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Naidoo, Jayendran (2017) The comparative performance of active and passive equity-only funds in South Africa, University of the Witwatersrand, Johannesburg, <http://hdl.handle.net/10539/23094>

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Master's Thesis

The comparative performance of active and passive equity-only funds in South Africa



Submitted by

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ABSTRACT

The world has and is still witnessing a tremendous growth in various categories of mutual funds. Active fund managers continue to grow globally with many asking for exorbitant fees for their research and investment services. Equally, passive funds in the form of Exchange Traded Funds (ETF's) and index trackers have also continued to grow. This massive growth does not preclude funds domiciled in South Africa. Passive investments have grown by about 51 percent a year in the last 10 years in South Africa. As at 2016, there are over 3000 mutual funds domiciled in South Africa. Amidst these growing funds is the ongoing debate relating to the question of which fund management style yields the best outcome. The global debate relating to passive versus active fund management has raged for decades with no clear winner. The extant literature provides mixed evidence on the competitive advantage to either investment strategies. Surprisingly, the evidence for South Africa remains scanty, with a handful of authors addressing the issue. This study therefore, sets out to examine the comparative performance of all equity-only active mutual and passive funds domiciled in South Africa. In addition, it analyses the performance persistence of active and passive funds in different business cycles. A major contribution of this study is that it examines, for the first time, the applicability of the Fama-French five factor model on South African mutual funds. It also employs a battery of econometric methods to address the issue at hand. Relying on data from 2003 to 2016, the study presents evidence that both active and passively managed mutual funds do not earn abnormal returns but rather underperform the benchmark. However, the active portfolio performs relatively better than the passive portfolio, although both underperform the market. The study also documents evidence of time-varying performance; both active and passive funds record their worst underperformance during

periods of financial crisis. The study also shows that passive portfolios tend to track the market performance more than active portfolios and that both fund categories tend to be sensitive to global market movements, suggesting that global factors matter for the riskiness of these funds. Finally, it is shown that in terms of driving factors, both active and passive fund managers generally give more preference to small cap returns than large cap returns. In addition, they are more growth oriented, as indicated by the negative coefficients for the HML factor.

DECLARATION

I declare that this is my work. All effort has gone into ensuring that there is no duplication of any prior research.

DEDICATION

I would like to dedicate this research to my parents, Raja Gopaul Naidoo and Selverani Naidoo, who worked tirelessly in poor conditions to provide an environment that fostered education and knowledge as a key differentiator for success. Their trials and tribulations have resulted in the culmination of this research.

ACKNOWLEDGEMENTS

I would like to thank my supervisor, Dr Thabang Mokoaleli-Mokoteli for her ongoing support and guidance. Further thanks go to her for motivating and obtaining a sponsorship from WBS for the data required for this research.

I would like to thank WBS for sponsoring the data for this research.

I would like to thank my wife, Thirusha, for her patience and support through my masters studies.

A special thank you to my children, Sayuri and Shailen, who are my inspiration to continuously strive for personal development and excellence.

I would also like to thank two groups of people; my supporters, those individuals who shared both their time, ideas and knowledge with me, and my detractors, who spurred me on to disprove their unwarranted beliefs. The former group deserves far greater thanks.

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Chapter 1. INTRODUCTION

1.1. Introduction

The purpose of this thesis is to investigate the comparative performance of passively and actively managed equity-only funds in South Africa. The current chapter introduces the thesis by presenting, amongst others, the objectives of the study and the research problem. The chapter is structured as follows: Section 1.2 presents the context of the study; Section 1.3 discusses the problem statement and research question; Section 1.4 highlights the research objectives; Section 1.5 comments on the benefits of this study; Section 1.6 discusses briefly the gap in the literature; Section 1.7 discusses the structure of the study and the chapters that will follow and finally section 1.7 concludes the first chapter.

1.2. Context of the study

A choice of investment style process is often influenced by the investor's belief about the efficiency of the market. If the investor believes that market is efficient, he will invest in passive portfolios and in active portfolios if he believes otherwise. Active portfolio managers believe it is possible to profit (generate excess returns or alpha) from the stock market with fundamental analysis and other techniques that are able to identify mispriced securities. The objective of active management is to produce better returns than a comparative market index. In an active investing style, fund managers rely on rigorous analytical research, forecasts, and their own judgment and experience in making investment decisions on what securities to buy, when to buy these securities and when to sell these securities. The investment management process can be dichotomized into the activities of stock selection and market timing (Kon, 1983).

On the other hand, passive fund managers aim to replicate the market or an index by purchasing shares that comprise the market or the particular index[1]. By replicating the market or index the passive fund manager aims only to match the performance of the market or the index. Rigorous analytical research is not required and market timing is of no significance because the objective is to merely track the market or index.

The global debate relating to passive versus active fund management has raged on since the seminal paper of Jensen (1968) with no clear winner. The question at the centre of the debate is, which fund management style performs better? What has fueled the debate further is that there is no clear evidence of a significant competitive advantage to either investment strategies. The literature appears polarized on the debate with as much evidence in favour of either strategy.

In 2013, the Nobel Prize in economics was awarded to Eugene Fama, Robert Shiller and Lars Peter Hansen[2]for their empirical analysis of asset prices with each individual representing a different school of thought as to whether markets really were efficient and that inevitably active fund management could not achieve returns in excess of the market. Fama's efficient market hypothesis has been the cornerstone of any debate against the success of active fund management. How could active fund managers generate excess returns if all the information about any given share was already reflected in the market price? On the other hand, Robert

[1] "..all passive portfolios, whether indexed or not, are designed to be stable and to match the long-term performance of one segment of the capital markets ..." Rudd, 1980

[2] ''Eugene Fama demonstrated that stock price movements are impossible to predict in the short-term, while Robert Shiller discovered that stock prices can be predicted over a longer period. In 1982, Lars Peter Hansen developed a statistical method for testing this type of theory. He demonstrated that Shiller's results could not be fully explained within the then-current models and Hansen's method is now used within all economics research.'' Nobelprize.org

Shiller,[3,4] spent most of his career focusing on the phenomenon of asset bubbles and behavioral finance. Asset bubbles have appeared at various times in the past, the most recent being the US housing bubble which led to the global financial crisis of 2008. If markets were efficient, then how was it that the world experienced these asset bubbles? The award of the 2013 Nobel Prize to these individuals whose research are contrarian lends further evidence to the unresolved debate of efficient and inefficient markets and an inadvertent polarization of the passive versus active fund management debate even further.

Interestingly, active fund managers continue to grow globally with many asking for exorbitant fees for their research and investment services. Equally, passive funds in the form of Exchange Traded Funds (ETF's) and index trackers have also continued to grow. Global assets under management (AUM) increased to $74tn in 2014, the highest figure recorded by the Boston Consulting Group's annual survey[5]. According to the same survey, only $11tn was invested in passive funds globally. This represents only a mere 14.86% of global assets under management. With such a large skew towards active fund management, it may appear that there is no debate on the performance of active fund management. However, research shows that where there has been a significant growth in passive funds, active fund managers have been extremely competitive in respect of their management fees (Cremers, Ferreira, Matos and Starks, 2016).

Active funds in South Africa dominate the mutual fund investment landscape. A mutual fund is an investment product that is made up of a pool of funds from multiple investors for the purpose of investing in a particular strategy. The strategy could be equity-only, bonds-only,

[3] Shiller's book, Irrational Exuberance, written with the lay investor in mind, highlights that investors are not rational economic beings.
[4] In 2011, Shiller made the Bloomberg's "The 50 Most Influential People in Global Finance"
[5] This was the latest survey conducted by the Boston Consulting Group

money market only or any other asset or a combination of any of the aforementioned. Mutual funds are managed by fund managers. The strategy will be contained in the mutual fund prospectus and investors will share proportionally in the performance of the mutual fund as determined by their initial investment. In South Africa, mutual funds are referred to as unit trusts and are governed by the Collective Investment Schemes Control Act No. 45 of 2002, which falls under the governance of the Financial Services Board (FSB).

Passive funds in the form of ETF's and Index Tracker Funds are relatively new in South Africa. In fact, equity-only Index Tracker funds began in February 1995 with the Stanlib Index Fund-R and the first equity-only ETF began in November 2000 with the Satrix 40 ETF. While both passive funds have grown in number, it is still a relatively small percentage of the total assets under management. There are currently equity-only ETF's with an approximate market value of R18.1bn listed on the JSE. There are currently equity-only index tracker funds with an approximate market value of R11.9 bn listed on the JSE. This is a total of approximately R30bn. In comparison, the total of all equity-only funds in South Africa excluding ETF's and tracker funds mentioned above has a total market value of R530bn. Passive equity-only funds represent 5.36% of the total equity-only funds under management in South Africa, and pales in comparison to the global ratio of 14.86% mentioned earlier[6].

An equity index tracker fund is a type of mutual fund that replicates performance of a stock market index as closely as possible by purchasing the same shares that are contained in that index in the nearly the same weighting as they appear in the index. The performance of the index tracker fund will then rise and fall as the JSE Top 40 index rises and falls. The fund

[6]Data obtained from Bloomberg

therefore tracks or replicates the performance of the index. The smaller the tracking error the closer the fund will replicate the index.

