-0.0089	-0.2737	1.5755
Information Ratio (Arith)	0.0247	0.0146	-1.9460	1.6510
Information Ratio (Geo)	0.0246	0.0146	-1.9044	1.6268
Sharpe Ratio	0.0034	-0.0068	2.5354	1.7756
Treynor Ratio (Arith)	0.0002	-0.0101	2.0290	1.7136
Treynor Ratio (Geo)	0.0002	-0.0101	2.0457	1.7179

Table 1: Sample regression analysis results

The regression analysis results in Table 1 indicated no statistically significant correlation between collective investment scheme fund size and risk-adjusted performance. The t-statistic for the Sharpe and Treynor ratios produced a confidence level of greater than 95%. The remainder of the t-statistic results are just below two (except for the Sharpe ratio) which indicate a confidence level closer to 90%. The Durban-Watson statistics for these results indicate minimal or non-significant autocorrelation in the data.

The results in Table 1 are consistent with a number of the studies in the literature review which indicated no correlation between fund size and risk-adjusted performance. These included the study by Berk and Green (2004), Reuter and Zitzewitz (2010) and the South African study of Hibbert (2003). The results are also consistent with tests performed by a business analyst at Allan Gray on all active collective investment schemes in South Africa finding no correlation between fund size and performance (van Andel, 2014). Berk and Green (2004) argued that the persistent investment inflows at performing mutual funds eliminated the constant high returns because the fund managers faced increasing diseconomies of scale. Therefore the performance results derived from the ability of some active managers to outperform benchmarks were neutralised by the disadvantages of large funds such as lack of liquidity and increased trading costs. Reuter and Zitzewitz (2010) also found no correlation between fund size and performance but unlike Berk and Green (2010) they found no such diseconomies of scale for larger funds.

Then the approach was to conduct a regression analysis across a select sample to confirm the robustness of the results. The funds that were in existence across the entire time period under review (1 January 2005 – 31 December 2014) were identified and included into a separate sample. The theory being that the review of a select sample of the 10-year funds across the entire period should exclude any of the short-term volatility in the market that may impact the risk-adjusted performance of funds that have only been in existence for a shorter time period (Hibbert, 2003). This was the approach used in Hibbert (2003). This produced a

limited sample of 17 (seventeen) collective investment scheme funds where data was readily available across the ten year period.

Risk-adjusted performance	R 2	R2 adjusted	T-stat	Durban Watson
Alpha	0.0042	-0.0669	0.3021	1.8930
Information Ratio (Arith)	0.0545	-0.0130	1.5792	1.2611
Information Ratio (Geo)	0.0621	-0.0049	-1.0713	1.2441
Sharpe Ratio	0.0136	-0.0569	1.6948	2.2341
Treynor Ratio (Arith)	0.0138	-0.0566	1.5792	2.2213
Treynor Ratio (Geo)	0.0147	-0.0557	1.6097	2.2266

Table 2: 10-year funds sample regression results

The results for these funds in Table 2 indicated no statistically significant correlation between collective investment scheme fund size and risk-adjusted performance. The t-statistics were all well below 2 (two) and therefore the confidence level in these results is closer to 90% confidence. The Durban-Watson statistics indicate that there is minimal or non-significant autocorrelation in the residuals of the regression analysis data.

Ranking analysis

The aim of the ranking analysis is to provide another method to examine whether there is any *prima facie* relationship between fund size and risk-adjusted performance. As a secondary objective it could also be used to determine whether a range could be identified in which the fund's risk-adjusted performance figures, relative to fund sizes, are at their maximum.

The 100 (one hundred) funds were divided into five equal groups of with 20 (twenty) funds in each group based on the AUM. Each fund was ranked in terms of the average of its fund size (AUM) and then organised into the five different quintiles. The averages of the risk-adjusted performance for the funds in each quintile were then calculated to see if there was a range of fund sizes where the risk-adjusted performance was maximised.

