PERFORMANCE ANALYSIS OF SOUTH AFRICAN HEDGE FUNDS

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DECLARATION

I, Joseph Adenigba declare that the research work reported in this dissertation is my own, except where otherwise indicated and acknowledged. It is submitted for the degree of Masters of Management in Finance and Investments at the University of the Witswatersrand, Johannesburg. This research has not been submitted for a degree or diploma to any universities.

Signature of candidate: Date:

Abstract

We use a comprehensive HedgeNews Africa data set from January 2007 to October 2016 to examine the performance of South African Hedge Funds in relation to JSE All share Index and All Bond Composite Index. We do so using *Capital Assets Pricing Model* (CAPM), *Fama* and *French three-factor model* and *four factor model*. Research on South African hedge funds are scarce, which motivate this research and in the light of the new regulation that provide for two categories of hedge funds, namely Qualified Investor hedge funds and Retail Investors hedge funds, to see how ordinary investor can benefit from this unique industry. The results show that South African hedge fund have low correlation with the All Bond Composite Index, but do not outperform the JSE All Share Index. We also find that South African hedge fund outperforms the All Bond Composite Index. We further test whether South African hedge fund managers have market timing ability and find that they do not have any significant market timing ability.

Dedication

To Rebecca, Olubukola, Olufemi and Olubunmi.

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Definitions and Descriptions

Global: Macro- Funds that aim to profit from major economic trends and events in the global economy, typically foreign exchange, interest rates and commodities. These funds make extensive use of leverage and derivatives.

Event Driven: Distressed Securities- Funds that trade the securities of companies in reorganization and/or bankruptcy, ranging from senior secured debt to common stock.

Market Neutral: Long/short Equity - Funds are those that invest on both the long and the short side of the equity market. Unlike equity market neutral funds (see below), the portfolio may not always have zero market risk.

Market Neutral: Convertible Arbitrage- Funds that buy undervalued convertible securities, while hedging (some of) the intrinsic risks.

Market Neutral: Equity- Funds that are simultaneously long and short matched equity positions, i.e. portfolios are designed to have zero market risk. Leverage is often applied to enhance returns.

Market Neutral: Fixed income- Funds that exploit pricing anomalies in the global market for interest rate securities and their derivatives.

All Share Index: JSE All Share monthly return.

ALBI: All Bond Composite monthly return.

SMB: Small minus Big. Difference between Top 40 Index and Small Cap Index.

HML: High minus Low. Difference between value Index and Growth Index.

Risk free rate: South African 3 month Treasury bill rate.

CHAPTER 1. INTRODUCTION

The first hedge Fund was started by Alfred Winslow Jones in the US in 1949. Since its inception in 1949 hedge fund have grown rapidly, especially over the past two decades. Since the early 1990s, hedge fund have become an increasingly popular investment vehicle as global investment increased from US$50 billion in 1990 to US$2.2 trillion in early 2007(Barclayhedge, 2013). Hedge fund industry assets under management (AUM) reach nearly US$3.2 trillion as of November 2015 (Preqin). The industry added US$71.5 billion in new capital inflows in 2015 (Preqin).But the total global hedge fund capital declined to US$2.86 trillion, in the first quarter of 2016 including investor outflows of US$15.1 billion making not only the largest quarterly outflow since 2Q09, but also the first consecutive quarters of outflow since 2009 (Hedge Fund Research Inc).

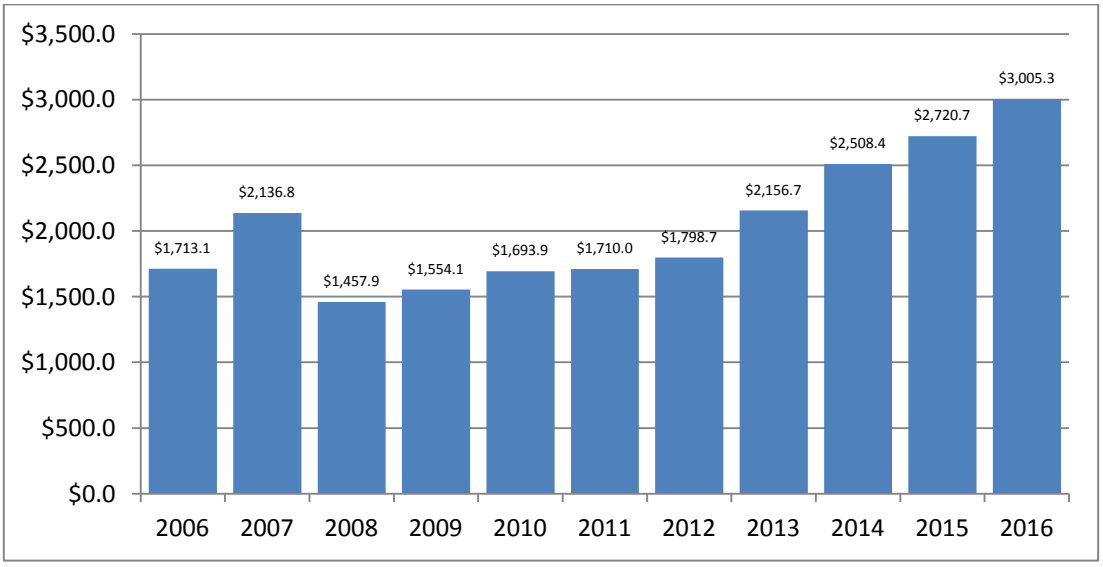

Figure1*:* AUM-Historical Growth of Assets. Source: BarclayHedge

There are no universally accepted definitions for hedge funds. According to Investopedia "*hedge funds are alternative investments using pooled funds that may use a number of different strategies in order to earn active return, or alpha, for their investors"*. According to Anthony Scaramucci(Little book of hedge funds. Pg.6*) "hedge funds are an alternative investment vehicle that seeks to produce absolute returns by utilizing a wide range of traditional and untraditional investment strategies that exploit market opportunities while*

protecting principal, preserving capital and maximizing returns. These private investment pools are actively run by managers who typically invest their own money in the fund and receive a 20 percent performance fee".

Hedge Funds are usually organized as limited partnerships, in which the investors are limited partners and the managers are general partners. Unlike the traditional investment like mutual funds, hedge funds use a broad range of instruments like short selling, derivatives, leverage or arbitrage on different markets to achieve absolute returns.

The investment strategies employed by various mutual funds are well documented, ranging from value investing to buying growth stocks, while hedge funds uses multitude of investment strategies. Stonham (1999b) describe fourteen hedge fund strategy categories, but Fung and Hsieh (1999a) describe seven main hedge fund investment strategies. Some of these strategies are Global, Global/macro, event driven, market neutral etc. (see Table 2).

Studies on performance of hedge funds yields mixed results. This could be as a result of different performance measures used according to Eling and Faust (2010). According to Capocci and Hubner (2004) in the 1980s performance measures based on the Capital Asset Pricing Models (CAPM), like Jensen's alpha (1968) and their extensions were commonly used in performance evaluation. Fung and Hsieh (1999b) and (2000b) use a modified version of the Sharpe ratio to rank the hedge fund performance and to specifically cater for hedge fund return distribution which were said to not be normally distributed.

Hedge funds use a variety of trading strategies, so analyzing all hedge funds using only on performance measurement framework that does not consider the characteristics of the specific strategies is of limited value Amin and Kat (2003). The CAPM model is a single factor model that compares a portfolio with the market as a whole and this lead to the modification of this model by Fama and French (1993). This Fama and French (1993) three – factor model takes the size and the book-to-market ratio of the firms into account. This model is well known for its explanatory power of mutual fund returns.

Carhart's (1997) Four-factor model which is an extension of Fama and French (1993) added a variable called the momentum effect to estimate the performance of hedge funds.

The study by Brown and Goetzmann (2001) using hedge funds data between 1989-95 find that hedge funds do not perform significantly better than most investment funds, while the study by Fung and Hsieh (1997) using 400US hedge funds and 3327 mutual funds find that mutual fund returns are highly correlated with standard asset returns, while hedge funds has low correlation with market performance. Hedge funds performance was also found to be superior to that of mutual funds.

Capocci, Corhary and Hubner (2003) investigate hedge fund performances and persistence in bull and bear markets using 2894 hedge funds, find that most hedge funds significantly out-performed the market during the whole test period.

Having hedge funds has part of a portfolio results in a marked improvement in the performance of the portfolio Amin and Kat (2003). They find that the best results are obtained when 10 to 20 percent of the portfolio value is invested in hedge funds. Also Fung and Hsieh (1997), Agarwal and Naik (2000a) find that inclusion of hedge funds in a portfolio can potentially result in better risk-return tradeoffs due to the low correlation between hedge fund returns and the returns on the traditional asset classes like equities, bonds, money markets and currencies.

1.1 South African Hedge Funds

According to Novare Investment the first South African hedge fund was created in 1995. Total Asset under management (AUM) was R1.4 billion in 2002 and this has grown to R67 billion by December 2015. Prior to 2012 South African hedge funds were loosely regulated, but in 2012 National Treasury and Financial Services Board (FSB) release a proposed frame works for the regulation of hedge funds. On 25 February 2015 the minister of finance in term of section 63 of the Collective Investment Schemes Control Act, No 45 of 2002 (CISCA) declared the business of hedge funds as a Collective Investment Scheme with effect from 1 April 2015. This made South Africa one of the few countries to put in place comprehensive regulation for hedge fund products.

The South African hedge fund is very small when compared to the traditional unit trust industry, which has a total asset of R1.8 trillion at the end of June 2015.