Similar to an index fund, an ETF represents a basket of stocks that reflects an index such as the JSE Top 40. An ETF, however, is not a mutual fund and it trades just like any other company on the JSE. Unlike a mutual fund that has its net-asset value calculated at the end of each trading day, an ETF's price changes throughout the day. Similar to any stock trading on the JSE, the ETF's price fluctuates with supply and demand. This supply and demand dynamic of the ETF affects the fund manager's ability to truly replicate the return on an index. Blitz and Huij (2012) examined the performance of passively managed ETF's that provide exposure to global emerging markets (GEM) equities and found that the tracking errors of these funds are substantially higher than previously reported levels for developed market's ETFs. In fact, the GEM ETF's fell short of their benchmark indexes by around 85 basis points per annum[7].

Most of the money that is actively managed in SA belongs to pension funds. Pension funds in South Africa in contrast to passive funds was formalised in 1956 and has approximately R2.85 trillion under management[8]. The Registrar of Pension Funds allows for up to 75% of this amount to be invested in ordinary and preference shares[9]. Most of these monies that are invested in pension funds are invested in actively managed funds. Further, regulatory changes (pension fund Regulation 28 revised July 2011) have allowed pension funds to invest monies with hedge funds (up to 10%, previously 0%) that by nature are not passive. Active funds account for a significant portion of assets under management. There are a plethora of

[7] For a detailed comparison of ETF's and Index Funds, review Garg and Sehgal (2014), Exchange Traded Funds (ETFs): An Effective Alternative to Traditional Mutual Funds

[8] This is the total of all local, offshore, money market, equity etc According to the Global Pension Assets Study 2016 by Willis Towers Watson

[9] Financial Services Board, Regulation 28

active funds with varying strategies, fees and fee structures. Such an array of choice can be challenging to pension fund managers and ordinary investors alike. The outcome for poor fund choices can be disastrous for the beneficiaries of the pension fund, and even more so when long term compounding is considered.

One aim of this study is to compare the performance of passive and active funds between 2003 and 2016. Knowing this will help investors make a more informed choice when they invest.

1.3. Problem Statement and Research Questions

There is an ongoing debate regarding the performance of passive and actively managed funds. Some researchers, Carhart (1995), Malkiel (1995), and Daniel, Grinblatt, Titman, and Wermers (1997), found that passive funds generally perform better while others, Avramov and Wermers (2006) and Kremnitzer (2012), found otherwise. In South Africa, Gilbertson and Vermaak (1982) found that mutual funds generally outperformed the relative index. Manjezi (2008) concluded that South African mutual funds are above average, outperforming the market. Bertolis and Hayes (2014) concluded that unit trusts showed slight outperformance.

However, Nana (2012), Mibiola (2013) and Tan (2015) did not find evidence of mutual fund outperformance over the general market. Nana (2012) confirmed that there was no convincing evidence of outperformance for the South African domestic equity unit trust industry as a whole. Mibiola (2013) did not find strong evidence of superior performance by the domestic general equity unit trusts over the market. Tan (2015) concluded that only 1 of the 10 funds had statistically significant positive Jensen's alpha confirming that equity funds underperformed the market index.

Regardless of the debate, in the recent past, SA experienced an increase in both passive and active funds with most of the investor's funds actively being managed. The number of regulated open-end funds (including mutual funds and ETFs) grew by 50% from 884 in 2008 to 1327 in 2015 (Investment Company Institute, 2016). In South Africa, in the last 10 years, passive investments have grown by about 51 percent a year (Holburn, 2016). While this represents phenomenal growth, the actual amount invested in passive funds still pales in comparison to global averages. It does appear that investors in South Africa may not know which of the two performs better. The difficulty in differentiating the performance between the two in SA is exacerbated by the fact that when compared to other countries, passive funds are relatively new in SA (Cameron, 2014). In addition, it is not clear why the active funds are still increasing in number and in value even after the advent of passive funds in South Africa.

On the academic front, recent advances in the econometric literature, also provides a basis for more empirical analysis of fund performance in South Africa. Studies such as Banz (1981), Reinganum (1981), Fama and French (1992) observed firm size and book-to-market effects in US equity returns. This eventually gave rise to the so-called Fama-French three-factor model (Fama and French, 1993), which comprises the market, size and book-to-market factors to capture observed size and book-to-market effects. Subsequently, the literature has been inundated by studies that employ this model. Basiewicz and Auret (2010) and Boamah (2015) are among the very few who explore this approach in a South African context. Notwithstanding, the fast pace of research in this field has brought forth a newer model, the Fama and French (2015) five-factor asset pricing model, which identifies two extra factors (profitability and investment) as potential drivers of asset returns. To the best of our knowledge, no other study has applied this new approach within a South African context.

Literature pertaining to fund performance outside of South Africa shows that in general active fund management cannot outperform passive funds (Chen, Jegadeesh and Wermers, 2000; Sorensen, Miller and Samak, 1998). As indicated previously, there has been a growth in the number of active funds and a growth in the amount of funds under active management in South Africa[10]. The lack of growth in passive funds in South Africa is contrary to the literature pertaining to countries other than South Africa. "According to Morningstar estimated assets under management in passive mutual funds have grown 230 per cent globally, to $6tn, since 2007" (Financial Times, 2016). It therefore appears that Pension Fund Managers and South African investors in general are yet to understand the difference in performance between active and passive funds. Why else was there a significant growth in active funds and a significant growth in funds under active management? This *could* be as a result of passive funds being relatively new and that the marketing of passive funds pales in comparison to the marketing of active funds. Alternatively, could it be that South African fund managers in general can beat the benchmark? This study aims to find answers to these questions.

The literature covers subsets of the equity-only mutual funds in South Africa. In the absence of a complete and thorough analysis of funds in South Africa, the apparent lack of awareness of the difference in performance between active and passive funds will ultimately lead to poor or bad investment decisions. Poor or bad investment decisions will lead to a worse quality of life for current pensioners and future pensioners for as long as this problem remains unresolved. Given the significant amounts of monies under management, not knowing which performs better is significant even with rudimentary calculations. The gap in the literature is that a comprehensive performance analysis has not been performed on all equity-only funds

[10] Refer to www.asisa.org.za

in South Africa within the context of French and Fama (2015). A comprehensive analysis will also reveal the performance of active and passive funds against its relevant market benchmark.

1.4. Research objectives

The objectives of this study are as follows:

- To determine the comparative performance of all equity-only active mutual funds and passive mutual funds in South Africa.
- Analyse performance persistence of active and passive funds in South Africa during different business cycles.
- To explore the applicability of the Fama-French five-factor model on South African equity-only funds.

1.5. Benefits of the study

Various parties will benefit from the study. One, retail investors will know which of the two fund investing styles maximize their wealth, when fees are included or excluded. Two, pension funds managers in South Africa, will understand the performance of the two fund investing strategies better and will be able to choose the fund that will ensure that employees retire comfortably. Three, policy makers, acting in the best interests of retail and institutional investors, will gain further insight into the performance of active and passive funds in South Africa and that such insight may lead to positive policy changes and better regulation of asset

management in SA. Lastly, investment management companies in South Africa can use the results of this research to motivate whether or not they should expand their passive fund management offering to take advantage of an anticipated normalization of the ratio of passive funds to total funds as experienced globally.

1.6. Gap in the Literature

There have been various studies on fund performance in South Africa. Gilbertson and Vermaak (1982) analyzed the performance of 11 South African mutual funds over the period 1974 to 1981. Manjezi (2008) investigated the performance measurement and ranking of 15 South African mutual funds over the period 2001 to 2006. Nana (2012) examined a sample of 151 South African domestic equity unit trusts, covering the 10-year period from January 2001 to December 2010. Mibiola (2013) conducted a detailed study of the performances of 64 unit trusts in South Africa from 1992 to 2011. Bertolis and Hayes (2014) investigated the performance of South African general equity unit trusts relative to the FTSE/JSE All Share Index during the period January 1994 to December 2012.Tan (2015) analyzed the performance of only 10 South African equity funds between January 2009 and November 2014. As can be evidenced, most sample sets of mutual funds range from a minimum of 10 to a maximum of 151. These are small subsets of the total number of mutual funds. There is a lack of a comprehensive sample set of mutual funds.

Though there are earlier empirical studies on fund performance in South Africa, there is still scope for further studies on the comparative performance of active and passive funds in South Africa. First, some of the earlier studies (see for instance Gilbertson and Vermaak, 1982;

Manjezi, 2008; Nana, 2012; Tan, 2015) have relied on a shorter sample period. In cases where an attempt has been made to use data beyond 10 years, a limited number of funds are used (see Mibiola, 2013).The small samples employed in previous studies cast doubt on the reliability of the estimates from the previous studies.

Another, glaring lacunae is on the econometric approach employed in previous studies. In terms of methodology, recent advances in the econometric literature renders the existing studies obsolete. Existing studies that employ multifactor asset pricing models in the South African context include Basiewicz and Auret (2010) and Boamah (2015). Quite recently, Fama and French (2015) have documented that asset returns respond to profitability and investment factors, in addition to the well-known market, size and book-to-market factors. The applicability of this new approach has so far not covered any African nor South African context. This therefore warrants an empirical work that explores this scope of method.

In view of the existing gaps in the literature, this study makes three key contributions. First, unlike other studies that have only analyzed a small subset of the equity-only mutual funds, this study aims to analyze a larger set of equity-only mutual funds – A total of 582 equity-only funds were analyzed in this study.