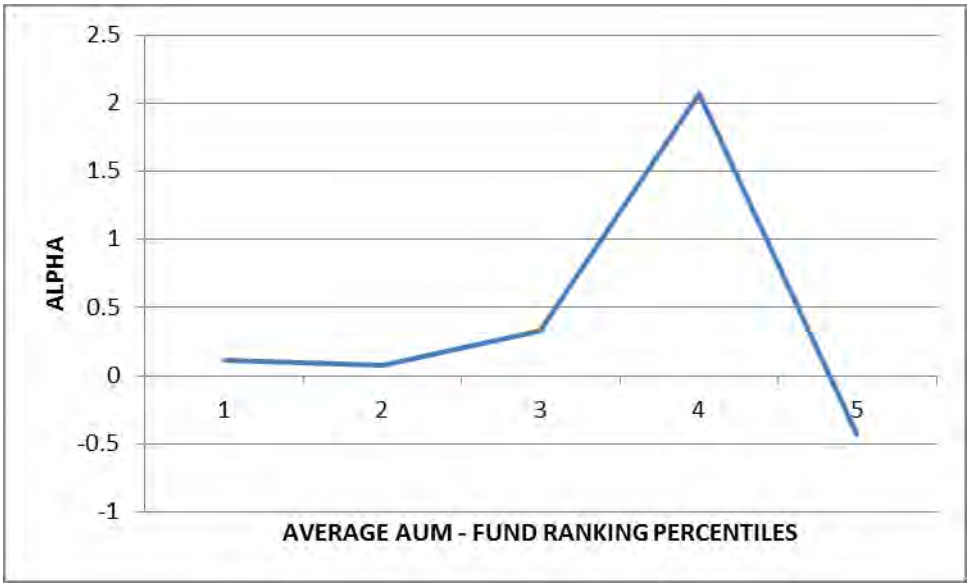
	1	2	3	4	5
AUM	105 089 493	258 843 222	578 833 309	1 399 847 261	6 031 741 174
Alpha	0.1157	0.0722	0.3250	2.0714	-0.4283
IR (Arith)	-0.5243	-0.5246	-0.2923	0.0014	-0.3564
IR (Geo)	-0.4068	-0.4089	-0.2136	0.0263	-0.2661
Sharpe	1.2782	1.0200	1.1154	1.1599	1.0094
Treynor (Arith)	15.7485	13.2964	14.0504	15.9818	13.9786
Treynor (Geo)	14.9647	12.6227	13.3297	15.1552	13.2798

Table 3: Ranking analysis – fund's AUM in quintiles

From a review of the results in Table 3, the 4th quintile fund size range (i.e. the second largest fund size range) has marginally the best performance across almost all of the performance statistics: Alpha, Information Ratio and Treynor ratio. It has the second best performance across the Sharpe ratio.

Alpha

The Alpha for the 4th quintile is 2.07 which is significantly larger than the second highest Alpha from the 3rd quintile which is 0.3.

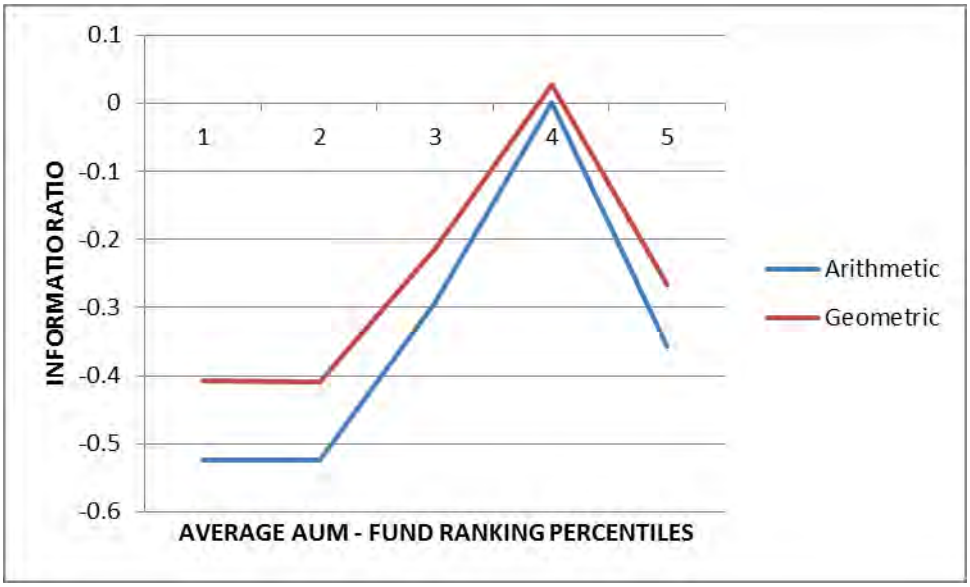


Graph 1: Average Alpha of the different fund ranking quintiles

Graph 1 shows a clear upward trend in correlation with collective investment scheme fund size. There is also a definite spike in the 4th quintile and then a substantial decrease thereafter to a negative number of Alpha for the 5th quintile (i.e. largest AUM fund size).

Information Ratio

The Information Ratios (arithmetic and geometric) for the 4th quintile is 0.001 and 0.02, respectively, which are the only positive Information Ratios out of all of the quintiles.

