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Gordon Institute of Business Science
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Determining whether active investment, using a combination of investment styles, out-performs passive investment

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U 13402430

A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.

10 November 2014

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ABSTRACT

The objective of this research paper was to examine the possibility of active investment out-performing the passive investment by using a combination-based investment style for an extensive period. The combination-based style included financial-ratio-based style, market-based style and behavioural-finance-based style in the Johannesburg Stock Exchange during the period from 1984 to 2014. The four-dimension optimisation exercise based on the combination-based style was done in the in-sampling period and the result was tested in the out-of-sample period. The results have confirmed that the combination-based style out-performed the benchmark by 13% per annum over a 14 year period, which suggested that active managers could out-perform passive investment. The out-performance could further improve by recalibrating the optimisation exercise throughout the out-of-sample period to ensure the investment style learns from and incorporates with new data.

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KEYWORDS

Active investment managers – The use of professionals to actively manage clients' financial assets. The responsibilities include a certain level of due diligence in the selection of investments, day-to-day accounting, statutory and fiduciary duties as well as additional administrative activities.

Low-cost index funds – Low-cost index funds is a collective investment scheme, it aims to replicate the movements of companies in a specific financial market or investment based style at a lower costs compared to active investment managers fees. It can be in the form of index mutual funds or exchange-traded funds, it is also as known as passive investment.

Investment based style – Investment based style is defined as an investment belief held by a group of managers who trust that following the approach adds value.

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DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to perform this research.

Tsz Ching Emic Sham 10 November 2014

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CHAPTER 1: DEFINITION OF PROBLEM

1.1 Introduction

Active investment managers charge investors a management fee to maintain control of their clients' portfolios of financial assets. The responsibilities of investment managers include a certain level of due diligence in the selection of investments, day-to-day accounting, statutory and fiduciary duties as well as additional administrative activities.

Furthermore, investors also pay a performance fee to an investment manager who consistently out-performs their benchmark and his/her peers (Muller & Ward, 2011). A problem arises when investors compare their investment managers' performance with that of low-cost index funds and exchange-traded funds (ETFs). There are many individuals who perceive that their investment managers are underperforming when compared to low-cost rival, index funds' results.

Low-cost index funds are not a novel idea; the United States of America's first index mutual fund, Vanguard 500 Index, was introduced in 1976 (Huang, 2013). Yet indexing has never been more popular than it is at present, and the number of distinct benchmarks and the funds that track these funds have swelled from 419, a decade ago, to 1 732 index portfolios, in 2013. The most significant growth has been over the past five years, where an increase of 70%, to $2trillion has been experienced (Huang, 2013).

In South Africa, Satrix 40 was the first ETF that was listed that provided investors access to South Africa's primary equity market index, the FTSE/JSE Top 40. Over time, South Africa has become more innovative in this area, moving increasingly away from traditional ETFs with indices based on market capitalisation to base on other significant elements (Cairns, 2014). Such ETF products are essentially indexing based on dividend yields, research affiliates fundamental indexing (RAFI), multi-asset class,

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social responsibility and volatility. The variety of ETF products allows for an offering of low-cost passive tools that investors usually expect from active management. These offering could offer investors the quickest and easiest way to gain equity market exposure at the lowest cost.

According to Turner Investments (2014), various studies have suggested that active managers are capable of out-performing the low-cost index funds and ETFs for extended periods. In addition to this, there are three characteristics of active management that make it attractive, especially in current market conditions: collectively, active managers tend to do best when the variance in performance of individual stocks is substantial, which could be the case going forward; it can pay handsomely to invest with the select active managers who have earned the best track records; and active managers are uniquely able to exploit the market's inefficiencies (Turner Investment Partner, 2010).

One argument in favour of passive investment is that generally, active managers do not out-perform their benchmark. In addition, when they do, higher costs are engraved into out-performance. Research has revealed that in the USA, the typical actively managed equity fund earns a negative after-fee alpha (Gruber, 1996; French, 2008; Fama & French, 2010).

Active managers believe in numerous investment styles. Fama and French (2010) posited that there is a strong association between cross-sectional equity returns and so-called style variables, including size, price-to-earnings (P/E) ratio, gearing and book-to-market (B/M) ratio. In addition, other researchers have identified price effects relating to dividends, momentum, cash flow and a January Effect (Muller & Ward, 2013).

1.2 Scope of research

The research addresses the possibility of active investment out-performing passive investment over an extended period. Active investment managers who incorporate a

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combination of investment styles have a greater possibility of out-performing those who use a single investment based-style or passive investment such as index mutual funds or exchange traded funds.

1.3 Motivation for research

The rationale behind this research is both personal and generic, as the matter is pertinent not only to the researcher, but also to the present South African and global investment climate. The researcher sough to answer the question: “Why invest in active managers when ETF offers better performance?” as this question has been raised by the researcher’s clients over the past years. The topic of active investment management *versus* passive investment has also often been raised at a client level in a private capacity. The difficulty in advising clients about these differences has necessitated the research. Essentially, a thorough understanding of, and more profound research into the topic was required.

The worldwide mutual fund industry has grown extensively from 2002 to 2010, with nearly 250,000 equity funds that have accumulated $10 trillion in managed assets. Much of the recent asset growth has been in explicitly indexed equity funds (index funds and ETFs), which have grown from constituting about 14% of assets under management in the industry in 2002 to about 22% in 2010 (Cremers, Ferreira, Matos & Starks, 2014). In the USA, assets in stock index funds have increased by 70% during the last five years, to $2 trillion. During the same period, money invested in actively managed USA stock portfolios has diminished by 18% (Huang, 2013). The shift by investors in the investment approach was investigated to determine whether this situation results from poor performance of active managers or merely from conditions that were optimal for passive investment at the time.

Active managers have numerous investment styles from which to choose. The research tested whether a combination investment-style fund could out-perform its benchmark as well as passive investment.

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The research sought to address the market trepidations concerning the performance of active managers; at the same time, the research explored which combination of investment styles, if any, increased the probability of out-performing the benchmark or passive investment. The research has proved to be relevant to larger fund managers as well as to small private investors due to the high portfolio concentration and high tracking error. Furthermore, investors could be exposed to higher credit risk on companies and constraint by Regulation 28 of Pension Fund Act as portfolio concentration increased.

1.4 Research problem

This research attempted to employ a quantitative time-series approach to examine the performance of active managers in South Africa with a combination-based investment style against passive investment, such as index funds or ETFs, or benchmark index. Furthermore, different combination-based investment styles were tested against each other on a time-series approach. This sought to prove that an active manager with a focus on a specific combination-based style can out-perform the benchmark and also out-perform the low-cost funds over an extended period.

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CHAPTER 2: THEORY AND LITERATURE REVIEW

2.1 Introduction

The literature reviewed in this section offers a brief description of the most prominent (or relevant) active managers, index funds and ETFs. Thereafter, literature concerning the supporting theories is reviewed and explored in relation to the research problem.