The second contribution is that it applies a battery of econometric methods. In particular, both single and multifactor asset pricing models are employed and for the first time the five-factor model of Fama and French is applied to South African equity-only mutual funds. The author has not found any literature pertaining to the use of the French-Fama 5-factor model to examine the performance of South African funds. This study will be the first to utilize this model to explain the performance of South African equity-only mutual funds. The Dynamic Conditional Correlation (DCC)-Generalized Autoregressive Conditional Heteroskedasticity

(DCC-GARCH) model of model of Engle (2002) and Tse & Tsui (2002) is employed to map out correlation between fund returns and benchmarks over time.

Last but not the least, a time-varying analysis of fund performance is provided.

1.7. Structure of the Study

The research study will comprise of 5 chapters. Chapter 1 introduces the study by presenting the context of the study and the research problem. Chapter 2 presents the literature related to the performance of passive and active funds, internationally and locally. Chapter 3 discusses the methodology employed to determine the comparative performance of active and passive funds. Chapter 4 presents the results and Chapter 5 discusses and concludes the thesis and recommends future research.

1.8. Chapter Summary

The debate on whether active funds perform better than passive funds still persists decades after Jensen's seminal paper. The debate will likely continue for many years further. Regardless of the outcome of the debate, retail or institutional investors alike, still need to allocate their funds to either passive or active funds but they are not aware of which of the two performs better/worse when fees are included or excluded in different economic cycles. This research will demonstrate this comparative performance and provide insights for investors that will impact their investment decision making for the better.

The next chapter presents the literature review.

CHAPTER 2. LITERATURE REVIEW

2.1. Introduction

The section provides a critical review of the empirical literature to various strands of empirical results contained in the extant literature. It covers two broad themes, namely global performance of active and passive funds; and performance of active and passive funds in South Africa. It further brings out the gaps in the literature and argues why this study is necessary. The ensuing subsections cover these broad themes.

2.2. The global performance of active and passive funds

Various strands of literature show that in general, very few active funds outperform passive funds. Carhart (1995), Malkiel (1995), and Daniel et al. (1997) all find small or zero average abnormal returns from mutual funds on samples of actively managed funds that are relatively free of survivorship bias. Sorensen et al. (1998) found that only 11% of mutual funds outperformed the S&P 500. Malkiel (2003) found that up to 71% of mutual funds underperformed the S&P 500, net of fees and asserts that the evidence strongly supports passive investment strategies in all markets. Fama and French (2008) asserts that the cost of active investing is large and that it is becoming increasingly important to think about passively managed investment strategies. To further confirm this, Fama and French (2010) showed that there are varying levels of skill amongst fund managers with very few fund managers actually outperforming the market.

On the other hand, Avramov and Wermers (2006) found that active management adds significant value. Kremnitzer (2012) showed that actively managed funds in emerging markets outperformed passive funds and yielded superior average 3 year net-of-fees

returns over passively managed ETF's. In their analysis of US mutual funds, Jiang, Yao and Zaynutdinova (2014) found that on average, 23% of active funds in their sample delivered lower returns to investors than their passive counterparts. After they adjusted for the differences in expense ratios and other costs directly associated with liquidity service, the percentage of active funds that outperformed their passive benchmarks increased to over 75%. Pástor and Stambaugh (2002) constructed optimal portfolios of equity funds by combining historical returns on funds and passive indexes and concluded that investing in active mutual funds can be optimal even for investors who believe that managers cannot outperform passive indexes.

Furthermore, some studies show that some managers do possess significant stock-picking talents and timing ability and utilize a variety of strategies that yield higher average returns than passive indexes. Daniel et al. (1997) analyzed 2500 equity funds from 1975 to 1994 and their results showed that mutual funds, particularly aggressive-growth funds exhibit some stock selection ability. Wermers (2000) also found evidence of stock picking ability. Duan, Hu, and McLean (2008) found that mutual fund managers have high stock picking ability for stocks with high idiosyncratic volatility. Baker, Litov, Wachter, and Wurgler(2010) found that an average fund's recent purchases significantly outperform its recent sales around the next earnings statement and also concluded that mutual fund managers are able to trade profitably because they are able to forecast earnings-related fundamentals. Jiang, Yao, and Yu (2007) found that, on average, actively managed U.S. domestic equity funds do have positive timing ability. Given this evidence, one might expect that mutual funds employing such stock picking abilities, timing ability and strategies have the potential to achieve higher average portfolio returns above their benchmarks.

The inconclusive evidence regarding the better of the two investing styles (active vs. passive) makes one question the need to assess performance of active and passive funds in the SA environment where the market is dominated by actively managed funds.

2.3. Performance of active and passive funds - South Africa

The literature on South African fund performance is scant. However, there are a few studies that have analyzed the performance of subsets of the South African equity funds. Gilbertson and Vermaak (1982) analyzed the performance of 11 South African mutual funds over the period 1974 to 1981. Returns were lower than three stock market indexes viz the JSE Actuaries All Shares Index, the JSE Actuaries Industrial Index and the RDM-100 Index. However, an analysis of risk adjusted returns showed that mutual funds generally outperformed the three indexes. There was also evidence of performance persistence exhibited by one fund that consistently and significantly outperformed all other funds as well as the three indexes.

Brink (2004) analyzed domestic general equity unit trust that traded on the Johannesburg stock exchange from 1984 to 2003, which were split into seven evaluation periods. Only active funds that tracked the FTSE/JSE All-Share Index were included in the sample and the average, median rate of return, standard deviation (risk) and a Sharpe ratio was calculated for each of the seven evaluation periods. Brink's general conclusion from the results is that the average investor would have, in the long run, earned the same return had he invested in a fund that tracked the index closely or an active unit trust and that in four of the seven periods, the investor would have been better off investing in an index fund. Brink (2004) included maximum costs in the performance percentages of the active funds and noted that the return on an index fund would be less than the performance of the index due to costs

that still needed to be included in the calculations. At the time average index unit trusts charged the same expenses as active unit trusts in the general equity category. Brink (2004) surmised that if these index fund expenses were taken into consideration and deducted from these performance figures then the argument for indexing did not look so compelling. Brink (2004) noted that it would have been ideal if the comparison between the performance of index unit trusts and the All- Share Index could have been included in this study which was not possible due to the limited size of the South African index unit trust market and the short period of data available for these funds at that point in time.

Manjezi (2008) investigated the performance measurement and ranking of 15 South African mutual funds over the period 2001 to 2006 using five risk-adjusted performance measurement methods to determine whether funds outperformed the market benchmark. The five risk-adjusted performance measures utilized were the Sharpe Ratio, the M2 measure, the Jensen's alpha, the Treynor Ratio and the Treynor-Mazuy model. Manjezi (2008) also used the Treynor and Mazuy (1966) quadratic model for assessing the selectivity and timing ability of fund managers. Manjezi (2008) concluded, amongst others, the following from the empirical results; South African mutual funds are above average, outperforming the market if one considers the performance of the nine funds which generated significant positive alpha values at the 5% significance level; fund managers can make excess returns above the risk-free rate in the medium and long-term. Treynor-Mazuy quadratic model showed little superior selectivity and timing ability with only Oasis Crescent Equity fund exhibits significant positive selectivity skill and market timing. There are cases where both positive stock selectivity and market timing were generated but neither one was significant. Manjezi (2008) noted the limitations of his study viz limited availability of SA mutual fund data, roughness of

the data edition from the database, the small sample of 15 against over 500 mutual funds, and the fact that time horizon of the study was not long enough.

Nana (2012) examined 151 South African domestic equity unit trusts, covering the period from January 2001 to December 2010 to establish whether unit trusts on average are able to deliver superior performance, and whether such performance persists. The study used six performance measures, namely nominal returns, sharpe ratios, capital asset pricing alphas, Fama and French (1993) three factor alphas, Carhart (1997) four factor alphas and Ferson and Warther (1996) conditional alphas to test for outperformance, while contingency tables, rank tests and time series regression were used to test for performance persistence. The results confirmed no convincing evidence of outperformance for the South African domestic equity unit trust industry as a whole. Nana (2012) found some evidence of short-run persistence. However, the strength of the persistence decreased over the long-run, disappearing almost entirely in some cases. Nana (2012) conceded that while the dataset was subject to survivorship bias, the principal conclusion was that this study was unable to produce conclusive evidence that unit trust managers on average possess superior skill.

Fox and Krige (2013) investigated the sources of performance in South African domestic equity unit trusts in an attempt to determine what proportion of a fund's returns is sourced through active sector allocation as opposed to stock selection. Sharpe's (1992) application of an asset-class factor model was adapted as a determinant for asset allocation. Fox and Krige (2013) found that, in the growth and general equity samples, funds were able to source out-performance through sector allocation, but this was often offset by poor stock selection. In the value sample, they observed that a higher proportion of returns were sourced from stock selection when compared with the other two categories. Given the small sample of funds

available for their analysis, Fox and Krige (2013) were unable to draw statistically significant conclusions but they did find apparent trends; the average active fund manager may not be able to out-perform the market, but top-performing fund managers were able to source out-performance through good sector allocation and stock selection over time.

Mibiola (2013) conducted a detailed study of the performances of 64 unit trusts in South Africa from 1992 to 2011. This 20-year period was divided into 7 different periods of four 5-year periods, two 10-year periods and the whole 20-year period to avoid survivorship bias. Mibiola's study used three different performance measures, the nominal returns, Sharpe Ratios and CAPM Alphas, to test for superior performance by the market or the funds. MibioIa (2013) did not find strong evidence of superior performance by the domestic general equity unit trusts over the market in any of the seven periods.