South African hedge fund usually charge 20 percent performance fee, while management fee ranges between 0 percent to 2 percent per annum according to Novare(2016). The funds that charges 0 percent management fee usually charge more than 20 percent performance fee.

1945	1995	2003	2007	2011	2012	2015
Alfred Winslow Jones coins the term "Hedge Fund"	First South African single manager Hedge fund established	The first fund of hedge funds established.	FSB starts regulating hedge fund managers	Introduction of regulation 28 for pension funds.	A proposed framework for regulating hedge funds was released.	Regulation of hedge funds under CISCA, No.45 of 2002.

Table 1. Evolution of South African Hedge Funds[1].

According to CISCA a hedge fund is defined as "*an arrangement in pursuance of which members of the public are invited or permitted to invest money or other assets, which uses any strategy or takes any position which could result in the arrangement incurring losses greater than its aggregate market value at any point in time and which strategies or positions include but are not limited to- (a) leverage; or (b) net short positions*".

The new regulations provide for two categories of hedge funds, namely Qualified Investor Hedge Funds, which are limited to institutions and high net worth individuals and Retail Investors Hedge Funds which are open to ordinary investors. A Qualified investor is defined by the FSB Board Notice 52 of 2015, as:

Any person who invests a minimum investment amount of R1 million per hedge fund and who- (a) has demonstrable knowledge and experience in financial and business matters which would enable the investor to assess the merits and risks of a hedge fund; or (b) has appointed a Financial Services Provider (FSP) who has demonstrable knowledge and experience to advise the investor regarding the merits and risks of a hedge fund investment. A retail investor fund is defined as a hedge fund in which any investor may invest because it meets the requirements set out by the FSB.

[1] Source: Novare Hedge Fund Survey 2016

The aim of the regulation is to provide better protection to investors, assist in monitoring and managing systemic risk to financial services industry, enhance transparency and monitor the development of financial market.

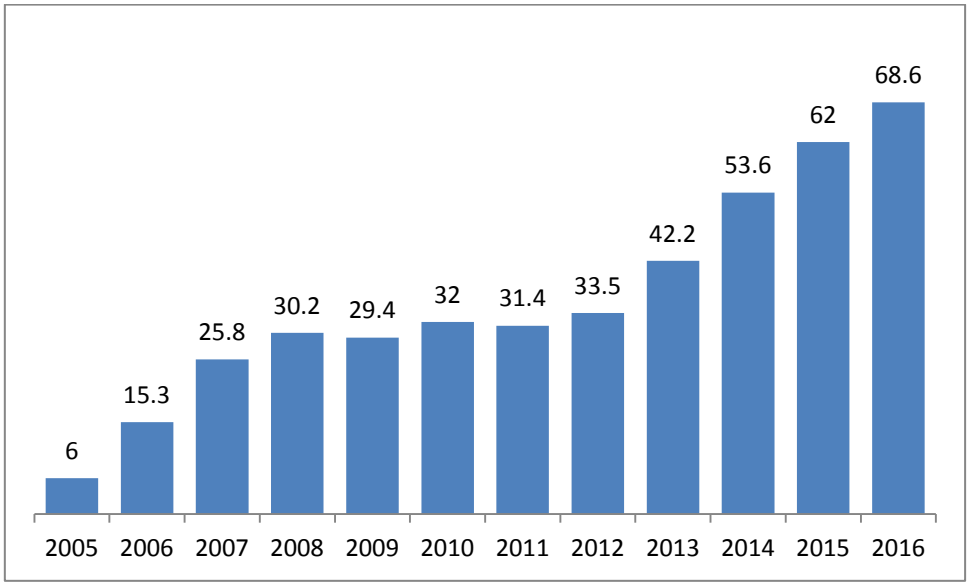

Figure 2:Hedge Fund Industry Assets(Rbn). *Novare Hedge Fund Survey 2016*

According to Novare (2016), 67.8 percent of managers elected to be categorised as Qualified Investor Hedge Funds, while 32.1 percent elected to be categorised as Retail Investor Hedge Funds, and 0.1 percent were undecided on the scheme they wanted to employ.

The common strategies employed by South African hedge fund include equity long/short, equity market neutral, fixed income, multi-strategy, volatility arbitrage, structured finance, commodities etc.(see Appendix A for description).

1.2 Motivation for the study

Research on South Africa hedge fund is scarce. This motivate this research and in the light of the new regulation, to see how ordinary investor can benefit from this unique industry. Up until the new regulation came into effect on 1 April 2015, hedge fund in South Africa was available only to wealthy individuals and institutions. Ordinary investors can diversify their portfolio further by including hedge funds in the portfolio. According to Agarwal and Naik (2000a), inclusion of hedge funds in a portfolio can potentially result in better risk-return

tradeoffs due to the low correlation between hedge fund returns and returns on the traditional asset classes like equities, bonds and currencies.

We will like to know whether South African hedge funds out or underperformed during the period January 2007 to October 2016. We also want to find out whether South African hedge funds have low correlation with JSE All Share Index and All Bond Composite Index.

We aim to make an empirical contribution to better understanding South African hedge funds and inform investors how they can benefit from this alternative investment vehicle. The findings presented in this study will be useful to investors, fund managers and the regulators.

1.3 Objectives of the study

The Objective of this study is to analyze the performance of South African hedge funds from a number of angles:

(i) To explore the correlation of South African hedge funds return with JSE All Share Index (ALSI) and All Bond Composite Index (ALBI).

(ii) To test whether South African hedge fund managers have significant market timing ability.

(iii) To see whether South African hedge fund produce absolute returns.

Our approach is similar to that of Capocci and Hubner (2004), Steri et al. (2008), Do et al. (2005) and Jordao and Moura (2010). Our study will contribute to the existing literature on the performance of hedge funds from emerging markets perspective.

The rest of the study will be organized as follows. Chapter 2 is the review of the literature on the performance of mutual funds and hedge funds, chapter 3 will provide a thorough description of the data and methodology, and chapter 4 will presents the results. Chapter 5 concludes the paper.

CHAPTER 2. LITERATURE REVIEW

Studies on hedge fund performance yield diverse results. According to Do et al. (2005) hedge fund research can be classified into three main categories: returns on hedge funds, modelling hedge fund performance, and hedge fund strategies.

2.1 Returns on Hedge Funds

Studies on performance of hedge funds, has yields mixed results. A number of studies find that hedge funds consistently outperform mutual funds and other standard asset classes while others conclude that hedge funds does not outperform mutual funds.

Fung and Hsieh (1997) using an extension of Sharpe's (1992) asset class model and focusing on hedge funds and commodity trading advisors (CTAs) find that mutual fund returns are highly correlated with standard asset classes, in contrast to hedge funds and CTAs that generate returns that have low correlation to the returns of mutual funds and standard asset classes.

Liang (1998) using hedge funds data from January 1994 to December 1996 find that most hedge funds provide positive abnormal returns and hedge fund performance dominate mutual fund performance. The author also found that correlations among different hedge fund strategies are low. The study find that hedge fund have lower correlations and market betas than mutual fund.

Ackerman, McEnally, and Ravenscraft (1999) using a large sample of hedge fund data from 1988-1995, find that hedge funds consistently outperform mutual funds, but not standard indices. They reckon that incentive fees explain some of the higher performance, but not the increased total risk. Liang (1999) compare the performance of hedge funds to mutual funds and several indices and find that hedge funds have both higher risk-adjusted performance and higher levels of risk than mutual funds, but lower than the market indices considered.

Brown, Goetzmann, and Ibbotson (1999), using annual data from the U.S Offshore Funds Directory investigate the performance and survival of offshore hedge funds and find that these hedge funds display positive systematic risk-adjusted returns.

Edwards and Caglayan (2001) using data on the monthly returns of hedge funds in US during the period January 1990 to August 1998, find that, on average, hedge funds earn significantly positive excess returns (8.52 percent annually), and that the returns differ markedly by investment style, ranging from an annualized excess return of 5.64 percent for global macro funds to 15.24 percent for sector specific funds. They find that while only 25 percent of all hedge funds earn positive excess returns, the funds earn an average annualized excess return of 18.72 percent. They reckon that fund manager skill may be a partial explanation for the positive excess returns earned by hedge funds.

Amin and Kat (2003) using monthly returns of 77 hedge funds and 13 hedge fund indices in US from May 1990 to April 2000, find that, as a stand-alone investment, hedge funds do not offer a superior risk-return profile. They find 72 individual funds and 12 indices to be inefficient, with the average efficiency loss amounting to 6.42 percent for individual funds and 2.76 percent per annum for indices whereas the study by Kosowski, Naik and Teo (2007) using the bootstrap and Bayesian methods conclude that hedge fund produce abnormal returns and that the abnormal returns are not due to luck.

The study by Frydenberg, Lindset and Westgaard (2008) using hedge fund indices from January 1994 to June 2005 find that some of the hedge fund has higher mean return and lower standard deviation than the equity market. They also find that the index return distributions of hedge fund indices are not normal as it show negative skewness and positive excess kurtosis, just in line with the findings of Amin and Kat (2001b).

Study by Agarwal, Boyson, and Naik (2009) compare hedge funds, traditional mutual funds and Hedged Mutual Funds (HMFs)-mutual funds that employ hedge-fund-like strategies, but lack the incentive structure and regulatory freedom available to their hedge fund counterparts. They find that HMFs underperform hedge funds by about 3.3 percent per year after accounting for both fees and risk, but they outperform traditional mutual funds. The authors attribute this performance pattern to prior hedge fund experience of HMFs managers and greater investment flexibility this funds have.