The difference in performance of active investment, passive investment and a combination investment style over the past 30 years is also reviewed. Fama and French (2010), amongst other researchers, have identified various so-called style-based variables and each of these is addressed, and a comparison of these is presented that spans a 30 year period.

2.2 Active managers

Active managers are asset managers that are employed to ensure that the financial goals of clients are achieved. The contract is basically a principal-agent relationship, whereby the clients establish a set of investment guidelines for the management of their assets, which the asset managers are required to observe. These guidelines also require the establishment of adequate incentives for the asset manager, to ensure that the assets are managed properly and in accordance with the clients' wishes (Zhao, 2005).

There are a vast amount of actively managed funds that exist worldwide and, over time, a significant number of articles have emerged, written by active investment managers who have sought to defend their investment methods relative to passive investment techniques. These articles have tended to focus on the superior intellectual

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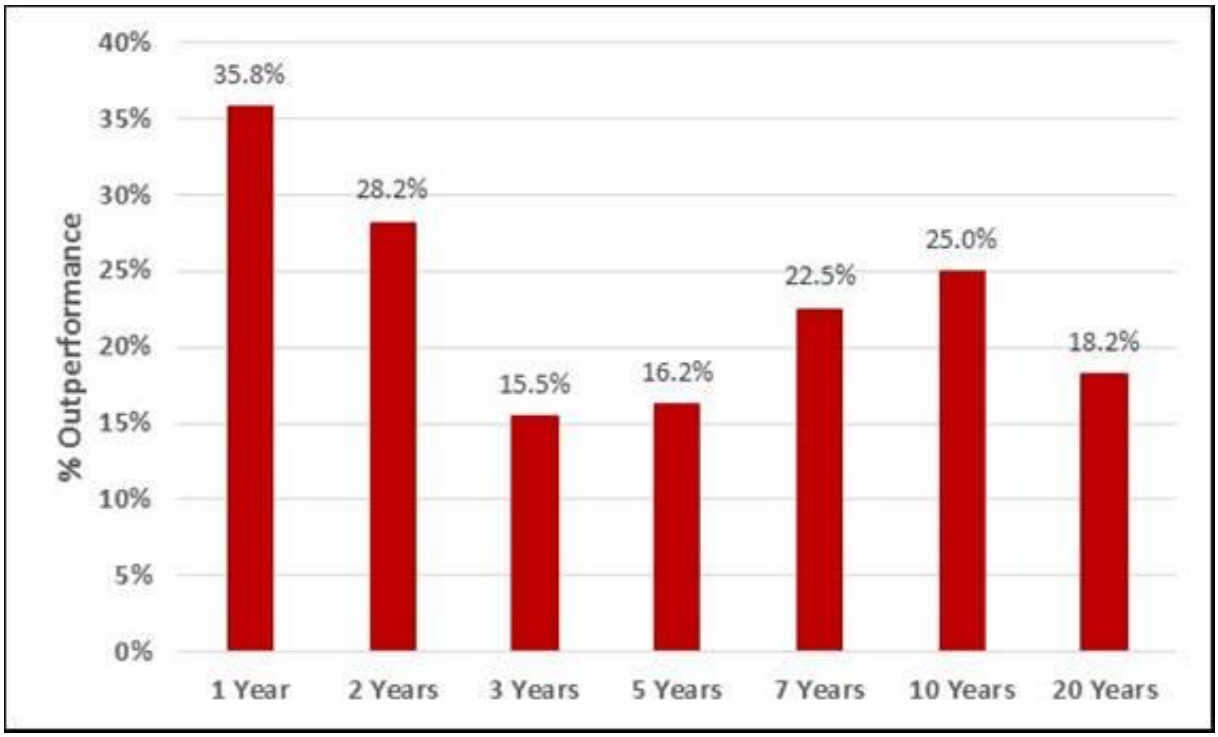
capacity of active managers and the methods that allow them to surpass the average returns of the market, which is the performance return provided by the passive index trackers (Lyudvig, 2014). Yet it has become increasingly difficult for active managers to out-perform the market.

According to Lyudvig, over the past 20 years an average of 23% of South African active unit trust managers have out-performed the All Share Index (ALSI), which is used as a benchmark (Lyudvig, 2014).

Figure 1: Percentage of actively managed general equity unit trusts that out-performed the FTSE/JSE ALSI over the past 20 years



Source: Unit Trust Survey (31 December 2013)

Based on the above information, an individual has a 77% chance of underperforming in the market when choosing active investment managers. This creates doubt when investors select to consult with active managers, as statistics expose that only 23% of active managers have the capacity to out-perform the market on an average.

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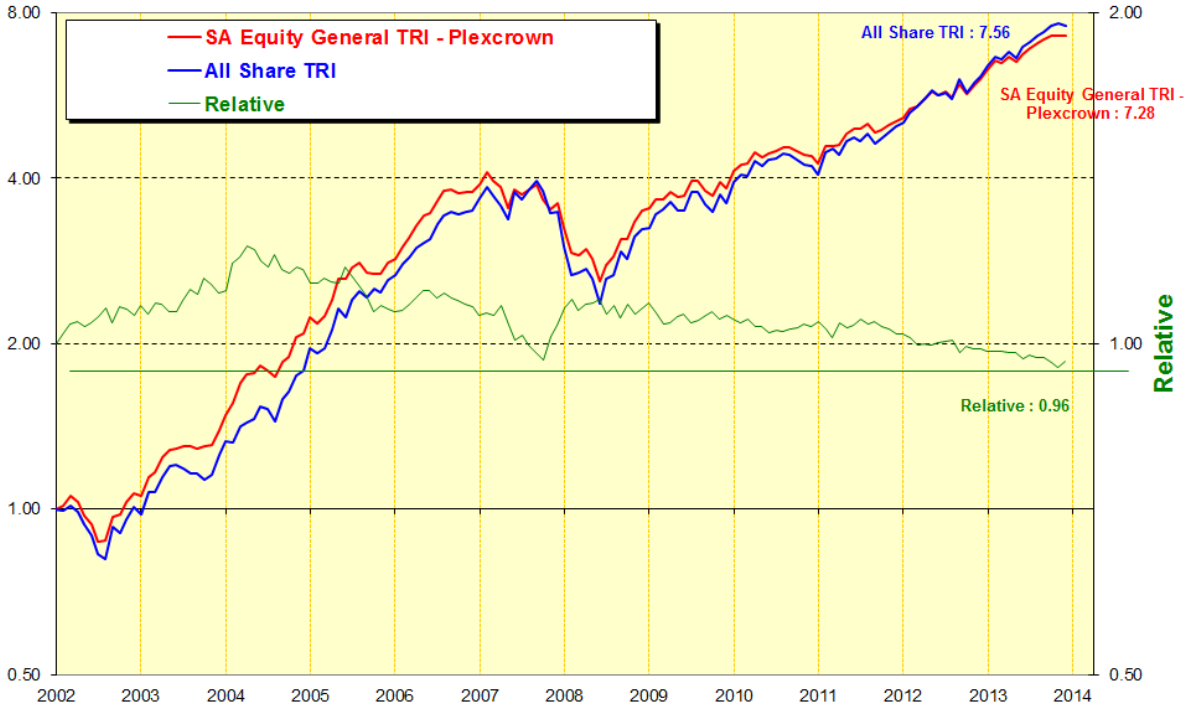
Data collected from PlexCrown, an independent leading retail unit trust fund-rating agency in South Africa, on South African General Equity Fund against South African All Share Index has revealed a different pattern since October 2002, illustrated in Figure 2. The data displays that South African General Equity Funds out-performed the All Share Index in the period from 2002 to early 2004, and from that point, the General Equity Funds have been under-performed by the All Share Index showed in the green line in the graph below.