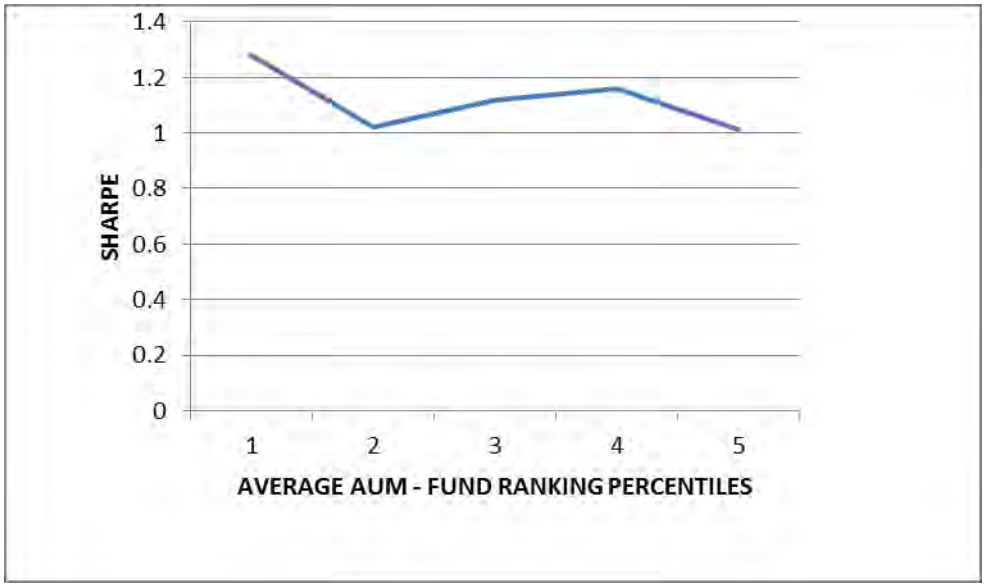


Graph 2: Average Information Ratio (arithmetic and geometric) of the different fund ranking quintiles

Graph 2 depicts the largely negative Information Ratio although there is also an upward trend with a spike at the 4th quintile. The Information Ratio results drop below zero for the 5th quintile.

Sharpe Ratio

The Sharpe Ratio for the 4th quintile is 1.15 which is marginally less than the highest Sharpe Ratio from the 1st quintile which is 1.2. Sharpe Ratio's above 1 indicate that the return is greater than each unit of risk taken to achieve that return.

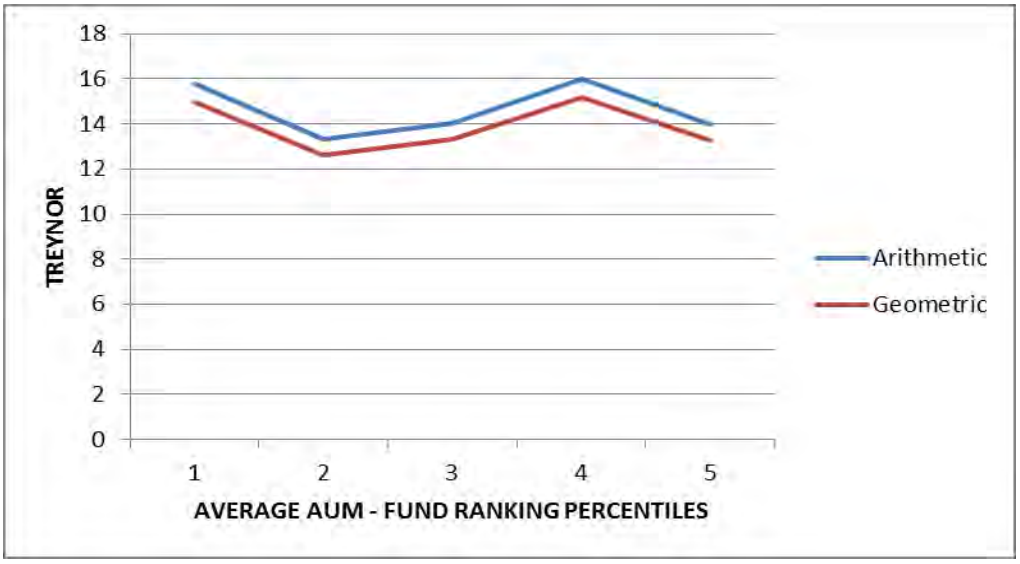


Graph 3: Average Sharpe ratio of the different fund ranking quintiles

Graph 3 depicts a positive Sharpe ratio for all of the fund quintiles and has produced a very flat line with variances between 1.2 and 1.

Treynor Ratio

The Treynor Ratios (arithmetic and geometric) for the 4th quintile are 15.9 and 15.1 respectively, which are higher than the comparative Treynor Ratios for the other quintiles.



Graph 4: Average Treynor (arithmetic and geometric) ratio of the different fund ranking quintiles

The AUM of the twenty (20) funds in the 4th quintile ranges between R912,267,649.3 and R1,930,696,676 in AUM (a range of about 1-2 billion in AUM) which represent a relatively small AUM in respect of the collective investment scheme industry.

The ranking analysis results support the view in some of the academic papers that there is an inverted U-Shape relationship between fund size and risk-adjusted performance which suggests an optimal fund size range to maximise risk-adjusted performance. Indro *et al.* (1999) found that funds must reach a minimum size to benefit from increasing economies of scale of fixed costs (acquiring and trading information) and reduced brokerage commission. However, the study also found diminishing marginal returns when the funds exceeded its optimal size such as increasing expense ratios from an over-investment in investment research and information. Tang, Wang and Xu (2010) also found in investigating Chinese mutual funds that the comparison between funds' size and performance reflected an inverted U-Shape relationship.