Eling and Faust (2010) evaluated the performance of hedge funds and mutual funds in emerging markets and find that hedge funds provide both higher returns and alphas, whereas most mutual funds do not outperform traditional benchmarks. They also find that hedge funds provide to some extent downside protection when compared to mutual funds that have a rather constant exposure to market movements.

Dichev and Yu (2011) using dollar-weighted returns to derive a more accurate estimate of actual investor returns and compares them to the corresponding buy-and-hold fund returns find that dollar-weighted investor return are about 3 percent to 7 percent lower than corresponding buy-and-hold returns. They also find that the real alpha of hedge fund investors is close to zero.

Klein, Purdy, Schweigert and Ved study the Canadian hedge funds using data from January 1998 to December 2011 find that Canadian hedge funds have higher risk-adjusted performance and different distributional characterists relative to the global hedge fund indices.

Some of the studies that find superior mutual funds performance also examine further its persistence. Hendricks, Patel, and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Brown and Goetzman (1995), and Wermers (1996) find evidence of persistence in mutual funds performance for a short period of one to three years, which they attribute to “hot hands” or common investment strategies. Brown, Goetzmann and Ibbotson (1999), test performance persistence over two consecutive periods and find little evidence of persistence in performance among offshore hedge funds.

Agarwal and Naik (2000b) investigate whether the nature of persistence in the performance of hedge funds is of short-term or long-term in nature by investigating the series of wins and losses for two, three, and more consecutive time periods. They find that the extent of persistence is sensitive to the return measurement interval.

Capocci, Corhary, and Hubner (2003) investigate hedge fund performance and persistence in bull and bear markets using 2894 hedge funds, find that most hedge funds significantly outperformed the market during the whole test period. The study by Boysen (2008), find that performance persistence is strongest among small, young funds. The study find that a

portfolio of these small, young funds with prior good performance outperformed portfolio of large, mature funds with prior performance by 9.6 percent per year.

2.2 Modelling Hedge Fund Performance

In hedge funds literature, different models have been used in performance evaluation. In the 1980s, performance measures based on the capital asset pricing model (CAPM) were used, and later the multi-factorial models of Fama and French (1993), Carhart (1997) and Grinblatt and Titman (1999), and the panel model of Steri et al. (2008).

The CAPM was developed by William Sharpe (1964). The CAPM is a single factor model that compares a portfolio with the market as a whole. The CAPM explains that every investment carries two distinct risks. One is the risk of being in the market called systematic risk, and the other risk called unsystematic risk, which is the risk specific to the firm. The CAPM helps to measure portfolio risk and the return an investor can expect for taking that risk.

Performance measures based on the CAPM include Sharpe ratio and Jensen's alpha. The Sharpe ratio measures the relationship between the risk premium and the standard deviation of the returns generated by a fund. Jensen's alpha measures the portfolio returns above or below that predicted by CAPM given the portfolio's beta and mean market return. These measures assume hedge fund returns to be normally distributed, but because of the dynamic trading strategies of hedge funds, they are not normally distributed. According to Amin and Kat (2003) because of the non-normality characteristics of hedge fund returns these methods of measuring performance are no longer appropriate.

Eling and Schumacher (2007) find that even though hedge fund returns are not normally distributed, the first two moments (i.e., mean and variance) describe the return distribution sufficiently well. A possible explanation they gave for this is that it might be that hedge fund returns are elliptically distributed. They conclude that from a practical point of view, the choice of performance measure does not have a crucial influence on the relative evaluation of hedge funds and that the Sharpe ratio is adequate for analysing hedge funds.

Ackerman, Mcenally, and Ravenscraft (1999), Brown, Goetzmann and Ibbotson (1999), Agarwal and Naik (2000b) and Liang (2000) use a single-factor model in their evaluation of hedge funds performance.

Fama and French (1993) is a three-factor model that modified the CAPM model to take into account two empirical factors about asset classes that tend to have higher returns. The first factor called SMB take into account the size of the company. The SMB is the difference in return for small and large sized companies. The second factor, called HML, measures the market value effect and is the difference in return for high book to market value and low book to market value companies.

Carhart's (1997) four-factor model is an extension of the Fama and French (1993) three-factor model. It added another variable called momentum effect, which is define by Grinblatt, Titman and Wermers (1995), as buying stocks that were past winners and selling past losers. According to Carhart (1997), the four-factor model may be interpreted as a performance attribution model, where the coefficients and premia on the factor-mimicking portfolios indicate the proportion of mean return attributable to four elementary strategies: high versus low beta stocks, large versus small market capitalization stocks, value versus growth stocks, and one-year return momentum versus contrarian stocks. Although Carhart paper focuses on the returns of mutual funds and not of hedge funds, the four-factor model can be use in the performance evaluation of hedge funds.

Darolles, Gourieroux and Jasiak (2008) use L-Performance measure to evaluate the performance of hedge funds. L-Performance is based on L-moments, which are conceptually close to the conventional power moments, but provide more detailed information about the extremes e.g. thick tails. L-moments are usually used in the analysis of catastrophic events such as extreme floods or earthquakes.

Tashman and Frey (2008) use Logistic Mixture of Linear Components (LMLC) model to model risk in arbitrage strategies. The LMLC model offers advantages over linear regression model and does not make the standard regression assumption of a linear relationship between explanatory and explained variable. According to the authors the LMLC model take into account the asymmetry and heavy tails of hedge fund returns.

Canepa, Gonzalez and Skinner (2015) use non-parametric techniques-which does not depend on any asset pricing model or require hedge fund returns to be normally distributed to determine if hedge fund industry outperformed the market. They find that hedge funds do not outperform the S&P 500 and the MSCI emerging market indices.

2.3 Hedge Fund Strategies

Hedge funds return is based on the strategies employed to achieve the absolute return. Hedge fund trading strategies is dynamic. Studies has shown that different hedge funds strategies has a different factor that drive the returns in each class, but a similar factor drive returns across same hedge fund strategy. Hedge fund strategies within a particular strategy regularly use similar methodologies to trade similar assets. They are often exposed to similar risk and have similar return characteristics.

Fung and Hsieh (1997a), Schneewels and Pescatore (1999) find that sources of the expected return differ for various hedge fund strategies, and that certain hedge fund strategies provide unique return opportunities that are not usually available through long only traditional stock and bond portfolio.

Fung and Hsieh (1997a; 2000), Agarwal and Naik (2003), Amin and Kat (2001) stated that hedge fund returns typically exhibit non-linear option-like exposures to standard asset classes because they can use derivates and follows dynamic trading strategies.

Brown and Goetzmann (2001) study the monthly return of hedge fund from 1989 to 2000 and find that there are at least eight distinct investment styles of hedge funds. According to them the risk exposure of hedge funds depends on the style employed by the fund. The authors find that differences in investment strategy contribute about 20 percent of the cross sectional variability in hedge fund performance.

Fung and Hsieh (2001) focuses on a popular strategy commonly referred to as “trend following”. The trend following is a strategy used for the majority of commodity trading advisors (CTAs). The authors use look-back straddles to model trend-following strategies, and show that they can explain trend-following funds returns better than standard asset indices.

Naik, Ramadorai and Stromgrist (2007) using data from January 1994 to December 2004 investigate whether capacity constraints at the level of hedge fund strategies was responsible for the decline in alpha generating ability of hedge funds and find that for four out of eight hedge fund strategies, capital inflows statistically preced negative movements in alpha.

Agarwal, Bakshi and Huij (2009) find that the type of investment stye employed by hedge fund has a significant effect on skewness and kurtosis. The authors find that the investable higher-moment factors explain the returns of a large number of managed futures, event driven and long/short equity hedge fund strategies. They also find that higher-moment risks matter more for those investment styles that tend to apply their strategies to the equity markets and are less relevant for styles in which equity risk is not the primary exposure.

Avramov, Kosowski, Naik and Teo (2011) evaluate hedge fund performance through portfolio strategies that incorporate predictability based on macroeconomic variables and find that hedge funds strategy that allows for predictability in managerial alpha, fund betas and benchmark returns outperform those strategies that exclude predictability altogether of allow for predictability in betas and benchmark risk premier only.

Boasson and Boasson (2011) examined the performance of the twelve major hedge funds investment strategies using Carhart (1997) multi-factor model and find that each of the twelve investment strategies outperform S&P 500 market index on a risk-adjusted basis. The authors also find that hedge funds provide better opportunities for portfolio diversification because of their low correlation with different indices.

Chen (2011) finds that there is a considerable difference in derivatives use across hedge fund strategies. The study found that global macro has high proportion (93%) of derivatives users while equity market neutral funds show the least use of derivatives (53%). The authors also find that derivatives use is associated with lower fund failure risk and there was no evidence to support the notion that hedge fund derivatives use leads to more risk taking. Bali, Brown and Demirtas (2013) using data from January 1994 to December 2011 find that the hedge fund strategy employed by different hedge funds leads to different performance outcome. They find that the long/short equity hedge and emerging markets hedge fund strategies outperform the U.S. equity market, while the long/short equity hedge, multi-

strategy, managed futures and global macro hedge fund strategies dominate the U.S bond market.

Palaskas and Stoforos (2013) used hedge funds data from March 2000 and September 2009, to investigate the performance of hedge funds by strategy and to check whether hedge funds managed to hedge their investments, find that all the hedge fund strategies with the exception of macro and short selling funds did not manage to hedge their investments.

The Study by Canepa, Gonzalez and Skinner (2015) using quantile regression method find that persistently superior performing hedge funds are possibly following a different investments strategy when compared to mediocre performing hedge funds. They find that the top performing funds avoid relying on passive investment in illiquid investment and follows strategies that return momentum profits. Klein, Purdy, Schweigert and Ved (2015), study on Canadian hedge funds, which include timing the commodity markets find that the individual investment strategy exhibit higher abnormal returns than the global hedge funds.