Bertolis and Hayes (2014) investigated the performance of South African general equity unit trusts against the FTSE/JSE All Share Index covering the period January 1994 to December 2012. They concluded that unit trusts underperformed in economic downturns and outperformed in periods of robust growth, but could draw no conclusions about unit trust performance during periods of average growth. Bertolis and Hayes (2014) further concluded that overall, unit trusts showed slight outperformance, but this outperformance was not found to be persistent.

Tan (2015) analyzed the performance of only 10 South African equity funds between January 2009 and November 2014. Quantitative easing during this period led to significant capital inflows and the JSE yielded 15.9 % compounded on average, per annum during this period. The Sharpe ratio (1966), Treynor ratio (1965) and Jensen's alpha (1968) methods are used to measure fund performance. Jensen's alpha was also used in identifying selectivity skills of

fund managers. Treynor and Mazuy (1966) and Henriksson and Merton (1981) regression analysis methods were applied to ascertain the market timing ability of fund managers. The study revealed that in the era of quantitative easing, although the JSE yielded significant returns, the 10 South African fund managers could not display a good performance both in selectivity skills and market timing abilities and only 1 of the 10 funds had statistically significant positive Jensen's alpha. Furthermore, Treynor and Mazuy (1966) regression analysis showed that over the same period fund managers did not have market timing ability, as none of the 10 funds had statistically significant positive coefficients. Tan (2015) deduced that South African fund managers had neither selective ability nor market timing ability during the quantitative easing era from Jan 2009 to November 2014.

2.4. Chapter Summary

The above literature review presented a chronology of the thought and status of the active versus passive mutual fund management debate. The information presented touches on various strands, mainly the global debate and the South African debate on the comparative performance of active and passive fund management.

In general, there are mixed results pertaining to the performance of mutual funds in South Africa and the review of the literature identified the following gaps in the previous studies. A larger pool of active and passive South African funds for the 14-year period from 2003 to 2016 has not been examined before using the Fama-French five-factor model as described in this thesis. Results from previous studies are clouded by insufficient data and small sample sets, which warrants further studies. This thesis addresses these shortfalls by employing a larger set of active and passive funds and conducts empirical analyses over the period 2003 to 2016 using monthly data. The significance of this market period relates to the fact that it contains

one of the greatest bull markets (2003 -2007), a bear market (2008 to 2010) and a period of recovery (2010 -2016).

In addition, previous studies have applied a number of multifactor models, including the three factor model (Basiewicz and Auret, 2010; and Boamah, 2015) on South African mutual funds but recent developments indicates that further study of a longer period using a more recent approach is warranted. This thesis, unlike the previous studies on South African funds, employs the Fama and French (2015) five-factor model, introduces two extra factors which have been ignored in previous studies viz profitability and investment factors.

The next logical step is to use a larger dataset and apply modern econometric techniques to active and passive funds in South Africa. The next chapter contributes to the literature by discussing the methodology of the study that was employed to fill the current lacunae in the research.

CHAPTER 3. RESEARCH METHODOLOGY

3.1. Introduction

This chapter covers the research process employed to test the hypotheses that were derived from the research questions in chapter 2. The chapter is organised as follows: Section 2.1 discussed the data used and the sources of the data. Section 2 presents the research design which comprises the different methods used to measure the performance of both active and passive portfolios. The chapter summary concludes the chapter.

3.2. Data and data sources

The data used in this study consist predominantly of equity only fund data. The information used includes fund returns, and any other relevant share returns data that may shed some insight in the performance of the funds. Active funds used in the study consists of SA equities mutual funds. Passive funds used include SA equities and comprises of ETF's and Index Tracker Funds. The first passive fund in South Africa started in 1996 and the market was slow to develop thereafter. Furthermore, the market benchmark viz the JSE top40 Index was created in 2003. This made it instructive to cover a research period which is set over a period spanning 2003 - 2016. There are currently 3034 mutual funds in South Africa; 582 of which are equity-only mutual Funds. There are 515 active equity-only mutual funds and 67 passive equity-only mutual funds. All mutual funds are considered, regardless of whether they survived the sample period or not. This will reduce potential impact of short term performance persistence on the final results and address the survivorship bias in the data which is a common drawback of existing studies and does not add precision to the results (Lemeshko and Rejnuš, 2015).

The funds data used is obtained from Profile Data. Profile Data is a comprehensive and continuously updated information resource covering unit trusts and collective investment schemes available in South Africa[11]. Profile Data provides detailed information on each management company fund, including: detailed fact sheets for all domestic funds, fees and charges (including commissions and TERs), fund news and fund managers' comments , detailed asset allocation information for all funds and full fund holdings

3.3. Research design

3.3.1. Measuring funds performance

Profile Data calculates the fund returns excluding fees as follows. Profile Data calculates a Total Return Index price stream. This is the daily Net Asset Value which would include a distribution. The funds are calculated by re-investing the dividends on the ex-div date using the price on the pay/reinvestment date. The funds monthly performance would then be the difference on the last day of the month's Total Return Index values.

The data used in this research excluded fees viz all returns on both passive and active equity-only portfolios exclude fees.

3.3.2. Benchmark models

This study uses various performance measures to assess the performance of active and passive funds. This study employs Factor models, within the framework of capital asset pricing model to estimate the performance of funds. Specifically, the single factor model and the Fama and French (2015) five-factor alphas are used to test for outperformance, while rank tests and are used to test for performance persistence.

[11] http://www.fundsdata.co.za/About.htm

To measure performance of active and passive funds, the five-factor Fama and French (2015) Model is used to determine the funds excess return. However, one cannot truly appreciate the performance measurement of the five-factor model without reviewing the evolution of the various factor models from Jensen's single factor model (1968). The existing mutual fund performance models will be applied to examine the performance of equity-only funds in South Africa. An investigation on whether funds generate excess returns will be performed, as well as an investigation on whether fund performance persistence does exist. The ensuing sections discuss the econometric models employed to benchmark funds' performance.

3.3.2.1. Domestic Market Model

The Capital Asset Pricing Model (CAPM) developed by Treynor (1961, 1962), Sharpe (1964), Lintner (1965a, b), and Mossin (1966) is widely used in the literature to analyze the performance of a risk-adjusted portfolio. The basic model is specified as follows:

$$R_{it} = \alpha_i + \beta_{0i} RM_t + \varepsilon_{it} \qquad (1)$$

where R_{it} is the return of fund *i* in excess of the risk-free rate (one-month South African T-bill rate or five year government bond) in month *t,*$RM_t$is the excess return on the domestic market (JSE index) in month *t* and ε_{pt} is the random noise from the model. The intercept (α_i) of this linear regression of fund returns on the market return benchmark is known as Jensen's Alpha (Jensen, 1968). The Jensen performance measure is a risk-adjusted performance measure that represents the average return on a portfolio over and above that predicted by the CAPM, given the portfolio's beta and the average market return. It determines whether the fund portfolio returns are commensurate with the level of risk. It is the difference between the actual fund returns and the expected fund return, given the market performance and fund beta. A portfolio which over performs the benchmark is said to have a positive alpha

while a portfolio with a negative alpha underperforms the market benchmark. A zero alpha implies that the portfolio manager adopts a buy and hold strategy. Recent studies that employ a similar measure include (Ferreira, Keswani, Miguel and Ramos, 2013; Premaratne and Mensah, 2014).

It is instructive to note that the CAPM approach to measuring performance has number of shortcomings. Firstly, as highlighted by Gruber (1966) and Ferreira et al. (2013), using benchmark portfolios that span the major securities held by funds might lead to wrong conclusions. Moreover, the CAPM model assumes a constant systematic risk for the portfolio over the estimation period. This assumption may not hold in instances where the portfolio manager times the market and adjust his portfolio exposure to the movements in the market return (Grinblatt and Titman, 1989). As this study is concerned with actively managed funds, which could have varying investment strategy, it will be erroneous to use a single market index to capture the fund's investment behaviour (Ferreira et al. 2013). Moreover, as argued by Prather, Bertin and Henker (2004), using a single benchmark could lead to wrong inferences about the fund's performance, especially if certain fund characteristic is correlated with an omitted benchmark.

3.3.2.2. International Market Model

As a second step, the domestic market model is expanded to include an international factor, similar to Ferreira et al. (2013) , as described by the following equation:

$$R_{it} = \alpha_i + \beta_{0i} RM_t + \beta_{0Fi} RMF_t + \varepsilon_{it} \qquad (2)$$

where RM_{Ft} is excess return on a foreign market index in month *t.* The foreign market return will be a value-weighted average of all countries market returns excluding South Africa.