Pillay, Muller and Ward (2010) study investigated the collective investment scheme market in South Africa and found an optimal fund size of below R5 billion (five billion rand) of assets under management. The paper found decreasing marginal returns citing decreasing liquidity as a contributing factor. In contrast to the Pillay, Muller and Ward (2010) study, the ranking analysis results indicate that an even smaller maximum fund size range of under R1.9 billion (one point nine billion rand) of assets under management may be preferable to maximise performance. However, the Pillay, Muller and Ward (2010) study did not consider an optimal fund size range but rather a "tipping point" for performance for AUM when investment into passive funds should be considered.

Optimal collective investment scheme fund range

The 20 funds in the 4th quintile which have the highest risk-adjusted performance ratios across almost all of the other quintiles are set out below:

Fund	AUM	Alpha	Info Ratio (arith)	Info Ratio (geo)	Sharpe Ratio	Treynor Ratio (arith)	Treynor Ratio (geo)
36ONE MET Equity	1 545 092 598	6.68	0.61	0.51	2.01	28.54	27.10
ABSA Select Equity	1 297 598 518	1.79	-0.14	-0.03	1.05	15.32	14.44
Citadel SA Equity H4 B1	1 225 005 789	-4.19	-1.07	-0.95	0.03	-0.83	-0.78
Discovery Equity	1 663 042 759	-0.10	-0.72	-0.51	0.46	6.21	5.92
First Avenue SCI Equity B1	912 267 649	2.06	-0.24	-0.18	1.47	19.67	18.66
Foord Equity R	1 697 034 005	3.15	0.35	0.32	1.23	18.26	17.28
Investec Active Quants A	1 065 461 019	1.39	0.04	0.04	0.99	13.01	12.32
Investec Wealth & Investment Equity	1 438 809 515	3.19	0.60	0.52	1.66	20.77	19.71
Marriott Dividend Growth B	1 108 612 992	4.25	0.02	0.10	1.12	22.00	20.71
NeFG BCI Equity	1 526 548 463	-0.28	-0.42	-0.35	0.94	12.96	12.21
NGI Private Wealth Core Equity	1 005 701 764	6.15	1.45	1.19	2.04	26.21	24.87
Old Mutual Albaraka Equity	1 110 119 520	3.08	-0.23	-0.15	1.40	18.47	17.48
Old Mutual Growth A	1 293 815 186	0.29	-0.37	-0.28	0.60	6.65	6.47
Old Mutual Top Companies A	1 743 832 350	0.82	-0.27	-0.20	0.66	7.39	7.17
Prudential Equity A	1 343 029 854	2.06	0.18	0.21	1.11	15.42	14.59
PSG Equity A	1 711 826 147	8.41	0.80	0.67	2.14	31.61	29.99
Sanlam Growth Institutional B1	1 006 009 036	3.06	0.72	0.65	1.17	16.46	15.55
STANLIB Equity A	1 910 479 821	1.39	-0.07	-0.05	1.14	14.35	13.66
STANLIB SA Equity A	1 930 696 676	1.25	0.00	0.02	1.10	14.52	13.73
STANLIB Value A	1 461 961 554	-3.01	-1.20	-0.99	0.89	12.63	12.01

Table 4: The 20 funds in the 4th quintile

The sample of the investment profiles of each of the fund fact sheets of these 20 funds from Table 4 has been included in Appendix 1. The inception dates of the funds in the 4th quintile vary greatly although the majority of these funds have been in existence for a number of years and some of these funds are included in the 10 (ten) year fund sample. There are also a number of funds from the same fund family such as Investec, Old Mutual and Stanlib in the 4th quintile. The relationship between the age of the fund, the family fund size and the risk-adjusted performance will also be examined closer in the results below.

The investment objective or strategy for a number of these funds refers to long-term capital growth and investing predominantly in South African equities. The investment in South African equities (of at least 70% of the assets) is required by Board Notice 90 of CISCA and the ASISA guidelines. Some of the strategies refer to the "value" investing philosophy or "stock selection" which seeks to identify mispriced assets that are price lower in the market than the equities intrinsic value. However, there is no consistent trend that can be identified in the investment strategy of these funds.

Other variables to AUM

The results of the ranking analysis suggested an optimal fund size range for performance in the 4th quintile. A ranking analysis was done again using AUM as the ranking criteria with other factors such as the age of the fund, log of family size and the TER to see if any of these factors are linked to the fund size.

Averages	1	2	3	4	5
AUM	96 204 694	258 843 222	578 833 309	1 399 847 261	6 031 741 174
Years	4.7500	6.3625	7.8250	11.7375	11.6750
Family Log AUM	12.5571	11.3807	27.7011	44.5148	48.7413
TER	1.5750	1.7030	1.5119	1.5876	1.3484

Table 5: Ranking analysis of AUM vs. other variables

The ranking analysis in Table 5 shows a link between fund size (AUM) and age of a fund. Berk and Green (2004) found that larger funds with established track records attracted persistent fund flows regardless of the persistence of high performance. However, the average age for the funds in the 4th quintile is just higher than that of the 5th quintile. This is perhaps also indicative of an underlying relationship between experience of fund managers and performance which is more difficult to quantify.