	Subcategory	Description
Arbitrage	Fixed income	Exploits pricing inefficiences in fixed income markets, combining long/short positions of various fixed-income securities.
	Convertible	Purchases convertible bonds and hedges equity risk by selling short the underlying common stock.
	Relative value	Exploits pricing inefficiences across asset classes, for example, pairs trading, dividend arbitrage, yield curves trades.
Event-Driven	Distressed securities	Invests in companies in a distressed situation (e.g. bankruptcies), and shorts companies bexpected to be in distress.
	Merger Arbitrage	Generates returns by going long on the target and shorting the stock of the acquiring company.
	Activism	Seeks to obtain representation on a company' s board of directors in order to shape company policy.
Equity-Based	Equity long/short	Consists of a core holding of particular equity securities, hedged with short sales of stock to reduce market exposure.
	Equity non hedge	Commonly know as "stock picking" ; that is, invests long in particular equity securities.
Macro	Global	Leveraged bets on anticipated price movements of stock markets, intrest rates, foreign exchange, and commodities.
	Emerging markets	Invests a major share of portfolio in securities of companies or the sovereign debt of developin countries.

Table 2. Four Major Categories of Hedge Fund Strategies[2].

[2] Sources: Mckinsey Global institute; Hedge Fund Research, Inc.; David Stowell.

2.4 Hedge Funds and Market Timing

One of the characteristics of hedge fund is the ability of fund managers to time the market properly in other to deliver absolute return. The hedge fund manager takes positions by anticipating the market trend or direction (either moving up or down).

Fung et al. (2002) test the market timing ability of hedge funds managers and find no evidence that hedge funds managers have market timing ability. Do et al. (2005) in their study of Australian hedge funds find no evidence of market timing ability of the Australian hedge funds managers, while Chen and Liang (2007) find stock market timing for the 'market timers' subset of global hedge funds.

Park H (2010) using hedge funds data from 1994 to 2008 find that security selection explains most of the excess return generated by hedge funds and the contributions of factor timing and risk premium are minimal. The author found that in the study period hedge funds on average shows negative timing ability of the stock market.

Klein, Purdy, Schweigert and Vedrashko (2015) investigate the market timing ability of the Canadian hedge funds managers and find that they do not time the Canadian or global stock and bond markets.

2.5 Hedge Fund Indices in South African Market

HedgeNews Africa calculate, the overall single-manager composite index for South African hedge funds as well as a number of different indices based on the type of hedge fund strategy, including Fund of Funds. The indices reflect the monthly net of fee returns of the funds in the indices. These hedge funds indices are:

(i) HedgeNews Africa single-manager composite Index- this covers all the hedge funds in South Africa, including those that are not domicile in South Africa.

(ii) HedgeNews Africa South African single-manager composite Index- this covers all the hedge funds that are domicile in South Africa.

(iii) HedgeNews Africa long/short equity Index- this covers the long/short strategies.

(iv) HedgeNews Africa market neutral & quantitative strategies Index- this covers the market neutral and quantitative strategies.

(v) HedgeNews Africa event driven Index- this covers the event driven strategies.

(vi) HedgeNews Africa fixed income Index- this covers the fixed income strategies.

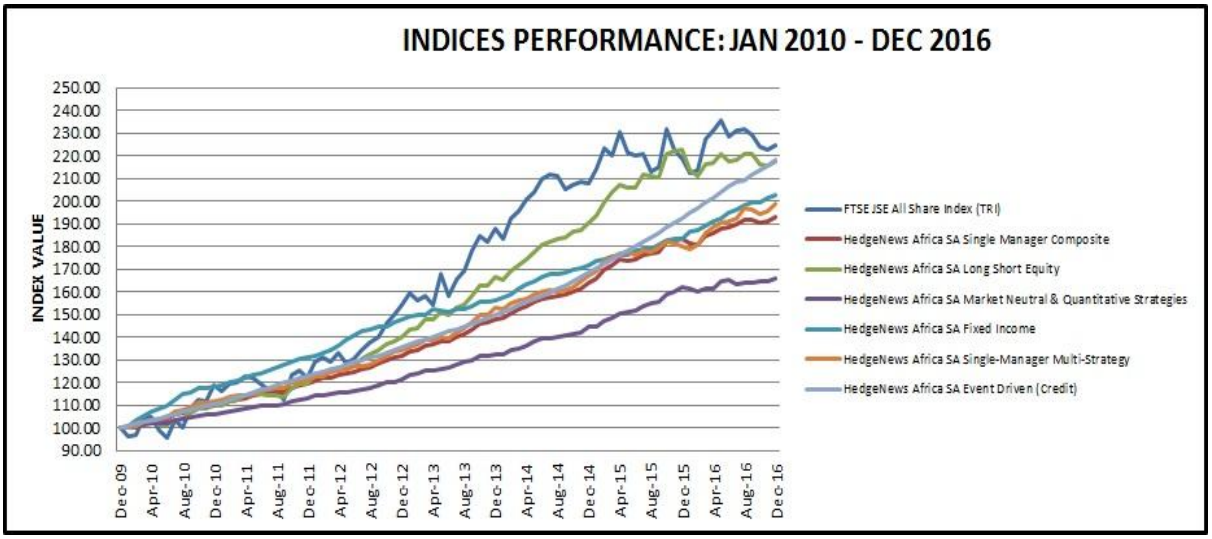

Figure 3 South African hedge fund indices.Sources:HedgeNews Africa South African Indices

According to HedgeNews Africa South African single- manager composite returned a net annualised 10.93 percent, with annualised standard deviation of 1.77 percent from January 2007 to September 2015, while the all share index returned an annualised 11.55 percent with standard deviation of 15.55 percent over the same period.

HedgeNews Africa single- manager composite, which includes Africa funds, both long-only and hedge, returned an annualised 8.58 percent, with standard deviation of 3.54 percent from January 2007 to September 2015, while the MSCI frontier markets Africa index returned an annualised -1.92 percent, with standard deviation of 26.59 percent, according to HedgeNews Africa.

Fund of Funds composite returned an annualised 10.02 percent, with standard deviation of 2.18 percent from July 2009 to August 2015 according to HedgeNews Africa.

2.6 Correlation Structure, Hedge fund and Market Index Returns

The correlation between HedgeNews South African single- manager composite, long/short index, multi-strategies, Top 40, small cap, all share , value and growth index and the HedgeNews Africa Single –manager composite (All Composite) is very high, while Fixed income has low correlation and event driven has a negative correlation with All composite.

	All Composite	SA Composite	Long/Short	Market Neutral	Fixed Income	Multi-Strategies	Event Driven	Top 40	Small cap	All Share	Value	Growth	All Bond
All Composite	1												
SA Composite	0.70	1											
Long/Short	0.85	0.82	1.00										
Market Neutral	0.40	0.68	0.51	1.00									
Fixed Income	0.27	0.15	0.11	-0.02	1.00								
Multi-Strategies	0.63	0.73	0.73	0.32	0.16	1.00							
Event Driven	-0.08	0.03	-0.14	0.11	-0.08	-0.17	1.00						
Top 40	0.72	0.61	0.71	0.31	0.24	0.59	-0.14	1.00					
Small cap	0.65	0.51	0.67	0.12	0.11	0.62	-0.17	0.61	1.00				
All Share	0.74	0.62	0.73	0.29	0.26	0.62	-0.15	0.99	0.68	1.00			
Value	0.70	0.53	0.64	0.18	0.29	0.57	-0.15	0.87	0.76	0.91	1.00		
Growth	0.66	0.59	0.68	0.30	0.21	0.57	-0.11	0.97	0.54	0.96	0.75	1.00	
All Bond	0.02	0.05	0.05	-0.21	0.22	0.07	0.01	0.03	0.36	0.08	0.23	-0.02	1

Figure 4. Correlation between South African Hedge Funds Indices and Markets Indices.

All the indices have a very low correlation with all bond composite index. All composite, HedgeNews Africa South African single- manager, long/short index and multi-strategies have high correlation with all share index, which is contrary to hedge funds selling point of low correlation with equity markets. Market neutral and fixed income, have low correlation with the all share index, while event driven have a negative correlation with the all share index.

CHAPTER 3. DATA AND METHODOLOGY

Performance measures that assume normality are not adequate for hedge fund analysis as these funds employ dynamic trading strategy, that make their distributions non-normal according to Amin and Kat, (2003). Because of the non-normality of hedge fund distribution, other performance measures that take into account skewness and kurtosis were introduced, but these are still not adequate in the evaluation of hedge funds performance according to the authors.

The study by Eling and Schuhmacher, (2012) find that "*the choice of performance measure does not affect the ranking of hedge funds as one would expect after studying the performance measurement literature. It appears that, even though hedge fund returns are not normally distributed, the first two moments (i.e. mean and variance) describe the return distribution sufficiently well".*

3.1 Data

Data on hedge funds are not readily available in South Africa as hedge fund managers are not under formal obligation to disclose their results. Globally hedge funds data for research purposes are usually source from data vendors such as Hedge Fund Research Inc. (HFR), Tass Management Limited (TASS), Eurekahedge Inc and Managed Account Reports Inc. (MAR).

In South Africa Hedge News Africa is the main source of hedge fund data. They have data on South African hedge funds dated back to 2002, so the data for my research is from Hedge News Africa. The data is a monthly return net of fee of, 162 hedge funds that are domicile in South Africa and have historical data of more than 24 months. The study by Ackermann, McEnally, and Ravenscraft (1999) recommended that 24 months historical data is the minimum length of hedge fund data that is required for the results not to have significant multi-period sampling bias.