3.3.2.3. Fama-French Five-Factor Model

The third reference model is the Fama-French five factor model (Fama and French 2015) as described by the following equation:

$$R_{it} = \alpha_i + \beta_{0i}RM_t + \beta_{1i}SMB_t + \beta_{2i}HML_t + \beta_{3i}RMW_t + \beta_{4i}CMA_t + \varepsilon_t \quad (3)$$

where SMB_t (Small Minus Big) is the size factor, which is defined as the difference between the average return on small capitalization portfolio and the average return on large capitalization portfolios; HML_t (High Minus Low) is the average return on value portfolios minus the average return on growth portfolios; RMW_t (Robust Minus Weak) is the difference between the returns on portfolios of stocks with strong and weak profitability, and CMA_t (Conservative Minus Aggressive) is the average return on conservative investment portfolios minus the average return on aggressive investment portfolios. β_{0i}, β_{1i}, β_{2i}, β_{3i}, and β_{5i} are the sensitivities or betas of the fund's excess returns to the market, size, book-to-market, profitability and investment, respectively. $\varepsilon_{i,t}$ is the random error of fund or portfolio of fund *i* in month *t.*

The five-factor model is designed to capture the relation between average return and *Size* (market capitalization), price ratios like BM, profitability and investment. This model is generally regarded as an improvement upon the single factor CAPM model and the three-factor model of Fama and French (1993). The factors will be constructed following the approach described in Fama and French (1993) and Fama and French (2015).

In all the regression models, a positive (negative) and statistically significant intercept or alpha is interpreted as evidence of superior (inferior) performance.

3.3.2.4. Construction of Factors

This section explains how the SMB, HML, RMW and CMA factors are constructed, following the approach highlighted in Fama and French (2015).

To begin with, the median market capitalization of the JSE Top 40 index was used as the breakpoint for sorting our size portfolios, while BM breakpoint is the median of BM for JSE Top 40. Following Fama and French (2015), 2x2 independent sorting was used to sort the JSE Top 40 stocks into two *Size* groups and two *BM* groups. This results in four-weighted (VW) portfolios. As described earlier, the SMB is the difference between the average returns of two small capitalization portfolios and the average returns of two large capitalization portfolios. Similarly, the value factor (HML) is the difference between the average of the two high BM portfolio returns and the average of the two low BM portfolio returns.

The profitability and investment factors are constructed following a similar approach used for the HML. Here, the 2x2 sorts for the RMW and CMA was applied except the second sort is respectively on operating profitability (robust minus weak) and investment (conservative minus aggressive) (Fama and French, 2015). RMW (Robust Minus Weak) is the average returns of the portfolios with strong profitability minus the average returns of portfolios with weak profitability. Conversely, the CMA is the average returns on conservative investment portfolios minus the average return on aggressive investment portfolios. Fama and French (2015) provide alternative ways to develop the factors using either 2x3 or 2x2x2 sorts. However, they conclude that the factors from the 2x3, 2x2, and 2x2x2 sorts produce similar results in the tests of a given model. For the purpose of this work, the 2x2 sort was utilized, as it is much easier to implement. Table 1 provides a summary of the individual factors and their components.

Table 1. Construction of Size, BM, Profitability and Investment Factors

Sort	Breakpoints	Factors and their components
2 x 2 sorts on	*Size*: JSE Top 40 median	$SMB = (SH + SL + SR + SW + SC + SA)/6 - (BH + BL + BR + BW + BC + BA)/6$
Size and *BM,* or	*BM*: JSE Top 40 median	$HML = (SH + BH)/2 - (SL + BL)/2 = [(SH - SL) + (BH - BL)/2$
Size and *OP,* or	*OP:*JSE Top 40 median	$RMW = (SR + BR)/2 - (SW + BW)/2 = [(SR - SW) + (BR - BW)/2$
Size and *Inv*	*Inv:* JSE Top 40 median	$CMA = (SC + BC)/2 - (SA + BA)/2 = [(SC - SA) + (BC - BA)/2$

Source: Fama and French (2015)

Notes: Two independent sorts are used to assign stocks in the JSE Top 40 into two Size groups and two BM, operating profitability (OP), and investment (Inv) groups. The value-weighted (VW) defined by the intersections of the groups are the building blocks for the factors. The labels are explained as follows: The first letter always describes the *Size* group, small (S) or big (B). The second describes the BM group, high (H), low (L), the OP group, robust (R) or weak (W),or the Inv group, conservative (C) or aggressive (A). The factors are SMB (small minus big), HML (high minus low BM), RMW (robust minus weak OP), and CMA (conservative minus aggressive Inv).

3.3.3. Estimation Techniques

The benchmark models specified above are linear and exactly identified. As a result, it is instructive to employ the least squares method to estimate the risk-adjusted performances. To ensure that the standard errors are robust to serial correlation and conditional

heteroscedasticity, the New and West (1987a) consistent estimator was employed for the variance-covariance matrix.

A separate regression will be carried out for each fund (both active and passive) or portfolio of funds using data from 2003 to 2016. Sub-sample estimations will also be carried out to ensure robustness and to account for business cycle changes as well as extreme market events like the 2007 to 2009 Global Financial Crisis.

As argued by Ayadi, Chaibi and Kryzanowski (2016), studies that base performance statistics and inferences on individual funds and averages tend to produce unreliable and biased results since individual estimated alphas are not independent as assumed (mostly correlated) and average significance levels do not make proper meaning. To address this, a portfolio-based approach was adopted using total net asset value or size-weighted (SW) portfolios of funds constructed using individual fund returns, which is in line with Ayadi et al. (2016).

3.4. Chapter Summary

This chapter covered the research process that will be employed to test the hypotheses. It described the data and econometric methodology that will be employed in the analysis.

The following chapter discusses the research results.

CHAPTER 4. RESEARCH RESULTS

4.1. Introduction

This chapter presents the data and empirical analysis for the various fund categories. The empirical evidence presented in this chapter relies on the econometric models outlined in Chapter three. The subsections that follow explain the results.

4.2. Data and Empirical Analysis

The sample for this study comprises of mutual funds domiciled in South Africa over the period 2003 to 2016. Our initial sample comprised 3034 funds returns retrieved from *Share Magic* database. Out of this, 515 actively managed equity-only funds and 67 passive mutual funds were sampled. The rest comprised of other fund categories such as balanced funds, Money Market Fund, among others. An equally weighted portfolio was then constructed for each fund category and their performance was tested against a benchmark index and the Fama-French factors. Two indices were used as benchmark portfolios: the JSE Top 40 index for domestic benchmark and the S&P index for global benchmark, respectively. To compute excess returns, the risk-free rate was proxied by the 3-month Treasury bill rate, obtained from the Reserve Bank of South Africa. The study relies on accounting and stock returns data for constituent firms of the JSE Top 40 index and constructs the Fama-French factors from a 2 x 2 sort on size, BM, operating profitability and investment. The Fama-French factors are constructed using the approach outlined in Chapter three.

4.3. Descriptive Statistics

Table 2 presents summary statistics for the equally weighted two portfolios of funds. It can be observed that, on the average, the monthly returns are positive for the portfolios of passive and active funds as well as the market benchmarks while all other factors record negative returns. Figure 1 displays the 6 month moving average for the return series. What is interesting is that the two portfolios move closely together, and also with the benchmark indices. The figure indicates the wide variations in returns over time with most of the wide swings occurring within the crisis period. The standard deviation ranges from 0.13 to 0.16, where the active portfolios record relatively lower standard deviation compared with the passive portfolio. This seems to be at odds with our expectations that active portfolios are usually more risky. The average returns of 0.04% percent for each fund group, suggest that investing in these funds could give similar returns over the sample period, but comes with different levels of risk. Overall, risk is higher compared to returns. This could possibly explain why passive mutual funds in South Africa are lagging relative to the global statistics. If passive funds offer the same returns as active funds but they are more risky then investors will simply choose active funds which are less risky and offer the same return. All the series display negative skewness and excess kurtosis, suggesting fat-tails in the return distributions. These two measures have important implications for risk management and asset allocation. In general, risk-averse investors tend to prefer stocks with positive skewness and low excess kurtosis (Kim and White 2004). The lower average returns translates into negative Sharpe ratios for the two fund groups. The Jarque-Bera statistic (Jarque and Bera, 1980, 1981) strongly rejects the null hypothesis of normality in the return distributions.

Table 2. Descriptive Statistics

	PASSPORT	ACTPORT	JSE	SMB	HML	INV	PROFIT	SNP
Mean	0.042	0.041	0.644	-4.290	-2.857	-1.836	-0.707	0.556
Median	0.045	0.044	0.687	-0.094	-0.151	-0.025	-0.003	1.081
Maximum	0.539	0.403	15.407	28.046	39.605	42.722	37.628	10.231
Minimum	-0.477	-0.363	-32.158	-434.978	-239.283	-269.346	-159.153	-18.564
Std. Dev.	0.162	0.130	6.475	35.215	21.402	23.178	16.055	3.993
Skewness	-0.133	-0.336	-0.956	-10.984	-8.086	-9.241	-5.789	-0.980
Kurtosis	3.773	3.781	6.410	134.827	90.243	107.202	58.350	6.008
Jarque-Bera	4.68	7.43	106.9	125026.6	55109.7	78398.2	22383.4	90.2
Probability	0.096	0.024	0.000	0.000	0.000	0.000	0.000	0.000
Sharpe ratio	-3.71279	-4.61905	0.025	-14.007	-16.351	-10.695	-8.407	-2.174