The ranking analysis also shows a clear link between AUM and family fund log AUM within the same sample. These results seem contrary to the investment philosophy of diversification where investors should prefer to diversify their portfolios by selecting different asset managers within the same category. However, the persistence of flows into the same fund family suggests that perhaps the reputation and brand of the asset manager is more important to attract asset flows than the requirement to spread investment risk through diversification. This was also consistent with the results found by Chen *et al.* (2004) that found a positive correlation between risk-adjusted performance and the log of the family fund size.

There does not be seem to be any identifiable trend in the ranking analysis of the TER. The 5th quintile (with the largest AUM) has the lowest TER than the other quintiles. However, the 5th quintile does not offer the highest performance ranking which also suggests that the actual impact of the TER on performance is minimal. This is in contrast to the results found

by Berk and Green (2004) which argued that there were diminishing marginal returns for larger funds reflected in higher TER for larger funds. However, Reuter and Zitzewitz (2010) also found no correlation between fund size and diseconomies of scale.

R-Squared	Alpha	Information Ratio (Arith)	Information Ratio (Geo)	Sharpe Ratio	Treynor Ratio (Arith)	Treynor Ratio (Geo)
Year	0.0009	0.0014	0.0003	0.0328	0.0024	0.0025
Log family size	0.0363	-0.0042	-0.0018	0.0496	0.0428	0.0419
TER	0.0082	0.0074	0.0073	0.0149	0.0230	0.0229

Table 6: Regression analysis of other independent variables

The regression analysis in Table 6 showed no statistically significant correlation between the other independent variables and the risk-adjusted performance ratios. This is generally consistent with the material in the literature review except for the log of the family fund size where Chen *et al*. (2004) found a positive correlation between family fund size and risk-adjusted performance. The difference with the results in Table 6 and other studies in the literature review in respect of family fund size may be due to the use of the log of family fund size from family funds only within the sample and not across the entire industry.

Comparative analysis to index funds

The comparative analysis seeks to compare the results against results for index funds for the appropriate measures of performance (Tracking Error and Excess Return). The limitations of such a comparison are acknowledged because different measures of performance for the index funds are being used for the analysis.

Regression analysis

The regression analysis compares the AUM of the index funds to the performance measures of excess return and tracking error.

	R 2	R2 adjusted	T-stat	Durban Watson
Excess Return	0.1307	-0.0142	0.9566	1.0486
Tracking Error	0.0322	-0.1290	0.8120	2.0610

Table 7: Regression analysis of index funds

The results in Table 7 reveal no correlation between the index funds and the performance measures selected for these funds. The small number of only 8 (eight) index funds in the sample have possibly lead to low t-statistics which are well below two. The Durban Watson statistic for the Excess Return also shows a degree of autocorrelation for the results while the Durban Watson statistic for the Tracking Error shows minimal autocorrelation. The results of no correlation between fund size and risk-adjusted performance support the suggestion of Pillay, Muller and Ward (2010:1) that large funds that experience diseconomies of scale should switch to passive investment strategies. But the *prima facie* relationship between fund size and performance for index funds should be explored more extensively through further studies.

Ranking analysis

The ranking analysis divides each of the 8 index funds into four quartiles of two funds each as the basis of comparison.

Averages	1	2	3	4
AUM	32 102 861	77 209 708	163 324 849	490 070 988
Excess return	3.0089	-0.3689	-0.9262	-0.9024
Tracking error	3.3358	3.0380	4.4459	2.9954

Table 8: Ranking analysis of index funds

The ranking analysis in Table 8 does not show any relationship between the ranking of the AUM and the performance measures. The Excess Return compared to the AUM of the index funds show a general downward trend for the AUM of the index funds with a slight increase in the last quartile. There seems to be no relationship between the Tracking Error and the AUM of the index funds.

Chapter 5: Conclusion

Summary of Findings

The primary objective of the study is to investigate the relationship between the fund size and the risk-adjusted performance measures of collective investment scheme funds in South Africa. The sample of 100 (one hundred) funds was selected based on the ASISA fund classification of SA Equity General.

The results of the regression analysis found that there was no statistically significant correlation between the fund size of a collective investment scheme and the risk-adjusted performance. This was consistent with the research found in South African academic literature and popular press (Cairns, 2012; Hibbert, 2003; van Andel, 2014).

However, the ranking analysis indicated that there may be an inverted U-shape relationship between fund size and risk-adjusted performance with an optimal fund size range in the 4th quintile. This was consistent with some of the results of the academic literature that found an inverted u-shape relationship between fund size and risk-adjusted performance (Indro *et al.*, 1999; Pillay, Muller & Ward, 2010; Tang, Wang & Xu, 2010).

The ranking analysis showed a relationship between fund size (AUM) and age of the fund and also between fund size (AUM) and family fund size. The increase in AUM linked to an increase in age and family fund size. There was no clear relationship between fund size and TER. However, the regression analysis also found that there was no statistically significant correlation between these factors (age, family fund size and TER) and the risk-adjusted performance of South African collective investment schemes.

Finally a review of the index funds within the same ASISA fund category also produced results where there was no statistically significant correlation between the fund size and the performance.