Nguyen et al. (2014) define multi-period sampling bias as the bias that occur when funds that failed to survive for the whole sampling period and the new funds that emerged during that period are excluded from the study. Fung and Hsieh (2000) used 36 months of historical

data to evaluate the importance of multi-period sampling bias in their study. They find that the bias is about 0.6 per cent. The study concludes that multi-period sampling bias is very small if at all exists.

Edwards and Caglayan, (2001) agreed with Ackermann et al. (1999) that historical data of 24 months is sufficient in the performance evaluation of hedge funds. The authors find an annual multi-period sampling bias of 0.32 per cent for the selected period. They reckon that when 36 months of data is the minimum required, it may result in the exclusion of many non-surviving funds from the study leading to survivorship bias.

Survivorship bias is said to occur when a sample of hedge funds includes only surviving funds operating at the end of the sampling period and exclude the dead funds. There are different reasons why funds cease to operate, majority cease to operate because of poor performance while other funds though still operating stop accepting new investors or stop reporting funds information to the data vendors. As a result of including only surviving funds, the historical performance are biased upwards in return and biased downwards in risk relative to the universe of all funds according to Fung and Heish (2001). The authors refer to this bias as “natural biases” that cannot be entirely mitigated. Fung and Heish, (2000b) find in their study using the TASS database a survivorship bias of 3 percent per year.

Our research is on South African hedge funds from January 2007 to October 2016. This period is chosen to include the financial crises of 2008. Another reason for choosing this period is to avoid backfilling bias as Hedge News Africa came into being in 2007. Nguyen et al. (2014) define backfilling bias as the bias that occur when data vendors only include the returns of funds that survived the backfilling period which may then lead to significant difference in the performance of funds with and without backfilling period.

Our data include all the living and dead fund so as to avoid survivorship bias. Funds of hedge fund are excluded from our data since this fund have individual hedge fund that are already included in our study in their portfolio.

Fund of Funds are funds that invest in other hedge funds. The reason behind funds of funds is to allow investors to be able to invest easily in hedge funds without having to construct a portfolio of hedge funds themselves. Funds of hedge funds are the largest investors into

hedge funds in South Africa. Fund of Funds allocations to hedge funds reduced from 57.3 percent to 56.5 percent in 2016, but still remained the highest contributor to hedge fund according to Novare hedge fund 2016 survey.

Hedge Fund Strategy	Alive	Dead	Total
Long Short Equity	39	13	52
Fixed Income	11	6	17
Event Driven	3	4	7
Market Neutral	17	19	36
Multi Strategies	17	15	32
Commodities	1	2	3
Absolute Returns	3	8	11
Managed Futures	1	3	4
Total	92	70	162

Table 3. Total number of hedge funds in our study.

The data on JSE All Share Index (ALSI), All Bond Composite Index (ALBI), Small Caps Index, Large Caps Index, high book-to-market, low book-to-market and momentum is source from I-Net Bridge and Bloomberg.

3.2 Methodology

We will examine the performance of South African hedge funds relative to the performance of JSE All Share Index (ALSI) and All Bond Composite Index (ALBI). Like most studies on the performance analysis of hedge funds I will start with *Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1966).* The notion of CAPM is that every investment carries two distinct risks- one is the risk of being in the market, which is the systematic risk (beta), and the second risk is the unsystematic risk which is specific to the firm.

According to Capocci and Hubner (2004) performance measures based on the CAPM, like Jensen's alpha (1968) and their extensions were commonly used in the performance evaluation. The CAPM is represented mathematically by:

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \mu_i \quad (1)$$

where: R_i is the portfolio return of asset *i*; R_f is return on a risk-free short-term asset; R_m is the return of the market portfolio ; $R_i - R_f$ is the excess fund return; α_i and β_i are the intercept and the slope of the regression respectively; μ_i is the random error term.

The intercept of this equation is called Jensen's alpha and is interpreted as a measure of funds performance relative to the market proxy used, which in our case is the JSE All Share Index. A positive and significant Jensen's alpha indicate that fund managers may generate superior relative performance. B_i, the slope of the regression is the market beta with respect to the fund's target market benchmark index, which in our case is the JSE All Share Index.

This model is simple and easy to explain and has been widely use in the performance evaluation of mutual funds and hedge funds.

The Three-factor model of Fama and French (1993)- this is a more sophisticated CAPM model to obtain a better explanation of returns. It takes the size and the book-to-market ratio of the firms into account. It is estimated from the following extension of the CAPM regression:

$$Ri - R_f = \alpha_i + \beta_i (R_m - R_f) + \delta_i SMB + \emptyset_i HML + \mu_i \quad (2)$$

where SMB is a series of hypothetical portfolio (the difference between portfolio returns on small stocks and portfolio returns on large stocks); and HML is the return difference of portfolios with high book-to-market equity (equity value by the market value of the fund) and returns with low book-to-market equity. These aim at isolating the firm-specific components of returns. β_i, δ_i, $\emptyset_i$ are regression gradients.

The four-factor model- this is an extension of the Fama and French (1993) three-factor model, but unlike Carhart's (1997) four-factor model with momentum effect we added All Bond Composite Index. This model is estimated using the following regression:

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \delta_i SMB + \emptyset_i HML + K_i ALBI + \mu_i \quad (3)$$

where ALBI is the all bond composite index. ALBI is added to see the performance of different hedge fund strategies in relation to the ALBI.

Market timing ability- this approach takes positions by anticipating the market trend or direction (either moving up/down). This is estimated using a model similar to the CAPM, but takes into account a factor that computes the ability to make such prediction. We use the model applied by Fung et al, (2002):

$$R_i - R_f = \alpha_i + \beta_i(R_m - R_f) + \gamma_i[(R_m - R_f)]D + \mu_i \quad (4)$$

where γ_i is the factor that calculates market timing. D is a dummy variable which takes the value of 1 for a bear market and zero otherwise. A bear market corresponds to the period 2007 to 2009 Global Financial crisis and the bull market corresponds to the recovery that follows.

here β_i is the market beta which represents the fund's systematic risk, while α_i here measures the manager's security selection ability. A positive and significant α_i indicate fund manager's security selection ability, while a positive and significant y_i indicate that the fund manager was successful in predicting market direction to increase the return of the fund.

CHAPTER 4. RESULTS

We study the monthly returns net of fee of 162 hedge funds that are domicile in South Africa from January 2007 to October 2016. The hedge funds in our study are classified according to the type of strategy employed by the fund. They include Long Short Equity, Fixed Income, Event Driven, Market Neutral, Multi Strategies, Absolute Returns and Managed Futures. We used equally weighted portfolio excess returns for each investment strategy. The regressions were done using ordinary least squares (OLS), corrected for serial correlation and heteroskedasticity.

4.1 Regression results and Descriptive statistics using CAPM

The capital Asset Pricing Model is a single factor based model. It is widely use in the performance evaluation of mutual funds and hedge funds, but the study by Fama and French (1993) question the adequacy of a single factor model to explain mutual fund performance. The intercept of CAPM model gives the Jensen alpha, which is a measure of abnormal returns.

Table 4 shows the regression results based on the CAPM model for each hedge fund strategy. The most common method use to evaluate hedge funds investment strategies returns is to estimate the alpha of the strategy, which is also known as Jensen's alpha (coefficients). The results show that the alphas (coefficients) of all the hedge funds are negative and statistically significant at the 1 percent significance level, except for Market Neutral with negative alpha that is not significant.

The selling point for hedge funds is their ability to produce abnormal returns, but from Table 4 South African hedge funds do not outperform the JSE All Share Index (ALSI) over the study period. For the Long Short Equity strategy for example, 55 percent of the movement in this strategy is due to the ALSI.

The p-value of the ALSI indicates that ALSI was significant in explaining the returns on the Long Short Equity, Market Neutral, Multi Strategies and Absolute Return strategies at 1 percent significance level. The average adjusted R-squared for this model is 45.2 percent.

	Coefficient	Std. Error	t-Statistic	P-value	Adj. R-squared
Long Short	-5.250	0.530	-9.902	0.000	0.547
ALSI	0.324	0.041	7.964	0.000	
Fixed Income	-7.706	0.294	-26.241	0.000	0.531
ALSI	0.029	0.018	1.599	0.115	
Event Driven	-3.385	0.484	-6.994	0.000	0.576
ALSI	0.045	0.027	1.686	0.114	
Market Neutral	-1.564	1.429	-1.094	0.292	0.337
ALSI	0.132	0.058	2.277	0.039	
Multi Strategy	-3.125	0.66	-4.732	0.000	0.722
ALSI	0.274	0.042	6.591	0.000	
Absolute Return	-4.225	0.954	-4.428	0.002	0.422
ALSI	0.171	0.054	3.169	0.011	
Managed Futures	-4.293	0.884	-4.857	0.000	0.029
ALSI	-0.021	0.097	-0.211	0.833	

Note: This table reports the time series regressions according to CAPM model of hedge funds investment strategies. See Eq. (1). The series consists of monthly returns of the hedge funds in our sample from January 2007 to October 2016. See Eq. (1), where: ALSI is the return on the market.

Table 4. Regression results using CAPM.

Table 5 provides the descriptive statistics on our sample for each hedge fund strategy using the CAPM model. Managed futures achieved the highest mean of 0.6 percent (bear in mind that the total number of Managed Futures in our study is 4), followed by Absolute Return with a mean of 0.5 percent with standard deviation of 0.1 percent.