Figure 2: SA General Equity Fund *vs* All Share Total Return Index



Source: PlexCrown (31 July 2014)

Fox and Krige's (2013) study investigated the sources of performance in South African domestic equity unit trusts. Given the concentration of the South African equity markets by sector, the study aimed to determine what portion of a fund's returns is sourced through active sector allocation as opposed to stock selection. Due to the small sample size, the study was unable to draw a statistically significant conclusion, but the trends revealed that the average active manager may not be able to out-perform the market

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and the source of out-performance is often offset by poor stock selection or poor sector allocation (Fox & Krige, 2013).

Research regarding active managers' out-performance in the market has received a mixed response. It would be expected that mutual funds would have superior performance, but evidence demonstrates the opposite. Research as far back as 1960s by Friend, Brown, Herman and Vickers (1962), Sharpe (1966) and Jensen (1968) exposed that mutual funds do not consistently out-perform the market. A more recent study by Chen, Jegadeesh and Wermers (2000) failed to support the persistence of fund performance, and any isolated cases of performance persistence were attributed to the momentum effect.

According to Turner Investments (2014), "active managers historically have tended to perform best in a market in which the performance of individual stocks varies widely". This illustrates that when performance is irregular—in other words, there are some stellar performing companies as well as some poorly performing companies—active management can help boost returns by selecting the well performing companies.

To clarify further: If half of the companies in the JSE Top 40 are performing well and half are performing poorly, an active manager who could overweight the star companies and underweight the dog companies could out-perform the benchmark.

Most of the world, including South Africa, is witnessing the active asset management industry becoming increasingly concentrated, with larger asset managers dominating the business. The concern regarding mega-managers is their size: They can only buy the larger market capitalisation companies, as other companies are too small to have any effect on the overall performance of the mega-manager (Lyudvig, 2014). The larger the asset manager becomes, the more difficult it is to perform. South Africa has a relatively narrow market, where the Top 40 shares constitute 90% of the daily trade in the market. Moving outside of this narrow range of shares leads to liquidity, tradability and other risks.

Duncan argued that if the markets are inefficient, then active management makes sense, as active management can exploit the market's inefficiencies. In the long term,

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the markets are reasonably but not perfectly efficient, but in the short term they can be inefficient. Active managers could out-perform by taking advantage of short term inefficiencies, but it is difficult to do so year after year (Cairns, 2014).

In the USA, economists have debated the value of active mutual fund portfolio management over the past fifty years, but the results of the discourse are decidedly mixed. Alan Crane and Kevin Crotty (2014) argued that when the skills of active managers are assessed, the performance of active management compared to that of an alternative passive investment is effectually being examined. The finding is that the top-performing index funds have similar skills when compared to the best active funds. However for the below-median funds, passive investments generally out-perform active managed funds. On balance, the empirical findings as consistent with the view that actively managed funds exhibit no portfolio selection skill (Crane & Crotty, 2014). While the assumption that index funds have no stock-picking skill beyond their underlying indices is uncontroversial, they may be skilled in other aspects of portfolio management.

According to Clarke, de Silva and Throley (2001), the value added in an active managed portfolio is dependent on the both managers' forecasting skill and the ability to take appropriate positions in securities that reflect those forecasts. The fundamental law of active management provides the maximum expected value added for an actively managed portfolio based on the forecasting ability of the manager and the breadth of application. However, it does not address the impact of portfolio constraints on potential valued added. Active portfolio management is typically conducted within constraints that do not allow managers to fully exploit their ability to forecast returns. Constraints such as no short sales and security concentration limits impede the transfer of information into optimal portfolio positioning, and decrease the expected value of the funds. Other constraints, such as market-cap and value/growth neutrality with respect to the benchmark are further restrictive of an active portfolio's composition (Clarke, de Silva & Throley, 2001).

2.3 Benchmarks

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A benchmark is a standard against which the investment manager or investment fund can be measured. Benchmarks form an integral part of fund management, both for active managers who seek an appropriate index against which to evaluate their performance, as well as for passive fund managers who seek an index to track (Kruger & van Ransburg, 2008). A commonly asked question is: What constitutes a suitable benchmark? This is a practical problem that has perplexed both fund managers and clients.

Most of the active fund managers try to minimise the risk of their fund under-performing the benchmark by reducing the tracking error. The tracking error is the conventional method utilised to measure how closely a fund replicates its benchmark index (Blume & Edelen, 2004). Essentially, it measures the deviation from the benchmark index. Therefore, most active managers managed their portfolios by trading the shares in companies that belong to these benchmarked indices in order to reduce their tracking error and their risk of under-performance (Kappou, Brooks & Ward, 2010; Wurgler, 2010).

In South Africa, the Johannesburg Stock Exchange (JSE) is often criticised for high levels of concentration, both in terms of market capitalisation and liquidity, and it is further complicated by a large and relatively volatile resources sector. For the majority of funds, the investment and due diligence process involves an evaluation of past performance and risks exposure to certain benchmarks. Thus, the selection of benchmark is critical in this context, and simply adopting the investment manager's stated benchmark for fund analysis may not yield accurate results (Bailey, 2013).

A well-known benchmark in the South African market is the ALSI. It is constituted according to the FTSE Global Classification System, on the basis of the free-float index methodology. Bailey (2013) claimed that ALSI, as it currently stands, cannot serve as a true benchmark index, as it suffers from a combination of prudential concerns and there is apprehension about whether it is representative of the local investment universe

The shareholder weighted index (SWIX) was created with the objective of being more representative of the local investment universe. By removing the foreign holdings of

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only the dual-listed shares from the ALSI, the aim is to reduce the concentration problem that is common this benchmark.

In contrast to the SWIX, the capped index (CAPI) addresses the issue of risk and concentration directly, while ignoring the issues of foreign holdings and the local investment universe. It is implemented at a 10% level on all shares, which constitute the ALSI, with secondary capping applied to any uncapped shares that might be increasing the weighting above the 10% level.

The third benchmark index is down-weighted resources benchmarks. It is a customised benchmark that is adopted by fund managers as a response to the problem of excessive resources weightings on the exchange. The methodology adjusts all resources shares within the ALSI, typically to 50% or 80% of their original weights, with the excess weight redistributed amongst the remaining shares in the index, in proportion to their original index weights.