Conclusions

The conclusion is that there is no statistically significant correlation between fund size and risk-adjusted performance for South African collective investment schemes. However, there may be an inverted U-Shape relationship between fund size and risk-adjusted performance which presents an argument for an optimal fund size range of between R912,267,649.3 and R1,930,696,676 (about 1 – 2 billion Rand) in AUM to maximise risk-adjusted performance.

As a secondary objective, the research looked at other factors linked to the fund size and found that other factors that are linked to the fund size (AUM) but that may contribute to the fund size (AUM) are age of the fund and family fund size. These factors were not linked to risk-adjusted performance.

In terms of the comparative analysis with index funds, there is no statistically significant relationship between fund size and the performance of index funds.

Summary of contributions

The research has indicated a possible inverted U-Shape relationship between fund size (AUM) and risk-adjusted performance for South African collective investment schemes. This therefore provides a basis for reviewing whether there is an optimal fund size range that maximises performance and begs the question as to whether collective investment scheme fund size should be capped. The research indicated that the optimal collective investment

scheme fund size range was between R912,267,649.3 and R1,930,696,676 (about 1-2 billion Rand) which does not represent any large or sizeable fund size and raises significant issues for some of the collective investment scheme fund managers with sizeable funds under management. The size of a fund could therefore also serve as selection criteria for investors when deciding on which funds would maximise the returns on their investment.

Furthermore, in terms of the index funds it is arguable because there seems to be no relationship between fund size and performance, the larger funds should switch to passive investment styles to avoid increasing diseconomies of scale.

Suggestions for further research

The scope of the academic research and the results of this paper provide a number of possible areas for further research.

Time period under review

The data was taken over a 10 (ten) year time period from 1 January 2005 – 31 December 2014. The regression and ranking analysis used the averages of the both the independent and dependent variables over this time period following the approach in Indro *et al*. (1999). However, it should be noted that Indro *et al*. (1999) only used a 3 (three) year time period from 1993-1995 which marginally reduced the intertemporal effects of taking averages of these variables over a longer time period. A possible area of further research could be to conduct a replication of this paper over shorter time periods (such as 3 (three) years) to investigate whether this has any impact on the results.

However, this paper followed the ten (10) year time period for the data which is the prevalent approach used in a number of studies (Edelen & Evans, 2007; Elton, Gruber & Blake 2012; Ferreira *et al.*, 2012; Hibbert, 2003; Yan, 2008) to facilitate comparability with these other papers. Furthermore, the longer time period for the data should smooth the effects of market cycles and volatility on the results. This is particularly important because the sample funds are in the equity category.

Investment style

The investment style of the fund was one of the factors identified in the literature review as being critical to the risk-adjusted performance of a fund (Yang, 2008; Ferreira *et al*, 2012). This factor was removed from the sample to minimise the impact of investment style on the results because it was outside the scope of the research. However, it could be useful to conduct an industry-wide analysis on the correlation between investment style and risk-adjusted performance.

Liquidity

The effect of liquidity was another one of the factors identified in the literature review (Yang, 2008; Ferreira *et al*., 2012) as being critical to the risk-adjusted performance of a fund. This factor was not considered because it was outside the scope of the research.

TER

Because the results of a fund are calculated net of expenses (Indro *et al*., 1999:79), the TER of a fund should have an impact on performance. Therefore the link between TER and performance of the fund could perhaps be reviewed with further analysis. Suggestions would be to analyse all of the individual components of TER for each fund specifically and suggest

where the TER may be under or overspending which would possibly have an impact performance.

Index funds and performance

Although the research did analyse the relationship between the index funds and performance, the review was only limited to those index funds within the same ASISA class as the sample. Arguably a broader sample of index funds would be required to understand if there was any relationship between index fund size and performance. The argument being that due to the traditionally low TER of index funds, investment into an index fund becomes more beneficial after the active fund has surpassed the optimal fund size range.

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Appendixes

Appendix 1: Fund Fact Sheets of Funds in the 4th quintile

36One Met Equity

Inception date: 1 July 2012

Investment objective/strategy (36One Met Equity Fund, 2014:1):

> *The fund invests predominantly in local listed equities and primarily follows a bottom-up stock picking approach. The fund may also invest in foreign listed equities. The fund can invest across all company market capitalisations and equity sectors, with the exposure to each sector varying in response to the valuation and economic fundamentals of the securities in that sector.*

ABSA Select Equity

Inception date: 23 February 2004

Investment objective/strategy (ABSA Select Equity Fund, 2015:1):

> *The fund is focused on stock selection and will invest primarily in South African-listed equities. Additional securities which may be included are non-equity securities, assets in liquid form and other income-bearing instruments and securities. A minimum of 75% of the fund's assets will be invested in equities at all times.*

Citadel SA Equity H4 B1

Inception date: August 2001

Investment objective/strategy (Citadel SA Equity H4 Fund, 2013:1):

> *The Fund is a specialist portfolio, having the primary objective of long-term growth in real terms of capital. Income will not be the primary objective of the Fund.*