Fund Strategy	Mean	Maximum	Minimum	Std. Deviation	Skewness	Kurtosis	Jarque-Bera
Long Short	0.003	0.012	0.000	0.002	1.964	8.247	119.926
ALSI	0.004	0.012	0.000	0.003	0.811	2.538	7.931
Fixed Income	0.003	0.005	0.001	0.001	0.841	3.099	7.921
ALSI	0.004	0.012	0.000	0.003	0.811	2.538	7.931
Event Driven	0.003	0.005	0.002	0.000	0.547	3.261	0.897
ALSI	0.006	0.011	0.000	0.004	0.092	1.766	1.102
Market Neutral	0.004	0.007	0.002	0.001	0.106	2.153	0.539
ALSI	0.006	0.011	0.000	0.004	0.092	1.766	1.103
Multi Strategy	0.004	0.007	0.002	0.001	0.129	2.128	0.585
ALSI	0.006	0.011	0.000	0.004	0.092	1.766	1.103
Absolute Return	0.005	0.006	0.003	0.001	-0.141	2.272	0.305
ALSI	0.006	0.011	0.001	0.004	-0.128	1.774	0.785
Managed Futures	0.006	0.027	0.000	0.004	1.739	8.797	114.271
ALSI	0.009	0.063	0.000	0.013	2.47	9.366	162.333

Note: This table reports the descriptive statistics of the hedge funds in our sample.

Table 5. Descriptive statistics of fund strategy using CAPM

From Table 5 Market Neutral and Multi strategies achieved mean returns of 0.4 percent with standard deviation of 0.1 percent respectively. Both Long Short Equity strategy and Fixed Income achieved mean returns of 0.3 percent with standard deviation of 0.2 percent and 0.1 percent respectively. The results of the Jargue-Bera show that South African hedge fund are not normally distributed similar to the findings of Capocci and Hubner (2002).

4.2 Regression results and Descriptive statistics: Three Factor Model

Table 6 shows the regression results based on Fama and French three factor model (1993). Fama and French three factor model is said to give a better explanation of fund behaviour (equation 2), because the dynamic trading strategies of hedge funds is taking into account by the model. The intercepts or alphas indicate whether a hedge fund strategy outperform or underperform the market after taking into account the market effect, small firm effect and value effect.

The alphas of the hedge fund strategies, except for Market Neutral are negative and significant at 1 percent significance level. This model also shows that South African hedge funds do not outperform the ALSI. The small size effect (SMB) is positive for Long Short Equity, Fixed Income, Multi Strategies, Absolute Return and Managed Futures strategies, but only significant for Fixed Income at 5 percent significant level. The SMB is negative for Event Driven and Market Neutral strategies.

The results seem to show that South African hedge funds do not have significant attraction for small caps stocks over the study period. The value effect (HML) is positive for Long Short Equity, Fixed Income, Event Driven, Market Neutral and Managed Futures, but only significant for Event Driven at 10 percent significance level. It is negative for Absolute Return and Multi Strategies and significant at 5 percent and 10 percent significance level respectively. The average adjusted R-squared improves to 46.7 percent compared to 45.2 percent from the CAPM model. SMB and HML seem not to add more explanatory power to this model in the South African context. These findings are similar to those of Jordao and Mouro (2011) in the Brazilian market, but lower than the findings of Capocci and Hubner (2002) in the US market.

	Coefficient	Std. Error	t-Statistic	P-value	Adj. R-squared
Long Short	-4.739	0.655	-7.235	0.000	
ALSI	0.302	0.040	7.539	0.000	0.475
SMB	0.009	0.031	0.296	0.768	
HML	0.014	0.029	0.506	0.615	
Fixed Income	-7.319	0.349	-20.929	0.000	
ALSI	0.026	0.018	1.454	0.151	0.551
SMB	0.027	0.013	2.075	0.042	
HML	0.008	0.013	0.645	0.522	
Event Driven	-3.595	0.497	-7.237	0.000	
ALSI	0.052	0.025	2.089	0.059	0.648
SMB	-0.029	0.019	-1.546	0.148	
HML	0.028	0.015	1.845	0.089	
Market Neutral	-1.673	1,651	-1.013	0.331	
ALSI	0.133	0.064	2.069	0.061	0.229
SMB	-0.010	0.048	-0.208	0.839	
HML	0.005	0.039	0.127	0.901	
Multi Strategy	-2.826	0.622	-4.544	0.001	
ALSI	0.266	0.038	7.071	0.000	0.775
SMB	0.035	0.027	1.289	0.222	
HML	-0.051	0.025	-2.076	0.060	
Absolute Return	-4.827	1.052	-4.589	0.003	
ALSI	0.149	0.047	3.183	0.015	0.596
SMB	0.022	0.029	0.767	0.468	
HML	-0.098	0.041	-2.416	0.046	
Maneged Futures	-4.494	1.364	-3.295	0.002	
ALSI	-0.016	0.106	-0.147	0.884	-0.003
SMB	0.187	0.106	1.761	0.085	
HML	0.045	0.087	0.519	0.606	

Note: This table reports the regression results using the Fama and French three factor model: see Eq. (2), where: Alsi is the return on the JSE All Share Index; SMB the return on the factor-mimicking portfolio for size; HML the return on the factor-mimicking portfolio for book to market equity.

Table 6. Regression results using the three factor model of Fama and French.

Table 7 provides the descriptive statistics of fund strategies using the Fama and French three factor model. Managed futures have the highest monthly mean returns of 0.6 percent, but with also the highest standard deviation of 0.5 percent. This is followed by Absolute Return strategy with monthly mean return of 0.5 percent with standard deviation of 0.1 percent compared to the monthly mean return of 0.4 percent for Multi Strategies with similar standard deviation. The monthly mean return of the ALSI is higher when compared to all the different hedge fund strategies.

Fund Strategy	Mean	Maximum	Minimum	Std. Deviation	Skewness	Kurtosis	Jarque-Bera
Long Short	0.003	0.0116	0.000	0.002	2.037	8.787	150.258
ALSI	0.004	0.012	0.000	0.003	0.833	2.639	8.719
SMB	0.001	0.011	0.000	0,002	2.916	11.879	338.529
HML	0.001	0.011	0.000	0.002	3.352	16.034	644.509
Fixed Income	0.003	0.005	0.001	0.001	0.84	3.099	7.921
ALSI	0.004	0.012	0.000	0.003	0.811	2.538	7.931
SMB	0.001	0.011	0.000	0.002	2.807	11.077	270.104
HML	0.001	0.011	0.000	0.002	3.218	14.955	514.609
Event Driven	0.003	0.005	0.002	0.001	0.547	3.261	0.897
ALSI	0.006	0.011	0.000	0.004	0.092	1.766	1.103
SMB	0.002	0.007	0.000	0.002	1.541	3.826	7.209
HML	0.003	0.011	0.000	0.003	1.532	4.504	8.249
Market Neutral	0.004	0.007	0.002	0.001	0.106	2.153	0.539
ALSI	0.006	0.011	0.000	0.004	0.092	1.766	1.103
SMB	0.002	0.007	0.000	0.002	1.541	3.826	7.209
HML	0.003	0.011	0.000	0.003	1.532	4.504	8.249
Multi Strategy	0.004	0.007	0.001	0.001	0.129	2.128	0.585
ALSI	0.006	0.011	0.000	0.004	0.092	1.766	1.103
SMB	0.003	0.007	0.000	0.002	1.541	3.826	7.209
HML	0.003	0.011	0.000	0.003	1.532	4.504	8.249
Absolute Return	0.005	0.006	0.003	0.001	-0.141	2.272	0.305
ALSI	0.006	0.011	0.000	0.004	-0.128	1.774	0.785
SMB	0.002	0.007	0.000	0.003	1.037	2.417	2.323
HML	0.003	0.011	0.000	0.003	1.452	3.763	4.505
Managed Futures	0.006	0.027	0.000	0.005	1.962	9.204	116.753
ALSI	0.009	0.063	0.000	0.013	2.331	8.375	109.703
SMB	0.002	0.010	0.000	0.002	1.508	4.418	24.063
HML	0.001	0.010	0.000	0.002	3.472	16.718	512.245

Note: ALSI is the JSE All Share index; SMB is the return on the factor mimicking portfolio for size; HML is the return on the factor mimicking portfolio for value effect: see Eq. (2).

Table 7. Descriptive statistics of fund using Fama and French model.

4.3 Regression results and Descriptive statistics: Four Factor Model

This model is similar to that of Carhart (1997) model. Here All Bond Composite Index ALBI) is added to Fama and French (1993) three factor model (equation 3), whereas Carhart added the momentum effect. Carhart (1997) extends the Fama and French model to captures the momentum effect, we added the ALBI to see the performance of the different hedge fund strategies in relation to the ALBI.

Hedge fund managers are required to produce alpha returns. The alpha of this model show that, if statistically significant hedge fund investment strategy outperform or underperform the ALSI and ALBI factoring in the market effect, size effect and value effect.

Table 8 shows the regression results of the hedge fund strategies in our sample using the four factor model. The alphas of all the hedge fund strategies are negative and significant for Long Short Equity, Fixed Income, Event Driven and Multi Strategies at the 1 percent significance level. This model also shows that South African hedge funds do not outperform the JSE All Share Index. The coefficient of ALBI are positive for Long short Equity, Event Driven, Market Neutral, Multi Strategies and Managed Futures, but only significant for Event Driven at 10 percent significance level.

The results show that South African Hedge Fund outperforms the All Bond Composite Index (ALBI). The average adjusted R-squared for this model is 46.3 percent. The addition of ALBI to this model seems not to add more explanatory power to this model in the South African context. The Multi Strategies have the highest adjusted R-squared which improves from 72.2 percent for the CAPM model to 77.5 percent for Fama and French three factor model to 80.6 percent for the four factor model.