Based on Kruger and Van Rensburg's (2008) research, the market concentration on the JSE is largely responsible for many of the inefficiencies of existing equity benchmarks. Liquidity also plays an increasingly important role in the determination of fund holdings as the fund size increases (Kruger & van Ransburg, 2008).

2.4 Index mutual funds

The first index mutual fund in USA was introduced in 1975. It is a type of mutual fund with a portfolio constructed to match or track the components of a market index, such as the Standard & Poor's 500 (S&P 500) index. It is a convenient way for investors to gain exposure in the stock market without trading an individual shares. It also offers a diverse share portfolio at an affordable price to investors (Bailey, Kumar & Ng, 2011; Kostovetsky, 2003).

Over the last forty years, the number of passive index funds has increased from one to over 350 (Investment Company Institute, 2013). This growth has not been confined to S&P 500 funds; index funds now track many active style indices. For example, S&P

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produces underlying indices for 12 different domestic equity value/growth and market capitalisation combinations alone, not to mention a variety of sector-specific indices.

Thus index funds have been elevated in importance by creating an unexpected implication on the share prices of their member companies, for which they were not designed (Gastineau, 2002). The purpose of the index funds is to replicate the benchmark index; therefore the index funds should have a tracking error close to zero. Since index funds must minimise tracking error, any introduction or exclusion of a share from the index triggers mechanical purchases or sales of that share regardless of the valuation (Petajisto, 2009).

Based on the popularity of index mutual funds, currently there are trillions of dollars managed worldwide with various connections to an index (Wurgler, 2010), including connections in the form of exchanged-traded funds that track an index, through index funds or unit trusts.

2.5 Exchange-traded funds (ETFs)

In South Africa the first ETF listed in 2000 was the Satrix 40; it is the quintessential index tracker, providing investors access to South Africa's primary equity market index, the FTSE/JSE Top 40. As Cairns (2014) explained, the Satrix 40 was ideal in providing an entry point into index-tracking through a product that was easy to understand (Cairns, 2014).

ETFs may trade at a market-determined price, which differs from their net asset value (NAV). Based on Charteris' (2013) research, these differences do not persist for more than two trading days, and arbitrary opportunities for investors are thus limited. However, the deviations contain important information about the following day's returns on ETFs, in contravention to weak-form market efficiency (Charteris, 2013).

As ETFs developed over time in South Africa, the ETF offering became more innovative. The traditional tendency of remaining with indices, based on market capitalisation, has changed; there are now alternative ways of observing the markets.

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These products offer low-cost passive tools that include tools usually expected from active management, such as market view or asset allocation, which provide more than a mandatory exposure. Many innovative ETF offerings are discussed from a South African perspective.

Satrix Divi is an innovative ETF offering that is based on dividend yields. This strategy is regarded as a well-recognised investment approach. Since 1926, dividends have contributed to nearly a third of all returns from equities, with two-thirds coming from capital gains (Cairns, 2014). The Satrix Divi was launched to track the FTSE/JSE Africa Dividend Plus Index, which ranks the top 30 companies from the large and mid-cap sectors of the JSE, based purely on their forecasted dividend yields. These rankings are determined through a consensus forecast.

Grindrod DiviTrax, a second dividend ETF, was launched in South Africa in 2014. It tracks the S&P South Africa Dividend Aristocrats Index and only includes those companies that enjoy average daily trade of at least R5 million, and that have consistently increased or maintained their dividends for five consecutive years (Cairns, 2014).

Satrix RAFI 40 is also an innovative product in the South African ETF market. The concept of tracking the FTSE/JSE RAFI 40 Index was introduced to South Africa recently (Caims, 2014). The RAFI methodology measures and ranks all JSE-listed companies based on four fundamentals, namely cash flow, book value, sales and dividends. The 40 companies that are ranked first are included in the RAFI 40 Index.

South Africa offers two multi-asset ETFs, namely NewFunds MAPPS Growth and NewFunds MAPPS Protect (Caims, 2014). These provide investors with a low-cost entry into asset allocation by investing in composite indices that consist of equity, bonds and cash. This remains a novel innovation for buying a single-listed security that provides access to the performance of more than one asset class.

Socially responsible investment (SRI) is also developing into a widely-followed practice and aims to promote sustainable and transparent business practices. The US has

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many ETFs tracking indices that measure everything from clean energy to corporate governance (Caims, 2014).

The JSE launched the SRI Index in May 2004, under the assumption that the index would foster good corporate citizenship and promote sustainable development (Caims, 2014). The index is measured against a holistic set of environmental and social governance (ESG) and related sustainability concerns, as well as a fourth concern, climate change. It uses an aggregation methodology in relation to the indicators, based on analysis of the information that companies make public. In South Africa, the universe of socially responsible ETFs is limited to two: the Nedbank BettaBeta Green Fund and the NewFunds New SA Fund.

Another popular indexing strategy in Western countries is that of ranking shares according to their level of volatility. The first South African ETF measuring volatility, the Grindrod LowVol Trax, was launched in April 2014. The fund tracks the S&P South Africa Low Volatility Index, which includes the 40 least volatile stocks on the market, based on their standard deviation over the last 252 days. The stocks must have a minimum three-day average trade value of R10 million to be eligible.

2.6 Style-based

Equity style is defined as an investment belief held by a group of managers who trust that following the approach adds value (Christopherson & Williams, 1997). To justify Christopherson and Williams' argument, a style should result in the clustering of factor tilts or portfolio characteristics among those portfolios that share the style. Four broad style categories were defined by Christopherson and Williams:

- **Value**

  Value investing focuses on companies that have demonstrated growth and profitability well below the market average, and that have experienced price declines because of adverse investor sentiment (Christopherson & Williams, 1997). Investment managers who follow this investment style could fall into one

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of the following categories of value investing: “the low P/E manager”, “the contrarian manager” or “the yield manager”.

Value investors are attracted to a bargain. Their strategy is to find stocks that are priced low as a result of a company’s temporary difficulty, because its industry has fallen out of favour or because of a bear market. Investors compare the intrinsic value of the stock, the actual value of the company, with the value that investors have given its shares in the market.

- **Growth**

  Growth managers invest in companies with above-average growth prospects, and are prepared to pay above market multiples for these growth rates (Christopherson & Williams, 1997). The two growth styles identified by Christopherson and Williams are “the consistent growth” and “the earnings momentum”.

  Growth enthusiasts seek companies with the best prospects for above-average growth. These investment managers believe that investing in companies whose earnings are growing faster than average is the best way to ensure a return. Growth investors tend to ignore trading multiples of the companies and mainly focus on the potential rapid growth to gain their return in share price (Burns, 2010).

- **Market-oriented**

  Investment managers who follow a market-oriented style do not have a strong preference for either growth or value. Instead, these investment managers prefer holding onto well-diversified portfolios, which are characteristic of the market average.

- **Size**

  The last style described by Christopherson and William is “size”. The investment manager who chooses to focuses on small companies is known as “the small

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capitalisation manager". This style could be further segmented to reflect a value, growth or market-oriented bias.