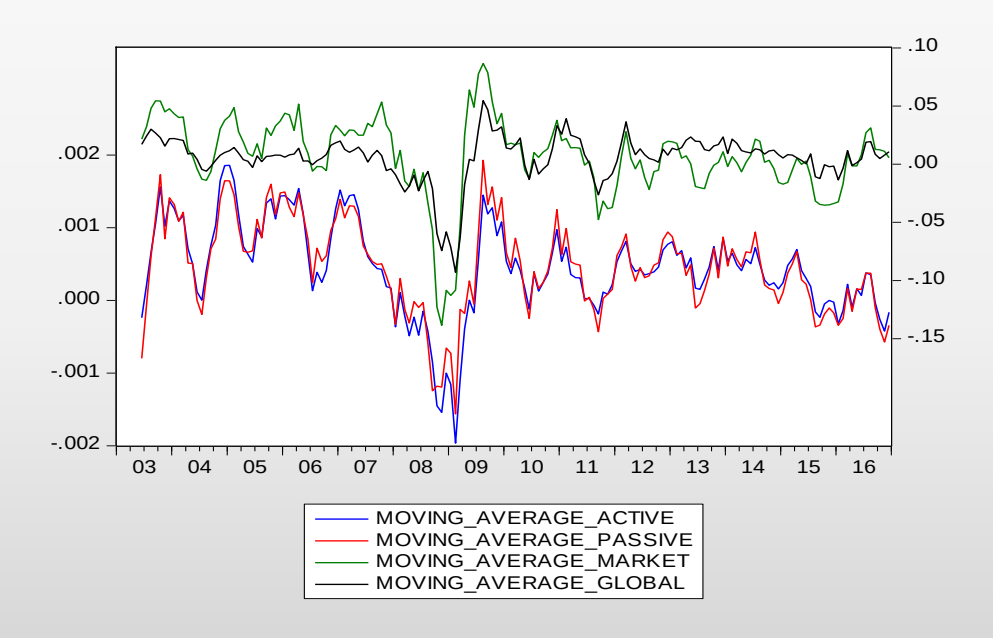

Figure 1. Relative Returns Overtime, 2003-2016 (6-month moving average)

Notes: The figure shows 6-month moving averages of relative returns for the passive and active fund portfolios, along with the domestic and global benchmarks.

Table 3 presents the linear correlations among the various series. The correlations between the SMB and other factors are high, 0.92 (HML), 0.92 (INV), 0.81 (PROFIT). There is also high correlation between HML and other factors, 0.93(INV), 0.86 (PROFIT). The high correlation is not surprising since all the factors use similar stocks. As shown in Fama and French (2015), the neutrality of the factors could be guaranteed irrespective of the high correlations.

Table 3. Correlation coefficients

Probability	PASSPORT	ACTPORT	JSE	SMB	HML	INV	PROFIT
ACTPORT	0.9174						
	(0.0000)						
JSE	0.6543	0.7267					
	(0.0000)	(0.0000)					
SMB	-0.0200	0.0114	-0.0465				
	(0.7973)	(0.8835)	(0.5498)				
HML	-0.1098	-0.0735	-0.0712	0.9239			
	(0.1567)	(0.3439)	(0.3590)	(0.0000)			
INV	-0.0854	-0.0096	-0.0259	0.9184	0.9298		
	(0.2712)	(0.9017)	(0.7386)	(0.0000)	(0.0000)		
PROFIT	-0.0795	0.0067	-0.0129	0.8103	0.8567	0.9196	
	(0.3059)	(0.9315)	(0.8683)	(0.0000)	(0.0000)	(0.0000)	
SNP	0.5906	0.6875	0.7802	0.0189	-0.0016	0.0643	0.0899
	(0.0000)	(0.0000)	(0.0000)	(0.8079)	(0.9831)	(0.4073)	(0.2465)

Note: Table shows pairwise correlation coefficients with p-values in parenthesis.

Figure 2, shows the time varying correlations between the portfolios and the benchmark index. The time-varying correlations were computed using dynamic conditional correlation

(DCC) (Engle, 2002). Of importance from the graph is the fact that the correlation between active portfolios and the benchmark is generally higher compared to the passive portfolios. This in a way suggests close movement between the market and the actively managed funds, which could lead to lower performance due to poor diversification.

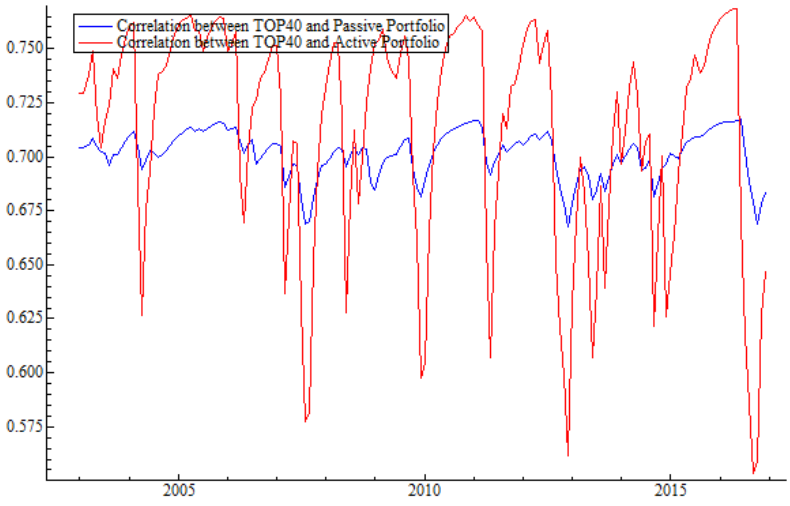

Figure 2. Conditional correlation using DCC model

Notes: The figure shows the dynamic conditional correlations between the benchmark and the respective funds. The correlations are computed using the DCC-MGARCH model.

4.4. Estimation Results

4.4.1. Overall Performance

This section evaluates the performance of the portfolios of funds according to the three approaches described in chapter three. Results in this section are based on equation 1, which was discussed in chapter 3. Here a focus on how the two fund groups respond to the excess returns of the domestic benchmark index as well as the presence of any abnormal returns was key. The abnormal returns, popularly referred to as Jensen alpha (Jensen, 1968), is measured through the magnitude of the constant term in equation 1. Alpha, by definition, measures the performance of a portfolio relative to its benchmark and can be regarded as a

portfolio manager's added value to fund returns. A positive alpha is an indication that the fund outperforms the benchmark index, while a negative alpha indicates underperformance. A zero alpha implies that the portfolio is tracking perfectly with the benchmark index and that there is over or underperformance. The process begins by regressing the returns of the active and passive portfolios on the excess returns of the benchmark index (JSE Top 40 index minus risk free rate) and the results are reported in Panel A of Table 4. With respect to fund performance, the two portfolios present statistically significant negative alpha. On average the passive fund class underperformed the market by 0.037% per month, while the active funds underperformed the market by 0.0177%. This presents a general evidence of underperformance of both active and passive funds. However, while both funds underperform, active funds perform better than passive funds. These findings are consistent with extant studies on the performance of equity funds (e.g. Premaratne and Mensah, 2014; Climent and Soriano, 2011; Silva and Cortez, 2016).

In addition, Table 4 shows the average β's (MKT), which is an indication of the sensitivity of portfolios of funds to the market index. The average β value ranges from 0.0215 to 0.0287 for the passive and active funds portfolios, respectively. It is instructive to note that the relatively low beta values suggest that these funds are less risky than the market portfolio (Jensen, 1967; Mensah and Premaratne, 2014).

Table 4. Performance against Benchmarks

	Passive	Active
	Panel A:Domestic Benchmark	
Constant (Alpha)	-0.00037**	-0.00017*
	(0.0001)	(0.0001)
MKT	0.0287***	0.0215***
	(0.0026)	(0.0022)
R-squared	0.41	0.36
DW	2.0406	1.6404
	Panel B: International Benchmark	
Constant (Alpha)	-0.0002*	2.87E-05
	(0.0001)	(9.10E-05)
MKT	0.0201***	0.0106***
	(0.0031)	(0.0024)
SNP	0.0132***	0.0168***
	(0.0028)	(0.00215)
R-squared	0.47	0.52
DW	2.0970	1.7298

Notes:This table reports the results for the Jensen measure in equation 1. Alpha denotes the Jensen alpha,MKT and SNP shows the sentivity of the funds to the domestic and internationalbenchmark indices, respectivelyR^2 is the adjusted R-squared value. Standard errors adjsuted for heteroskedaticity and autocorrelation are shown in paranthesis. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively.

As argued in previous studies (e.g. Ferson and Schadt, 1996; Sawicki and Ong, 2000; Mensah and Premaratne, 2014), the magnitude of the R-squared for the regression results gives information on the extent to which fund managers track the performance of the market index. The results in Table 3 show relatively low R-squared values for the two fund categories (0.408 for passive funds and 0.35 for active funds), suggesting a poor fit for the models. Comparatively, the relatively high value for the passive portfolios is an indication that fund

managers in this group adopt a passive strategy or track the performance of the market, which is consistent with our expectations. The very low R-squared values for the active portfolios suggest that these funds do not necessarily adopt a passive strategy, as expected.

4.4.2. Time-varying Alpha

The analysis is carried out for different time periods using a rolling regression over a 25 month window. Figure 3 presents the time-varying alpha values for the two portfolios along with the business cycle indicator gleaned from the Reserve Bank of South Africa. Interestingly, figure 3 shows pro-cyclical nature of fund performance; that is, the performance of both the active and passive funds move closely with the business cycle, which suggest that the performance of these funds hinges on the overall health of the economy. The black horizontal line demarcates excess performance and underperformance, if alpha values are above and below the horizontal lines, respectively. It is instructive to note that, the funds underperform the benchmark index over a large part of the sample period; the alphas are mostly negative and hence lie below the black horizontal line. Interestingly, the worst performance of these funds coincides with the Global Financial Crisis of 2007 to 2010, suggesting that funds show lower performance in times of crisis. It also suggests that performance of South African funds conforms to developments in the global economy.