Discovery Equity

Inception date: 5 November 2007

Investment objective/strategy (Discovery Equity Fund, 2015:1):

> *The fund is biased in favour of value investment. The result of this approach is a relatively concentrated equity fund, comprising mostly of out-of-favour stocks. Consequently, the fund may behave very differently to the overall market with a defensive and above average yield. The fund may invest in all JSE listed companies as well as interest bearing securities, debenture stock, preference shares, liquid assets, participatory units in collective investment schemes and foreign investments. Fund Objective The fund will target returns in excess of the benchmark or peer group median, measured over rolling three-year periods, calculated on a total return basis with dividends reinvested. Investment Philosophy Stock prices do not always reflect the value of companies due to factors such as investor sentiment, the impact of news flow and other short-term considerations. The fund's contrarian approach focuses its research on exploiting these extremes. For example, the asset managers will assess which companies' intrinsic business values are higher than the price at which shares in that company can be purchased. This process combines a qualitative review of the business with the quantitative depth gained from the financial metrics.*

First Avenue SCI Equity B1

Inception date: 1 July 2011

Investment objective/strategy (First Avenue SCI Equity Fund, 2014:1):

> *To provide substantial capital growth over the long-term with due regard for absolute risk by out-performing the market index by 3% p.a. over rolling 3 year periods First Avenue is a valuation-driven equity manager. The objective of our investment style is to create wealth for our clients through the consistent application of our investment philosophy and process over long periods of time. Our strategy is to assume increasing defensive postures through the evolution of a bubble (of excess liquidity). We are confident that we will make more money in the event of an inevitable correction than we will have lost in the bubble. We do not consider ourselves capable of predicting either the duration of the bubble nor the timing of its end. Our results for the quarter were driven by a confluence of market returns and company fundamentals. This is in distinct contrast to momentum investing where movements in share prices are not justified by company fundamentals (commensurate value creation and cash flow growth). Our stock selection rather than sector allocation was overwhelmingly responsible for our outperformance of the market (SWIX).*

Foord Equity R

Inception date: 1 September 2002

Investment objective/strategy (Foord Equity Fund, 2015:1):

> *The fund aims to earn a higher total rate of return than that of the South African equity market, as represented by the return of the FTSE/JSE All Share Index including income, without assuming greater risk.*

Investec Active Quants

Inception date: 1 April 2005

Investment objective/strategy (Investec Active Quants Fund, 2015:1):

> *The Fund aims to provide capital growth over the long term by investing primarily in South African equities (e.g. company shares). The Fund uses a quantitative investment strategy (i.e. using a mathematical model to identify investment opportunities) with regards to stock selection and portfolio construction. Other investments may include the units of other funds (including foreign funds) and derivatives (financial contracts whose value is linked to the price of an underlying asset).*

Investec Wealth & Investment Equity A

Inception date: 1 September 2012

Investment objective/strategy (Investec Wealth & Investment Equity Fund, n.d.:1):

> *The Investec Wealth & Investment Equity Fund process employs a 'top down', 'bottom up' approach to investing that involves combining our macroeconomic ('top down') view which identifies attractive sectors / industries / themes with the selection of existing and emerging blue chip companies ('bottom up') which we believe will outperform. We seek to invest in successful, growing, attractively valued companies with strong and / or improving operating performance that are receiving increasing investor attention. We favour management teams that have demonstrated an understanding of how to manage the asset base to enhance shareholder value.*

Marriott Dividend Growth B

Inception date: 1 August 1988

Investment objective/strategy (Marriott Dividend Growth Fund, 2015:1):

> *The Marriott Dividend Growth Fund has as its primary objective an acceptable dividend yield combined with long term growth of income and capital. To achieve this objective the fund will seek out fundamentally sound listed companies that currently pay dividends and possess the potential for consistent and sustainable dividend growth in the future. The fund aims to achieve a dividend yield for its investors in excess of the dividend yield of the Financial and Industrial Index and*

to grow distributions in excess of the dividend growth achieved by the Financial and Industrial Index measured over rolling two-year periods.

NeFG BCI Equity Fund

Inception date: 1 August 2008

Investment objective/strategy (NeFG BCI Equity Fund, 2015:1):

> *The NeFG Equity Fund is a general equity portfolio that may consist of financially sound equity securities, property shares and property related securities listed on exchanges and assets in liquid form. In selecting securities for this portfolio, where possible, the manager shall seek to sustain high long-term capital growth. The portfolio may also invest in participatory interests and other forms of participation in portfolios of collective investment schemes and other similar schemes which are consistent with the portfolio's primary objective. The Manager may make active use of derivatives to reduce the risk that a general decline in the value of equity markets may have on the value of the portfolio. The portfolio's equity exposure will always exceed 75% with the balance, if any invested in assets in liquid form.*

NGI Private Wealth Core Equity Fund

Inception date: 1 May 2004

Investment objective/strategy (Nedbank, 2015:1):

> *The appointed investment manager, in conjunction with the Nedbank Private Wealth Investment Research team meets on a regular basis to review the Fund. The investment manager adopts a bottom-up approach to position the Fund. From a bottom-up perspective, stock picking decisions are based on exploiting market inefficiencies through diligent fundamental analysis.*