Momentum effect is another investment style that has been extensively researched by academics. According to Jegaheesh's (1990) findings, there is a strong evidence of the predictive behaviour of stock returns. This revelation rejects the hypothesis that stock prices follow random walks and attributes the predictability of stock returns either to market inefficiency or to systematic changes in expected stock returns (Jegadeesh, 1990). Furthermore, Jegadeesh and Titman (2001) indicated that over 1% of abnormal return can be achieved by a self-invest strategy that consists of purchasing stocks that have out-performed in the past six months and selling the stocks that have under-performed during the same period (Jegadeesh & Titman, 2001). This strategy relates to the behavioural-finance-based style, where investors ranked stocks based on their past three to 12 month returns to predict for the relative performance over the next three to 12 months to gain the abnormally high returns. George and Hwang found that a momentum strategy based on the 52-week high provides superior returns (George & Hwang, 2004).

Muller and Ward (2013) established that with an indiscriminately low level of interest cover investment style portfolio with a median of 1.7 times interest cover, it would persistently under-perform and should be avoided. The very low interest cover indicates that companies are over-gearing and are in financial crises. The best performing portfolio has a median that is 3.7 times greater than the interest cover ratio, even though there is no sustained evidence of out-performance against the index (Muller & Ward, 2013). The graph below depicts the five different portfolio performances ranked by their interest cover ratio and the results support the theory regarding capital structure, in that there is an optimal gearing level for companies.

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Figure 3: Style – Interest cover

Source: Muller & Ward, 2013

Hou, Xue and Zhang (2012) suggested that return on equity predicts share price returns. A company with a high expected return on equity (ROE) relative to a low investment relates to high discount rates within the company. The high discount rates are necessary to counteract the high expected return on equity to induce low net present values of new capital and subsequently low investment. Conversely, if the discount rates are not high enough to compensate for the high expected on equity, the company would instead observe high net present value to investment. Similarly, the low expected ROE relative to high investment ensures low discount rates. However, if the discount rates are not low enough to counteract the low expected return on equity, the firms would instead observe low net present values of new capital and then invest less (Hou, Xue & Zhang, 2012).

To further assess Hou, Xue and Zhang's suggestion, Muller and Ward's (2013) research found that within the 5th quintile (very low ROE companies) and in the 1st quintile (very high ROE companies), investment style generated the poorest return compared to the highest portfolio return in the 3rd quintile companies, as displayed in the figure below (Muller & Ward, 2013):

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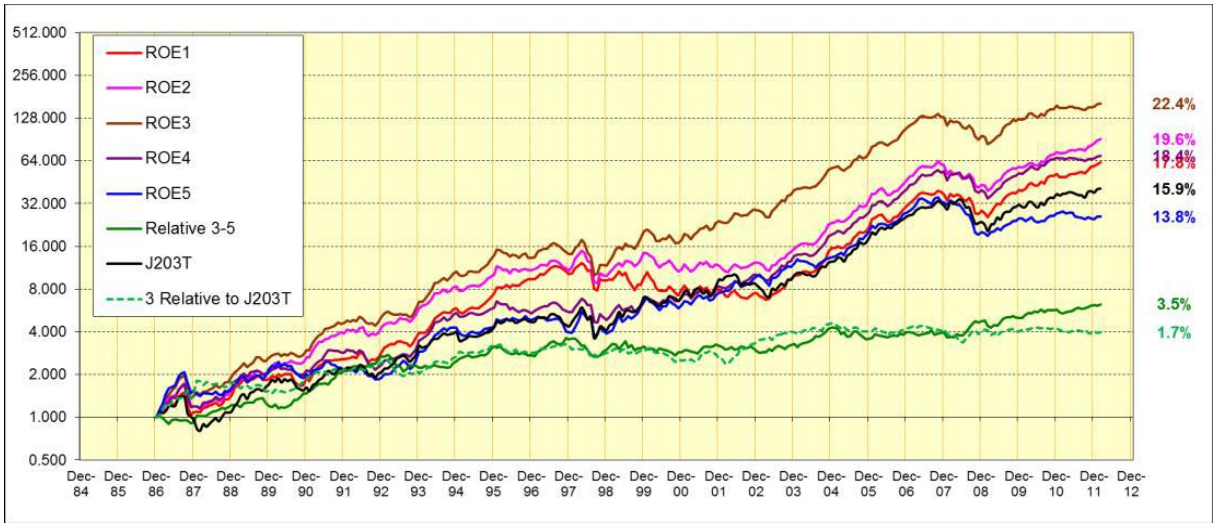
Figure 4: Style – Return on Equity



Source: Muller & Ward, 2013

The explanations from Muller and Ward were that the poor performance of the high return on equity portfolio was either that these shares are already fully priced by investors, or else that the very high levels of return on equity in the prior period have peaked and are not sustainable (Muller & Ward, 2013).

As Christopherson and Williams (1997) emphasised, the traditional difference in value and growth stocks is the investment style. Ahmed and Nanda (2010) found that in the traditional methods of classification, the instance is ignored when value and growth investing strategies can complement each other in selecting superior performing stocks, instead of being mutually exclusive. In Ahmed and Nanda (2010) research disclosed that growth in earning per share is more proficient in capturing growth than a measure of low earnings yield. Ahmed and Nanda's study provided a strategy for investing in companies that have the dual characteristics of high earnings yield and high growth in earnings per share that out-perform a strategy of high earnings yield alone (Ahmed & Nanda, 2010).

There are no rules or reasons to prevent active managers from combining different based-styles to predict future stock prices. Evidence permits the combination of

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fundamental strategies with the technical momentum approaches to yield results that out-perform pure technical momentum strategies (Shih, 2010)

Chen and Lee found that a combination of behavioural-finance-based style and market-based style out-performed the individual momentum strategy (Chen & Lee, 2011). Research has revealed that a combination of six month price momentum with various value strategies during the period from 1993 to 2008 in the Finnish stock market culminated in an increase in the performance of the portfolio (Leivo & Patari, 2011).

The success found in the combination of behavioural-finance-based style and market-based style is evident in the work of Bettman, Sault and Schultz (2009), who proposed a hybrid stock valuation model using book value and earning per share as the market-based style and price momentum as the behavioural-finance-based style. The result proved to have superior explanatory power relative to considering either fundamental or technical analysis in isolation (Bettman, Sault & Schultz, 2009).

Similarly, Neely, Rapach, Tu and Zhou found evidence from their research that indicated that the fundamental and technical analysis method captures different sources of equity premium changes and these two approaches were deemed complementary to each other (Neely, Rapach, Tu & Zhou, 2010).

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CHAPTER 3: RESEARCH PROPOSITION

The objective of this research paper was to examine the plausibility of a combination of investment-based styles to present to active managers. Secondly, the research paper sought to determine whether the combination-based style could out-perform the benchmark, index mutual funds or exchanged-traded funds.

To complement the testing of this strategy, the return on each based-style was compared; respectively the financial-ratio-based style, market-based style and behavioural-finance-based style.