Most of the South African hedge fund managers seem to prefer JSE All Share Index, followed by the All Bond Composite Index for their investment. The results also show that South African hedge funds are not normally distributed as seen from the Jarque-Bera statistics. This is similar to the findings of Frydenberg, Lindset and Westgaard (2008), and those of Amin and Kat (2001b).

	Coefficient	Std. Error	t-Statistic	P-value	Adj. R-squared
Long Short	-4.403	0.637	-6.911	0.000	
ALSI	0.300	0.038	7.968	0.000	
SMB	0.017	0.030	0.557	0,579	0.449
HML	-0.011	0.027	-0.416	0.679	
ALBI	0.018	0.025	0.714	0.478	
Fixed Income	-7.357	0.378	-19.441	0.000	
ALSI	0.025	0.018	1.379	0.173	
SMB	0.028	0.013	2.074	0.042	0.545
HML	0.009	0.013	0.674	0.503	
ALBI	-0.003	0.011	-0.271	0.787	
Event Driven	-3.722	0.453	-8.222	0.000	
ALSI	0.049	0.022	2.166	0.053	
SMB	-0.028	0.017	-1.675	0.122	0.714
HML	0.019	0.015	1.271	0.230	
ALBI	0.025	0.013	1.938	0.079	
Market Neutral	-1.905	1.688	-1.129	0.283	
ALSI	0.129	0.065	2.007	0.070	
SMB	-0.008	0.049	-0.165	0.872	0.215
HML	-0.008	0.043	-0.180	0.860	
ALBI	0.032	0.036	0.879	0.398	
Multi Strategy	-3.034	0.591	-5.136	0.000	
ALSI	0.257	0.035	7.267	0.000	
SMB	0.039	0.025	1.560	0.147	0.806
HML	-0.059	0.023	-0.525	0.028	
ALBI	0.035	0.021	1.702	0.117	
Absolute Return	-5.256	1.423	-3.694	0.010	
ALSI	0.146	0.049	2.919	0.027	
SMB	0.020	0.031	0.658	0.535	0.547
HML	-0.103	0.044	-2.331	0.059	
ALBI	-0.021	0.042	-0.485	0.645	
Managed Futures	-3.786	1.538	-2.462	0.018	
ALSI	-0.026	0.107	-0.242	0.809	
SMB	0.182	0.106	1.713	0.094	-0.033
HML	0.044	0.087	0.507	0.614	
ALBI	0.071	0.071	0.995	0.325	

Note: AlSI is the JSE All Share Index; SMB is the return on the factor mimicking portfolio for size; HML the return on the factor mimicking portfolio for value effect; ALBI is the All Bond Composite Index: see Eq. (3).

Table 8. Regression results using the Four Factor model.

Fund Strategy	Mean	Maximum	Minimum	Std.Deviation	Skewness	Kurtosis	Jarque-Bera
Long short	0.003	0.012	0.000	0.002	1.839	7.966	130.492
ALSI	0.004	0.014	0.000	0.004	0.849	2.666	10.243
SMB	0.001	0.011	0.000	0.002	2.978	12.694	442.289
HML	0.001	0.011	0.000	0.002	3.553	17.889	930.067
ALBI	0.000	0.004	0.000	0.001	3.036	13.853	528.341
Fixed Income	0.003	0.005	0.001	0.001	0.841	3.099	7.921
ALSI	0.004	0.012	0.000	0.003	0.811	2.538	7.931
SMB	0.001	0.011	0.000	0.002	2.807	11.077	270.104
HML	0.001	0.011	0.000	0.002	3.218	14.955	514.609
ALBI	0.001	0.004	0.000	0.001	2.879	12.367	337.539
Event Driven	0.003	0.005	0.002	0.001	0.547	3.261	0.897
ALSI	0.006	0.011	0.000	0.004	0.092	1.766	1.103
SMB	0.002	0.007	0.000	0.002	1.541	3.826	7.209
HML	0.003	0.011	0.000	0.003	1.532	4.504	8.249
ALBI	0.001	0.004	0.000	0.001	2.383	8.108	34.569
Market Neutral	0.004	0.007	0.002	0.001	0.106	2.153	0.539
ALSI	0.006	0.011	0.000	0.004	0.092	1.766	1.103
SMB	0.002	0.007	0.000	0.002	1.541	3.826	7.209
HML	0.003	0.011	0.000	0.003	1.532	4.504	8.249
ALBI	0.001	0.004	0.000	0.001	2.383	8.107	34.569
Multi Strategy	0.004	0.007	0.002	0.001	0.129	2.128	0.585
ALSI	0.006	0.111	0.000	0.004	0.092	1.766	1.103
SMB	0.002	0.007	0.000	0.002	1.541	3.826	7.209
HML	0.003	0.011	0.000	0.003	1.532	4.504	8.249
ALBI	0.001	0.004	0.000	0.001	2.383	8.108	34.569
Absolute Return	0.005	0.006	0.003	0.001	-0.141	2.272	0.305
ALSI	0.006	0.011	0.000	0.004	-0.128	1.774	0.785
SMB	0.002	0.007	0.000	0.003	1.037	2.417	2.323
HML	0.003	0.011	0.000	0.003	1.452	3.762	4.505
ALBI	0.001	0.004	0.000	0.001	1.899	5.728	10.931
Managed Futures	0.006	0.027	0.000	0.005	1.962	9.204	116.753
ALSI	0.009	0.063	0.000	0.013	2.331	8.375	109.703
SMB	0.002	0.010	0.000	0.002	1.508	4.418	24.063
HML	0.001	0.010	0.000	0.002	3.472	16.718	512.245
ALBI	0.001	0.007	0.000	0.001	4.25	21.897	930.325

Notes: ALSI is the JSE All Share Index; SMB is the return on the factor mimicking portfolio for size; HML the return on the factor mimicking portfolio for value effect; ALBI is the All Bond Composite Index: see Eq. (3).

Table 9. Descriptive statistics of fund using the Four Factor model.

Table 9 shows the descriptive statistics of fund strategies using the Four Factor Model. Managed Futures have the highest mean returns of 0.6 percent, with standard deviation of 0.5 percent, followed by Absolute return with monthly mean returns of 0.5 percent with standard deviation of 0.1 percent Market Neutral and Multi Strategy both have monthly mean returns of 0.4 percent with standard deviation of 0.1 percent. Event Driven and Fixed Income both have monthly mean of 0.3 percent with standard deviation of 0.1 percent.

	Long Short Equity	*Fixed Income*	*Event Driven*	*Market Neutral*	*Multi Strategies*	*Absolute Return*	*ALSI*	*ALBI*
Long Short Equity	1.000							
Fixed Income	0.112	1.000						
Event Driven	-0.158	-0.082	1.000					
Market Neutral	0.510	-0.019	0.111	1.000				
Multi Strategies	0.724	0.167	-0.193	0.320	1.000			
Absolute Return	0.814	0.155	0.017	0.676	0.729	1.000		
ALSI	0.739	0.247	-0.148	0.302	0.625	0.629	1.000	
ALBI	-0.095	-0.056	0.057	-0.063	-0.165	-0.123	-0.108	1.000

Table 10. Correlation of hedge funds strategies with ALSI and ALBI**.**

Table 10 shows the correlations of hedge funds strategies with the ALSI and ALBI. Long Short Equity strategy has the highest correlation of 0.739 with the market, followed by Absolute Return which has a correlation of 0.629 and by the Multi Strategies with correlation of 0.625. Event Driven has a negative correlation of -0.148 with the market, whereas Market Neutral and Fixed Income have correlations of 0.302 and 0.247 respectively. All the hedge fund strategies except for Event Driven have negative correlations with the All Bond Composite Index (ALBI). The negative correlations of the different hedge fund strategy with the ALBI provide diversification opportunities.

	ALSI	**ALBI**	**SMB**	**HML**
ALSI	1.000			
ALBI	0.081	1.000		
SMB	-0.542	0.326	1.000	
HML	-0.180	0.335	0.530	1.000

Table 11. Correlations between variables

Table 11 presents the correlation between regression variables. The highest correlation is 0.530 between HML and SMB and the lowest is -0.542 between SMB and ALSI. The average correlation between the variables is 0.09, which is quite low to raise any concerns of multicollinearity.

4.4. Regression results using the market timing model

Market timing measures the hedge fund manager's ability to anticipate the direction of the broad market (either moving up/down). Hedge fund managers should be able to forecast the future direction of the market and adjust their fund's market risk exposure accordingly.

Table 12 shows the regression results of estimating the market timing model for South African hedge fund managers. The alpha in this model measures the hedge fund manager's

selection ability and γ_i measures the manager's market timing ability. According to Fung et. al. (2002), the use of this model allowed us to be able to distinguish between hedge fund managers performance by means of security selection (a positive and significant alpha) and those performances due to the managers market timing ability (a positive and significant $\gamma_{i)}$.

The results show that the alphas (coefficients) of all the hedge fund investment strategies are negative and statistically significant at the 1 percent significance level, except for Managed Futures which is negative but only significant at 5 percent significance level. The ALSI*Dummy (γ_i) which measures the fund manager's market timing ability are all negative and statistically significant at the 1 percent significance level for all the hedge fund strategies, except for Managed Futures which is also negative but not significant.

So, based on this evidence, it can be concluded that South African hedge manager's do not have significant market timing ability. Our findings are similar to those of Fung et. al. (2002), Do et. al. (2005), in their study of Australian hedge fund manager's market timing ability, Park H (2010), and Klien, Purdy, Schweigert and Vedrasko (2015) for Canadian hedge fund managers.