Figure 3 also depicts that active portfolios generally show slightly higher alpha than passive portfolios, which is consistent with the general expectations of these funds. The average alpha values (-0.000371 and -0.000170 for passive and active portfolios, respectively), as shown in panel B of table 5, suggest that active portfolios perform relatively better compared to passive portfolios, although both underperform the benchmark. To corroborate this further, one must carry out various tests for equality of means between the two series. Panel

A of table 5 confirms that there is indeed a difference between the mean values; the p-values for the t-test, Satterthwaite-Welch t-test, Anova F-test and Welch F-test show statistical significance at 0.05, thus overwhelmingly rejecting the null hypothesis that the two series are equal.

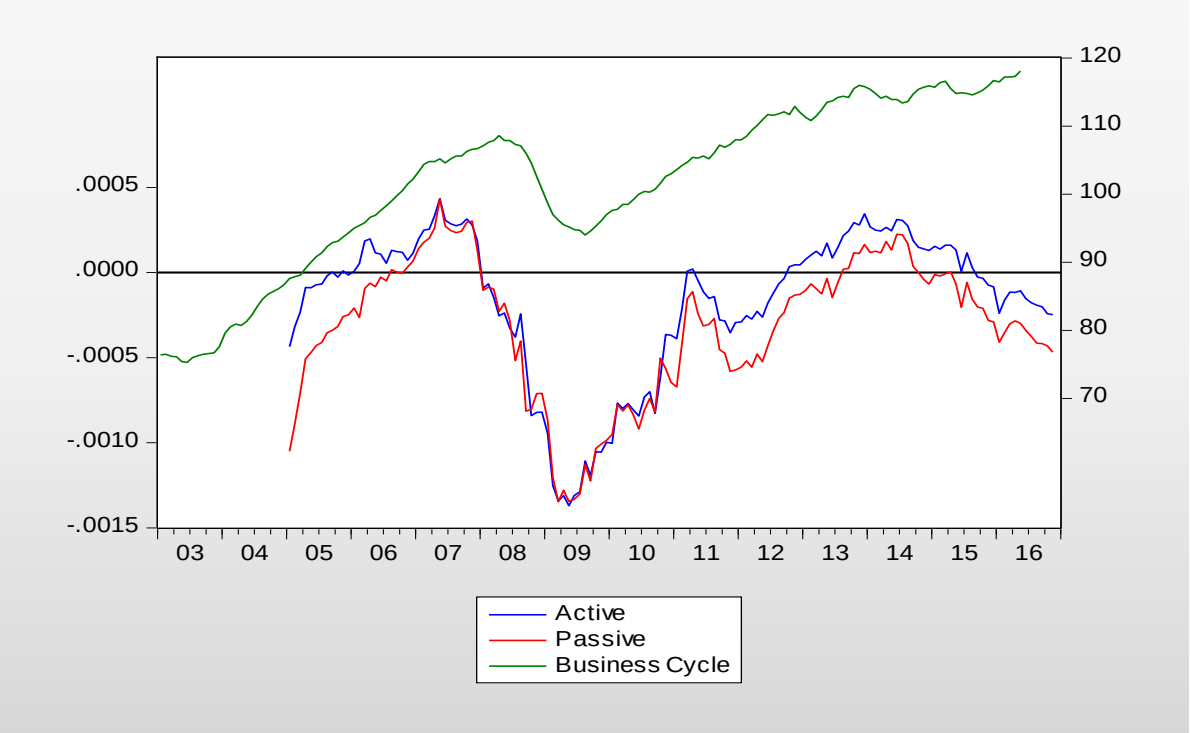

Figure 3. Time-varying alpha estimated using rolling regression with window size of 25 months

This leads to the conclusion that funds in South Africa, on the average, do not earn abnormal returns but rather underperform the benchmark index. In addition, passive portfolios tend to track the market performance more than active portfolios, as expected. Moreover, the sensitivity of these funds to the market tend to be very low, indicating less riskiness. We have also shown that active portfolio performs relatively better than the passive portfolio, although both underperform the market.

Table 5. Test for Equality of Means Between Series

Method	df	Value	Probability
t-test	284	-2.952211	0.0034
Satterthwaite-Welch t-test*	282.8169	-2.952211	0.0034
Anova F-test	(1, 284)	8.715547	0.0034
Welch F-test*	(1, 282.817)	8.715547	0.0034

Panel B:Category Statistics

Variable	Count	Mean	Std. Dev.	Std. Err. of Mean
Passive Alpha	143	-0.000317	0.000405	3.39E-05
Active Alpha	143	-0.000170	0.000433	3.62E-05
All	286	-0.000244	0.000425	2.51E-05

Note: The table shows the Test for Equality of Means Between Alpha Series for passive and active funds.

Sample: 2003M01 2016M12. Included observations: 168. *Test allows for unequal cell variances

4.4.3. International Benchmark

Panel B of Table 4 shows the results after including the global benchmark index as a factor. Results indicate that the two portfolios are sensitive to global factors, in addition to the domestic factors. The positive and statistically significant weighting is an indication that global factors matter for the riskiness of these funds. On the average, passive funds respond more to domestic factors compared to global factors, as shown by the marginal impact of the two factors, 0.02 (domestic benchmark) and 0.013 (global benchmark). On the other hand, the marginal impact of global factors is greater (0.016) than the impact of domestic factors (0.01)

on active funds. Most importantly, it is noted that the passive portfolio still underperforms the market, due to the negative and significant alpha. Conversely, the active funds do not show any statistically significant direction of performance.

4.4.4. Results using Multi factor Models

Next, the Five-Factor model is used to evaluate the investment strategies of funds in South Africa. Table 6 presents the results of applying the Fama-French five factor model to the sample of funds. Firstly, the result mainly points out that both portfolios show significant under-performance in relation to the market proxy. Both the active and passive portfolios exhibit negative and statistically significant alphas at 5%. Second, the size factor (SMB) tends to be statistically significant for both active and passive funds. The SMB factor loadings are 0.0024 and 0.0014 for the passive and active portfolios, respectively. The positive values suggest that both fund categories are more sensitive to small cap returns rather than large cap returns. The level of sensitivity to low caps is however, not so high considering that beta values are very low. Third, the coefficient for the book-to-market factor (HML) is negative and statistically significant for both funds. The coefficients are -0.0027 and -0.0034 for passive and active funds, respectively, with the negative weighting indicating that they are more growth-oriented (Mensah and Premaratne, 2014). Fourth, the coefficients for the investment and profitability factors are not statistically significant, suggesting that these factors are not factored in South African funds for both active and passive funds. Fifth, the adjusted R-squared values are relatively low for both portfolios (0.37 for active funds portfolio and 0.43 for passive funds portfolio).

It is worth noting that the significance of the size and the book-to-market factor stresses the importance of controlling for additional factors, besides the market factor. Panel B of Table 5

presents Wald test results conducted under the null hypothesis that the coefficients of the additional factors are jointly equal to zero. The low p-values clearly provide evidence to reject the null hypothesis at 5%, further supporting the importance of these factors.

Table 6. Empirical Results on Five-Factor Model

	Passive	Active
	Panel A:Estimated Coefficients	
ALPHA	-0.0004***	-0.0002*
	(0.0001)	(0.0001)
MKT	0.0283***	0.0211***
	(0.0027)	(0.0022)
SMB	0.0024***	0.0014**
	(0.0008)	(0.0007)
HML	-0.0027**	-0.0034***
	(0.0014)	(0.0012)
INV	-0.0008	0.0010
	(0.0017)	(0.0014)
OP	-0.0006	0.0002
	(0.0016)	(0.0013)
	Panel B:Model Diagnostics	
Adj R-squared	0.43	0.37
F-statistic	26.4359	21.0351
Prob (F-statistic)	0.0000	0.0000
DW	1.9971	1.6340
Wald Test	0.0298	0.0488

Note: This table reports the results for Fama-French five factor model. MKT, is the market return factor, SMB is the size premium defined as the difference between the largest stocks and the smallest stocks HMLis the difference between the returns of stocks with high book to market ratio and the stocks with low book to market ratio, INV is the average returns on conservative investment portfolios minus the average return on aggressive investment portfolios. Alpha is the intercept of the regression equation, which indicates excess returns over the benchmark portfolio.. R^2 is the adjusted R-squared value. DW is the durbin watson test results for first order serial correlation. Wald test is the p-value for the Wald Test under the null hypothesis that the estimated coefficients are jointly equall to zero. F-statistic and Prob (F-statistic) show the joint significance of the estimated coefficients. Standard errors adjsuted for heteroskedaticity and autocorrelation are shown in paranthesis. ***,**, and * enote significance at 1%, 5% and 10% respectively.

4.4.5. Sub-period Analyses

The five-factor model is also estimated for different sample periods. Three sub-samples are considered, namely, the pre-financial crisis, period of global financial crisis, and the period after the global financial crisis. The sub-sample analysis is carried out to essentially check the consistency of the performance of the funds under study. In other words, the results serve as an indication of how persistent the performance of both passive and active funds has been over the years.