Essentially, the following portfolios were created to monitor the results:

Table 1: Investment based-style portfolio

CATEGORY	STYLE OF INVESTMENT	PARAMETERS
Portfolio 1	Financial-ratio-based style	Five year average return on equity
Portfolio 2	Financial-ratio-based style	Interest cover ratio
Portfolio 3	Market-based style	Earnings yield
Portfolio 4	Behavioural-finance-based style	12 month momentum
Portfolio 5	Combination-based style	5 year average Return on Equity Interest Cover ratio Earnings Yield

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CHAPTER 4: RESEARCH METHODOLOGY

4.1 Proposed research method

4.1.1 Rationale for proposed method

This study sought to explore and delve into the different investment approaches. It was based on JSE price data from 1984 to 2014, in combination with company financial statement data from company websites and INET. The data included all companies that were listed on the main board of the JSE over the same period, and included new listings and delisted companies. All corporate actions related to changes in share prices, share splits or consolidations were backward adjusted in the time-series data.

Total return from companies was calculated on a quarterly basis. The returns from new derivative companies into the original holding company were included and thereafter both companies were treated as separate entities.

In the share return calculation, share buy-backs were not accounted for, on the basis that these are a form of capital reduction that only affects those shareholders who exit the company (Muller & Ward, 2013). Dividends were included in the share return calculation using the Yahoo Finance and INET historical time series of dividend pay-outs. The calculation also included scrip dividends in the share returns.

The newly listed shares were included at the beginning of the next quarter. The delisted shares were dropped at the end of each quarter, on the basis of their last price prior to the cessation of trading.

There were more than 350 companies listed on the JSE over the time period that was analysed. The ALSI comprises only the largest 160 companies, but it represents

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approximately 99% of the total market capitalisation. Companies that fall outside of the ALSI are considered to be too illiquid for institution clients; therefore, they were excluded from the analysis. The possible investment styles in the literature review were used to select the companies from the ALSI, to form an investment portfolio, which was compared with the benchmark, index funds and ETFs.

The methodology was to imitate a set of investment philosophies that active managers follow and time series was employed to compare the set's performance to benchmark or low-cost index funds. This allowed back-dated testing to ensure that it was based on a real time basis and to mitigate the stock selection bias and survivor bias.

4.1.2 Proposed research process

The research project took the form of a quantitative study. The initial step included the optimisation of the portfolio return from the combination of parameters for the period from 1984 to 2000, referred to as optimisation in sample testing. Second, the optimised parameters in the period from 2000 to 2014 were assessed, to examine whether the investment style continued to perform, referred to as an out of sample testing. The return profile on each of the parameters in each investment based-style was also assessed. Finally, the combined different parameters were assessed in terms of their return profile to ascertain which of the combination offers the highest return by filtering the ALSI companies into the possible investment styles. These results were categorised into financial-ratio-based styles, market-based styles and behavioural-finance-based styles.

- **Financial-ratio-based styles:**

  Financial theory supports the idea that companies that exhibit strong accounting-based results ought to demonstrate correspondingly better performance in terms of investor returns (Muller & Ward, 2013). The following attributes have been identified as financial-ratio-based styles parameters:

  - Return on capital

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- Return on equity
- Interest cover
- EBITDA ratio
- Revenue growth
- Free cash flow

This analysis selected return on equity and interest cover as the primary parameters to examine the return profile under the financial-ratio-based style.

- **Market-based-styles:**

Research has proven that the size of a company negatively correlates with returns (Muller & Ward, 2013). Financial ratio with market value of a share has been shown to differentiate style metrics such as value and growth. Share tradability or liquidity is also considered to be a significant criterion for investment decisions. The following have been identified as market-based styles parameters:

- Market capitalisation
- Price to book
- Dividend yield
- Earnings yield
- Liquidity

Earnings yield was chosen in this analysis as the primary parameter to examine the return profile under the market-based-style.

- **Behavioural-finance-based styles:**

According to Van Ransburg and Muller, momentum and mean reversion feature strongly in various behavioural indicators (Muller, 1999; van Ransburg, 2001).

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The following parameters were identified as part of the behavioural-finance-based styles restrictions:

- Momentum
- Mean reversion
- Analysts' recommendations

Under the behavioural-finance-based style, momentum was chosen as the primary parameter to examine the return profile.

- **Combination-based styles:**

There has been reported success regarding the combination based-style (Bettman, Sault & Schultz, 2009). Therefore, this analysis took the primary parameters in each of the styles to examine the different return profile with different combination of primary parameters.

- Return on equity
- Interest cover
- Earnings yield
- Momentum

By performing the filtering process, the companies that suited the selected criteria on a rolling quarterly basis were included in the portfolio. The performance of the portfolio was measured against its benchmark and the low-cost index funds.

Based on the literature review, the correct and most appropriate benchmark was selected. This step enabled the researcher to review the portfolio construction and the investment selection process to determine the appropriate benchmark.

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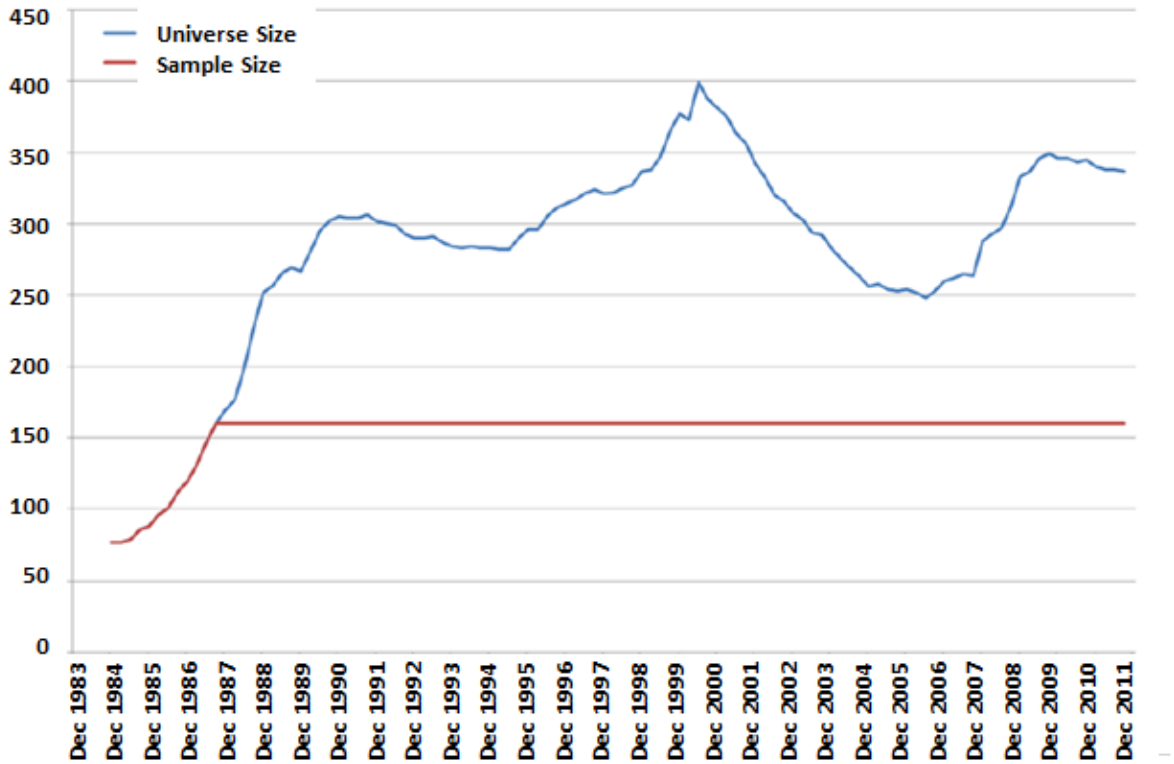
The same applied to index mutual funds and ETFs. These serve as a comparison for the combination style-based funds.