	Coefficient	Std. Error	t-Statistic	P-value	Adj. R-squared
Long Short	-5.206	0.794	-6.561	0.000	0.573
ALSI	0.224	0.062	3.604	0.000	
ALSI*Dummy	-0.137	0.023	-5.946	0.000	
Fixed Income	-3.694	0.527	-7.005	0.000	0.510
ALSI	0.184	0.041	4.448	0.000	
ALSI*Dummy	-0.063	0.015	-4.106	0.000	
Event Driven	-3.949	0.411	-9.615	0.000	0.625
ALSI	0.158	0.032	4.897	0.000	
ALSI*Dummy	-0.075	0.012	-6.277	0.000	
Market Neutral	-3.994	0.471	-8.483	0.000	0.635
ALSI	0.176	0.037	4.772	0.000	
ALSI*Dummy	-0.088	0.014	-6.444	0.000	
Multi Strategy	-4.183	0.557	-7.515	0.000	0.607
ALSI	0.228	0.044	5.222	0.000	
ALSI*Dummy	-0.095	0.016	-5.891	0.000	
Absolute Return	-4.310	0.485	-8.895	0.000	0.662
ALSI	0.189	0.038	4.995	0.000	
ALSI*Dummy	-0.099	0.014	-7.048	0.000	
Managed Futures	-3.901	1.742	-2.240	0.034	-0.108
ALSI	0.083	0.133	0.629	0.535	
ALSI*Dummy	-0.026	0.064	-0.411	0.685	

Table 12. Regression results using the market timing model.

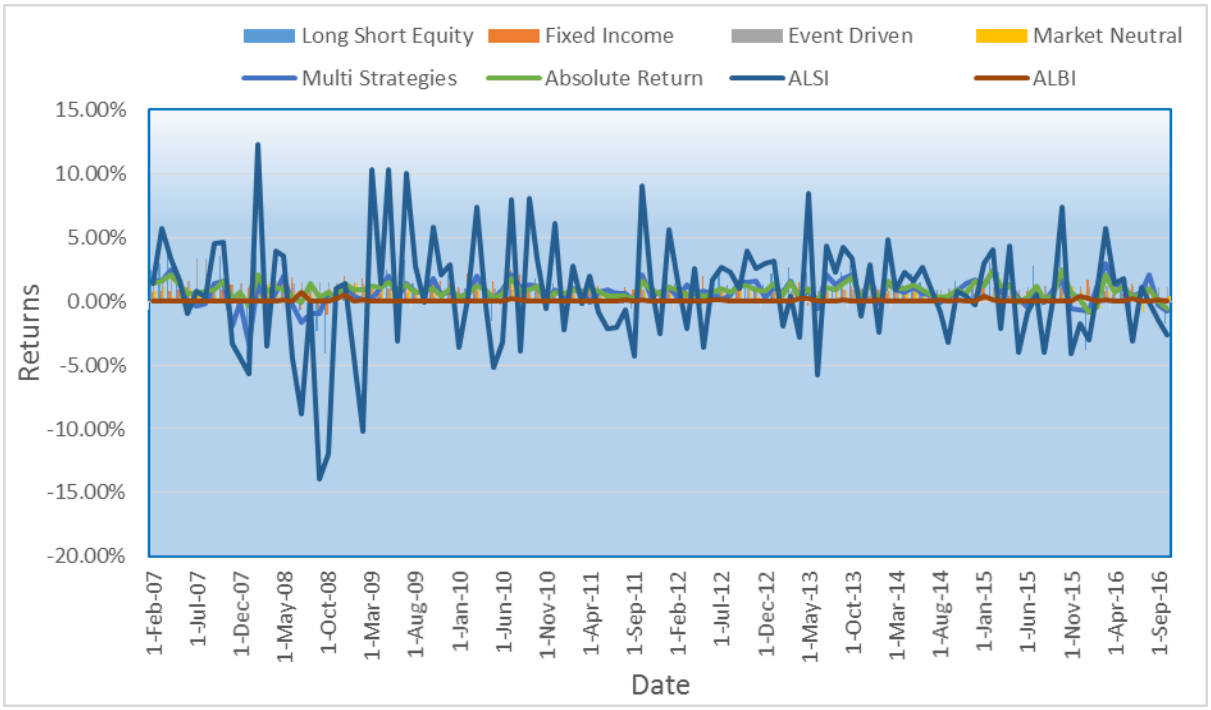

Figure 5. Historical returns of funds and Alsi and Albi from February 2007 to September 2016

Figure 5 present the monthly mean returns of the different hedge fund strategies, ALSI and ALBI. The ALSI have higher monthly mean returns.

Figure 6. Scatter graph of fund returns between February 2007 and October 2016

Figure 6 shows the scatter graph of monthly mean returns of the hedge fund strategies in our study compared to the ALSI and ALBI. The ALSI clearly have the highest monthly mean returns, but with also higher volatility.

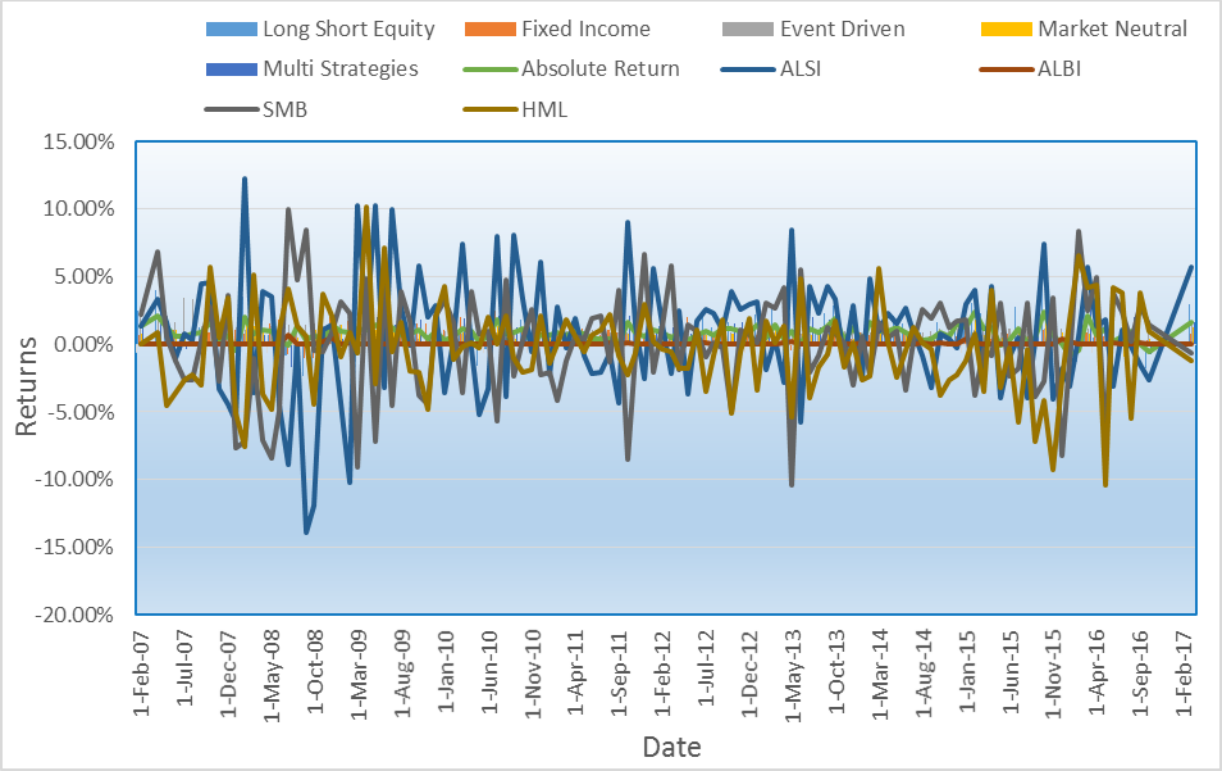

Figure 7. Historical returns of funds, Alsi, Albi, smb and hml.

Figure 7 shows the historical returns of the different hedge fund investment strategies in our study compared to returns on the ALSI, ALBI, SMB and HML. In this figure, the ALSI return is mostly higher than those of the different hedge fund strategies in our study. The ALSI also have higher return volatility.

CHAPTER 5. CONCLUSION

We analysed the performance of South African hedge funds in relation to JSE All Share Index (ALSI) and All Bond Composite Index (ALBI). We do so using Capital Assets Pricing Model (CAPM), Fama and French three-factor model and four factor model. According to the literature hedge funds are different compared to mutual funds in terms of investment strategies and returns characteristics. South African hedge fund is still very small when compared to the traditional unit trust industry and hedge fund globally, therefore literature and knowledge about South African hedge fund is limited, which motivate this research and in the light of the new regulation to see how ordinary investor could benefit from the industry.

The results shows that South African hedge fund have low correlation with the ALBI, but do not outperform the JSE All Share Index. South African hedge fund outperforms the All Bond Composite Index. Our results also show that South African hedge fund managers prefer to invest in JSE All Share Index and All Bond Composite Index.

We further test whether South African hedge fund managers have market timing ability and find that they do not have any significant market timing ability.

There are several limitations of our study regarding how hedge fund data are collected. HedgeNews Africa is the main source of hedge fund data in South Africa and hedge fund managers are not obligated to report their results. We use the period 2007 to 2016 so as to avoid backfill bias, because HedgeNews Africa was started in 2007.

Further study need to be done to see whether the inclusion of hedge fund into portfolio as a means of diversification offer any benefit to investors.

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