Table 7 presents the results of the five-factor model for different sample periods. The key results are highlighted. Mainly, the active portfolio presents underperformance in relation to the market proxy during the period of the global financial crisis while its performance in the period before and after the crisis tends to be statistically insignificant. Interestingly, the results of the passive portfolios also suggest a significant underperformance of the market proxy during and after the global financial crisis; the alphas are negative and statistically significant at 5% level. There is no evidence of under or outperformance for passive portfolios in the pre global financial crisis period, as the alpha coefficient is insignificant. It is worth noting that the level of underperformance during the global financial crisis is relatively higher compared to the pre-crisis and post-crisis periods, which is consistent with market expectations. For instance, as one moves from pre-crisis to the crisis period, the alpha for the passive funds portfolio increases from -0.0002 to -0.0014 and declines to -0.0002 in the post-crisis period. The alpha coefficient for both active and passive funds is -0.0014, which seems to indicate that both funds perform equally during periods of financial crisis.

Table 7. Empirical Results on Five-Factor Model in different sub-periods

	Alpha	MKT	SMB	HML	INV	OP	R^2
Panel A: Pre Crisis Period (2003M01 2007M11)							
Passive	-0.0002	0.0285***	0.0053***	-0.0092***	0.0047	-0.0018	0.50
	(0.0002)	(0.0051)	(0.0018)	(0.0033)	(0.0039)	(0.0024)	
Active	0.00016	0.0215***	0.0059***	-0.0089***	0.0063**	-0.0018	0.56
	(0.0002)	(0.0038)	(0.0013)	(0.0025)	(0.0029)	(0.0018)	
Panel B: Crisis Period (2007M11 2009M07)							
Passive	-0.0014**	0.0331***	0.0016	0.0019	-0.0046	0.0008	0.40
	(0.0005)	(0.0081)	(0.0023)	(0.0038)	(0.0044)	(0.0042)	
Active	-0.0014***	0.0247***	-0.0003	-0.0012	0.0000	0.0024	0.36
	(0.0004)	(0.0067)	(0.0019)	(0.0032)	(0.0037)	(0.0034)	
Panel C: After Crisis (2009M07 2016M12)							
Passive	-0.0002**	0.0256***	-0.0016	-0.0018	0.0000	0.0016	0.48
	(0.0001)	(0.0031)	(0.0018)	(0.0021)	(0.0027)	(0.0026)	
Active	-0.0001	0.0172***	0.0001	-0.0028*	0.0015	0.0012	0.40
	(0.0001)	(0.0024)	(0.0015)	(0.0017)	(0.0022)	(0.0021)	

Note: This table reports the results for Fama-French five factor model. MKT, is the market return factor, SMB is the size premium defined as the difference between the largest stocks and the smallest stocks HML is the difference between the returns of stocks with high book to market ratio and the stocks with low book to market ratio, INV is the average returns on conservative investment portfolios minus the average return on aggressive investment portfolios. Alpha is the intercept of the regression equation, which indicates excess returns over the benchmark portfolio.. R^2 is the adjusted R-squared value. Standard errors adjusted for heteroskedaticity and autocorrelation are shown in paranthesis. ***,**, and * enote significance at 1%, 5% and 10% respectively.

4.5. Chapter Summary

The fourth chapter presented the empirical results, based on the single index model, and multifactor models. Rolling regression was estimated to map out the performance of active and passive funds, measured through alpha, over time. Sub-sample analyses were also carried out as a way of examining how performance varies during different economic conditions (i.e. calm and crisis periods). Contrary to expectations, the passively managed fund's Sharpe ratio was significantly greater than the actively managed fund's Sharpe ratio. Of important note is the fact the both actively managed and passively managed funds underperform the market both over the sample period. It was noted that the underperformance is much worse during crisis period. In addition, the chapter pointed out that actively managed funds perform relatively better compared to passively managed funds, although both of them underperform the market.

CHAPTER 5. DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

The global debate relating to passive versus active fund management has raged on since the seminal paper of Jensen (1968) with no clear winner. For many decades now, there is still no clear winner or answer to the question of which fund management style yields the best outcome. The extant literature provides mixed evidence on the competitive advantage to either investment strategies. Amidst the ongoing debate, the world is still witnessing the tremendous growth of funds in both categories. Active fund managers continue to grow globally with many asking for exorbitant fees for their research and investment services. Equally, passive funds in the form of Exchange Traded Funds (ETF's) and index trackers have also continued to grow. For instance, passive investments have grown by about 51 percent a year in the last 10 years in South Africa (Holburn, 2016).

Yet, there is still very little evidence on which fund category performs best. Very few studies (Gilbertson and Vermaak, 1982; Majenzi, 2008; Nana, 2012; Bertolis and Hayes, 2014) have explored this issue, with none, to the best of our knowledge, considering how the performance varies with time and different economic conditions. In addition, none of the existing studies on South Africa so far, has employed the Fama and French five-factor model, recently proposed in the literature, to study the issue. It is therefore essential to revisit this debate and throw more light on what the real evidence is, using new approaches.

This study therefore, sets out to examine the comparative performance of all equity-only active mutual and passive funds domiciled in South Africa. In addition, it analyses the performance persistence of active and passive funds in different business cycles. Another

major contribution of this study is to examine the applicability of the Fama-French five factor model on South African mutual funds. That is, it examines the size, BM, HML, Profitability and Investment effects on South African mutual funds. The data set consisted of monthly data from 2003 to 2016 for 515 actively managed funds and 67 passive mutual funds. An equally weighted portfolio was constructed for each fund category and their performance was tested against a benchmark index and the Fama-French factors. The study relies on accounting and stock returns data for constituent firms of the JSE Top 40 index and constructs the Fama-French factors from a 2 x 2 sort on size, BM, operating profitability and investment. Three different approaches are employed: the use of single index models, multifactor models and time-varying models. This chapter summarizes the main finding. It also provides a discussion on the implications of the results and concludes by identifying areas for future research.

5.2. Findings and implications

The main findings are as follows. First, the results show that on the average, both equity-only active mutual funds and passive funds do not earn abnormal returns but rather underperform the benchmark. This underperformance persists over a considerable number of years. However, the active portfolio performs relatively better than the passive portfolio, although both underperform the market.

Second, the results show evidence of time-varying performance; both active and passive funds record their worst underperformance during periods of financial crisis. Evidence of underperformance has implications for investors, considering the increasing fees charged by fund managers, particularly active funds.

Third, passive portfolios tend to track the market performance more than active portfolios. The results also document that both passive and active portfolio are sensitive to global market movements, suggesting that global factors matter for the riskiness of these funds. However, passive funds are more exposed to domestic factors compared to global factors, as shown by the marginal impact of the two factors, 0.02 (domestic benchmark) and 0.013 (global benchmark). On the other hand, the marginal impact of global factors is greater (0.016) than the impact of domestic factors (0.01) on active funds.

The study also sought to examine the applicability of the Fama and French five-factor model on South African mutual funds. Essentially, it explores the responsiveness of South African mutual funds to the market factor, size factor, book-to-market factor, profitability and investment factors. Evidence provided in the study suggest that only the first three factors (Market, SMB, HML) are captured, while the investment and profitability factors do not yield any statistically significant results. Positive and statistically significant weightings were recorded for the SMB. Thus, in terms of driving factors, both active and passive fund managers generally give more preference to small cap returns than large cap returns. In addition, they are more growth oriented, as indicated by the negative coefficients for the HML factor. The lack of significance recorded for the profitability and investment factors infers that the Fama-French five factor should be applied with caution.

5.3. Recommendations and Future Research

A number of recommendations are made for future consideration. This study considers funds in two broad categories – equity-only active funds and passive funds. Yet, funds domiciled in

South Africa fall into several sub-groups, such as bond funds, money market funds, balanced funds, just to name a few. The relationship between these sub-groupings could be considered for further studies. Second, the models employed in this study are unconditional in nature and hence are unable to give an accurate evidence of time-varying performance. Future studies could consider using conditional models, which can best capture time-varying performance. More on the modeling technique, it would be interesting to have a comparative examination of the Fama-French five-factor and the Carhart four factor model, which accounts for momentum, along with other competing models. Finally, exploring the performance of mutual funds using the mean-variance spanning test is recommended as a future exercise. This could enable one to verify the consistency of the underperformance evidenced in the current study.

One contentious area in the fund performance literature is whether the proportion of fund's assets that goes into expense of its running (i.e. management or advisory fees) could have any potential effect on returns. Previous studies such as Jensen (1967), Malkiel (1995), and Carhart (1997) document evidence of a negative relationship between expense ratio and fund performance. Others, including Barber, Odean and Zheng (2005) do not find any relationship between expense ratio and fund performance. So far, the author was not aware of any study that has investigated this relationship for South African funds. Thus, it may prove useful to investigate the relationship between fees charged and the performance of South African mutual funds. Another closely related area is how the level of other transaction costs incurred during fund purchase (commissions and redemption fees) impact fund flows in South Africa.

Furthermore, for future research, each active fund performance should also be compared to its relevant benchmark. This study, together with previous studies, has used only a single market benchmark viz FTSE/JSE All Index or JSE Top40 Index as the market benchmark. A more accurate and meaningful comparison would be to compare the active fund with the benchmark as noted in the fund's mandate.

Finally, the benchmark index employed is only available from 2003 and beyond, although mutual funds have been around since 1996. Thus, it could be worthwhile to recreate a synthetic Top 40 index for the period 1996 to 2003, so that future research covers all passive funds since their inception.

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