4.2 Proposed population

The population under consideration comprised of all shares listed since 1984 on the JSE. The survivorship bias was avoided by including delisted companies and the unbundled shares were treated as new listings. All the index mutual funds and ETFs listed on the JSE since 1984 were also considered, along with any low-cost index funds trading outside of South Africa.

Figure 5: Population and sample



Source: Muller & Ward, 2013

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4.3 Size and nature of the sample

The low-cost index funds were assumed by using the All Share Index (ALSI) in this analysis. The benchmark was compared to the combination style based portfolio over a 30 years period. The sample was based on the appropriateness of the combination of style-based portfolios.

4.4 Data collection, data analysis and data management

To examine the performance of a combined investment-based style, data must be collected in the population universe. The data collection is the most influential aspect in research findings**;** therefore**,** data collection must be free of error. After capturing the data, data analysis be performed to determine the findings from the data. This process involves consistency and careful management. In addition, any limitations in the research should not be ignored (all research faces certain limitations), provided that there is an acceptable degree of limitations.

4.4.1 Data collection

Data collection took the form of a combination of data from company financial statements and data from company websites and Bloomberg/INET; newspapers were also used. The data was captured manually, using Microsoft Excel, as well as Excel direct links from Bloomberg/INET.

Company websites were used to collect financial statements in order to cross-reference statistics from third-party service providers. It was important to ensure that all the data in the collection was correct and error-free, as errors could jeopardise and skew the final research results.

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Newspapers such as Business Day were also used to collect low-cost index funds data. These were used together with websites to collect funds' prices over the 30 years period.

4.4.2 Data analysis

The researcher used Microsoft Excel for data analysis, and employed VBA code to manipulate the data from Access databases. The parameters enabled the researcher to select the start date, end date, the number of investment selections, the weighting of each investment, the review period, the number of benchmarks, the number of low-cost index funds and, most importantly, the input to the investment-based styles parameters.

Portfolios were based on the set parameters that had three sub-portfolios. The first sub-portfolio invested in the first month, the second sub-portfolio invested in the second month and the third sub-portfolio invested in the third month. Each sub-portfolio maintained investments over a three month period and on the last day of each quarter, the portfolio value was retained and the portfolio was rebalanced, based on the set parameters. The weighting of each investment was an equal weighting basis.

Each investment was given an equal weighting based on the parameters' findings at the beginning of each quarter and each trade was included a security transaction cost, value added tax and market impact adjustment. In this research paper, a total transaction cost of 1.1% per trade was used, derived from the daily analysis of companies closing bid-offer spreads.

The graph below demonstrates the historic spread for the largest 40, 80, 120 and 163 companies from year 2000 to 2014. The top 40 had a 1.5% and 0.15% spread in 2000 and 2014 respectively. The same trends were evident for the top 80, 120 and 163 companies in the ALSI. The top 120 companies included the top 80 companies; it is in an accumulated basis. The exception period occurred during the financial crisis in 2008, as the graph indicated that the spread widened, especially towards the smaller companies. The gap between the top 40 and top 163 narrowed substantially, and could

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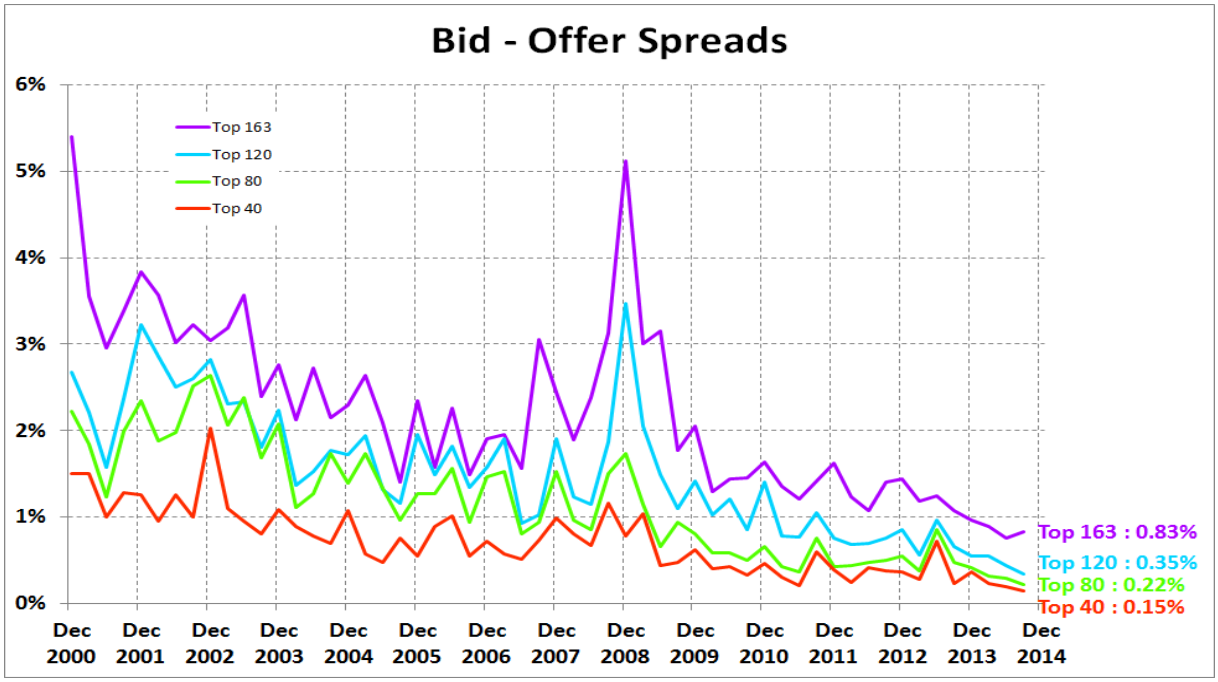
be explained by the improved efficiency in the market or the increasing of algorithm trading by the market makers. In the research paper, 1.1% was used as the total transaction cost and it is believed that this is a very conservative approach based on the historic trends and also using the bid-offer spreads.

Figure 6: Bid and offer spread



Source: INet, 2014

4.5 Potential research limitations

The following aspects were limitations to this study:

- The possibility of a “look ahead” bias.
- Liquidity constraints, depending on the value of the investment portfolio.
- Financial statement data is generally only released by company a few months after the financial year-end date.