Old Mutual Albaraka Equity Fund

Inception date: 1 June 1992

Investment objective/strategy (Old Mutual Albaraka Equity Fund, 2014:1):

> *The fund is strictly managed in accordance with Shari'ah (Islamic Law) and therefore does not invest in shares of companies whose core business involves dealing in alcohol, gambling, non-halaal foodstuffs or interest-bearing instruments. The Shari'ah Supervisory Board oversees adherence to the applicable Shari'ah principles. This fund specifically adheres to the standards of the Accounting and Auditing Organisation for Islamic Financial Institutions (AAOIFI) as interpreted by the Shari'ah Supervisory Board.*

Old Mutual Growth Fund

Inception date: 1 April 1993

Investment objective/strategy (Old Mutual Growth Fund, 2015:1):

> *The fund invests primarily in listed "growth-style" companies showing above average growth potential, an entrepreneurial attitude and the potential to increase market share. These are companies whose future earnings growth potential has not yet been fully discounted. Up to 30% of the portfolio may be diversified into value-type shares. Derivatives may be used for risk management purposes. The fund may gain exposure to offshore assets, including emerging markets, subject to legislative limitations.*

Old Mutual Top Companies Fund

Inception date: 1 November 1991

Investment objective/strategy (Old Mutual Top Companies Fund, 2015:1):

> *The fund aims to achieve high, long-term capital growth by investing in a concentrated portfolio of shares across all sectors of the JSE. The portfolio manager places emphasis on well-researched, superior, high-conviction share selection. This portfolio is invested fully in shares. Derivatives may be used for risk management purposes.*

Prudential Equity Fund

Inception date: 2 August 1999

Investment objective/strategy (Prudential Equity Fund, 2015:1):

> *All JSE-listed companies that meet the portfolio manager's value criteria. The Fund seeks out "value" situations by attempting to capture all components of return over time, including high dividend yield, earnings growth and possible market re-rating. The intended maximum limits are Equity 100%, Listed Property 10%, Offshore 15%.*

PSG Equity Fund

Inception date: 31 December 2007

Investment objective/strategy (PSG Equity Fund, 2015:1):

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

Sanlam Growth Institutional Fund

Inception date: 1 January 2004

Investment objective/strategy (Sanlam Growth Institutional Fund, 2015:1):

> *This is a pure equity fund diversified across all sectors of the JSE. The fund aims to achieve maximum capital growth above the benchmark, FTSE/JES Shareholder Weighted Index over the medium to long-term by investing in companies that are of quality and have the right fundamentals to grow better than the benchmark. This fund is suitable for investors who can withstand potential capital volatility in the shorter term. The Fund applies a thematic approach with a focus on companies with quality management and good cash flow generation capabilities. The top down "thematic" approach means that the manager will attempt to identify the sectors and companies in the market that are likely to benefit over the medium to long term from trends in the investment market. The manager will also focus on more liquid counters. The Fund may hold offshore equity.*

STANLIB Equity

Inception date: 1 January 2000

Investment objective/strategy (STANLIB Equity Fund, 2015:1):

> *The Portfolio's main objective is steady growth of income and capital, a reasonable level of current income and the maximum stability for capital invested. The securities to be included will consist of securities, non-equity securities and participatory interest of collective investment schemes in securities. The STANLIB Core Equity Franchise's primary objective is to grow and preserve capital over a long-term period.*
>
> *The Franchise incorporates the following beliefs:*
> *• Is style agnostic – combining value and growth;*
> *• Is benchmark conscious with a tracking error of 3 to 5%*
> *• Uses the STANLIB research team as its primary input for stock selection*
> *• Invests in companies that are growing earnings above the market, generating economic profit, distributing cash and are attractively valued.*

STANLIB SA Equity

Inception date: 1 June 2000

Investment objective/strategy (STANLIB SA Equity Fund, 2015:1):

> *The primary objective is steady growth of income and capital in the longer term. The securities to be included will consist of ordinary shares from a broad spectrum of the sectors of the JSE Securities Exchange and when appropriate, other securities, including non-equity securities and preference shares. The Trustees shall ensure that the composition of the assets and their respective proportions in this Portfolio will not be identical to the STANLIB Equity Fund at all times.*

The STANLIB Specialist Equity Franchise seeks to outperform the market within the framework of its various benchmarks. Key considerations include:
• Companies with improving fundamentals should lead to outperformance over time. Fundamentals include, margins, volumes and capital effectiveness
• Markets overreact to short term influences, ignoring longer term fundamentals.
• Share price performances work in cycles.

STANLIB Value Fund

Inception date: 8 September 2000

Investment objective/strategy (STANLIB Value Fund, 2015:1):

> *The primary objective is medium to long-term capital growth, with income generation as a secondary objective. The securities to be included will predominantly consist of shares in companies listed on exchanges. The shares to be acquired will be shares which in the opinion of the Manager have greater intrinsic value than that reflected by their share prices in the relevant market.*