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- Share prices do not reflect the lag in the release of financial results.
- Accounting standards change over time.
- Active managers based on the set parameters criteria.
- Data was based on JSE listings only and did not cater for dual-listing companies.
- The parameters generated by the four-dimension optimisation exercises were not recalibrated over time, therefore the optimisation was completed only once and the optimisation point could be different after year 2000.

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CHAPTER 5: RESULTS

In this research report, the portfolio return testing in each primary parameter was stipulated, and then the different primary parameters were combined into one parameter to examine the combination-based style return profile. The primary parameter was based on the following three styles: Financial-ratio-based styles, market-based styles and behavioural-finance-based styles.

The initial outcome determined the optimisation point in the combination-based style from the period between 1984 and 2000. This was done to ascertain the point at which the combined parameters generated the highest return for that period; the results are calculated in a four-dimension structure.

Based on the filters within the financial-ratio-based style, market-based styles and behavioural-finance-based style, the four-dimensions optimised return profiles on five years' average return of equity, interest cover ratio, earnings yield and momentum investment styles are presented in the tables below. This four-dimension optimisation exercise consisted of one variable parameter and three fixed parameters simultaneously. The optimised parameter points are as follows:

- Return on equity: above two percent of five years' average
- Interest cover: above zero times
- Earnings yield: the top 40th percentiles of the highest earnings yield
- Momentum: the eighth percentile of the highest share price return in the last four quarters.

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Table 2: Four-dimension optimised on five years' average return on equity

		Return
ROEAvg5	-10%	51.9%
	-8%	51.9%
	-6%	52.0%
	-4%	52.0%
	-2%	51.8%
	0%	51.8%
	2%	52.1%
	4%	52.1%
	6%	42.3%
	8%	44.9%
	10%	36.4%

Table 3: Four-dimension optimised on interest cover ratio

		Return
InterestCover	0.0	52.1%
	1.0	51.2%
	2.0	48.4%
	3.0	48.7%
	4.0	44.4%
	5.0	31.5%
	6.0	30.5%
	7.0	22.8%
	8.0	17.2%
	9.0	16.1%
	10.0	20.7%

Table 4: Four-dimension optimised on earnings yield

		Return
EarningsYield	0%	0.0%
	10%	15.9%
	20%	22.7%
	30%	40.4%
	40%	52.1%
	50%	50.4%
	60%	51.0%
	70%	49.3%
	80%	44.8%
	90%	37.6%
	100%	35.2%

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Table 5: Four-dimension optimised on momentum

		Return
Momentum	1%	4.2%
	2%	22.9%
	3%	34.3%
	4%	42.1%
	5%	49.7%
	6%	42.1%
	7%	45.6%
	8%	52.1%
	9%	50.9%
	10%	49.4%
	11%	46.5%
	12%	46.4%

The objective of the above four-dimension optimisation exercise was to determine which combination of the parameters generated the highest return. As the results demonstrated, above two percent of five years' average return on equity, above zero interest cover ratio, 40th percentile of the highest earnings yield and the eighth percentile of the highest share price return in the last four quarters are the optimal points that generated the highest return combination from 1984 to 2000. A compound annual growth of 52.1% over the 16 years period was generated through this combination-based style.

The second step tested the performance on the optimised parameters independently in the out-of-sample period. The following graphs illustrate the return profile and portfolio characteristics from 2000 to 2014 based on each parameter:

Muller and Ward (2013) found that investing in the third quintile of the return on equity, that companies generated the highest return compared to the other quintiles. As the four-dimension optimisation exercise indicated, the two percent of five years' average return on equity is the optimal level to generate the highest return over the period from 1984 to 2000. The following graphs provide the return profile and the characteristics of this parameter under financial-ratio-based style in the period from 2000 to 2014:

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Figure 7: Above 2% five years' average Return on Equity portfolio characteristics

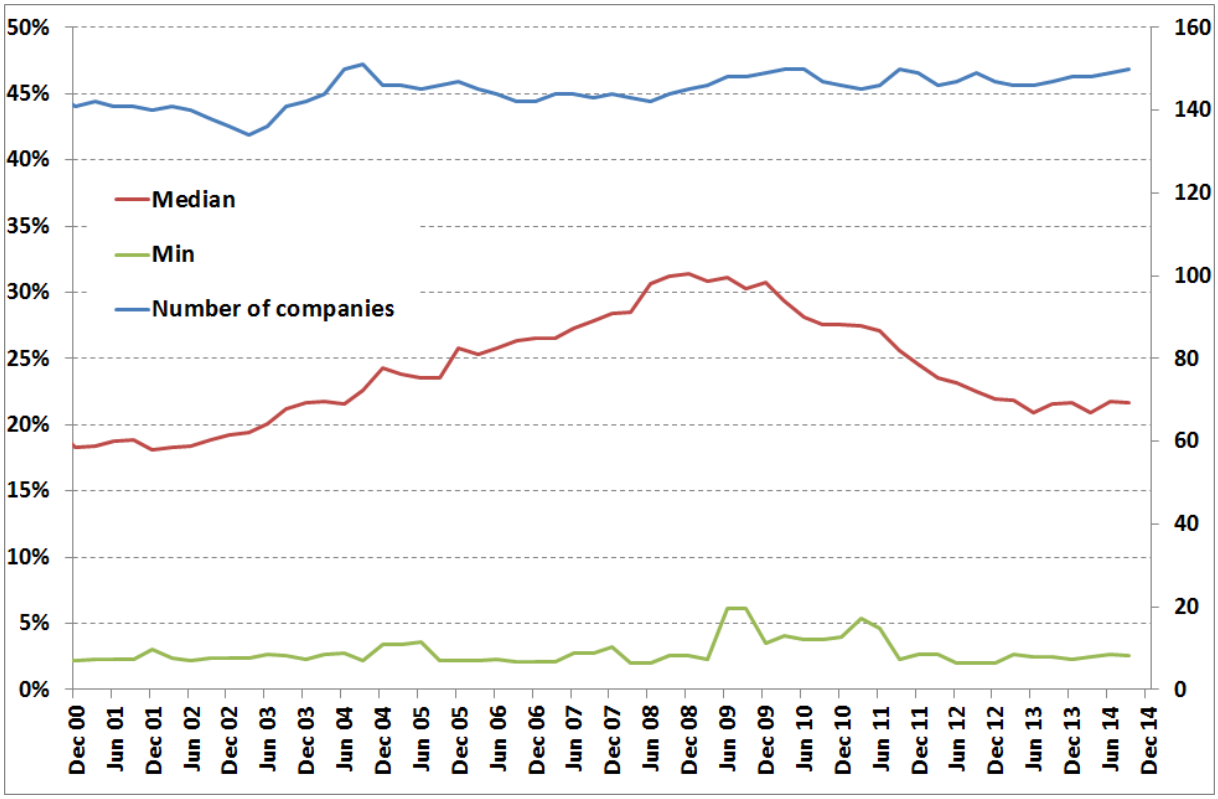
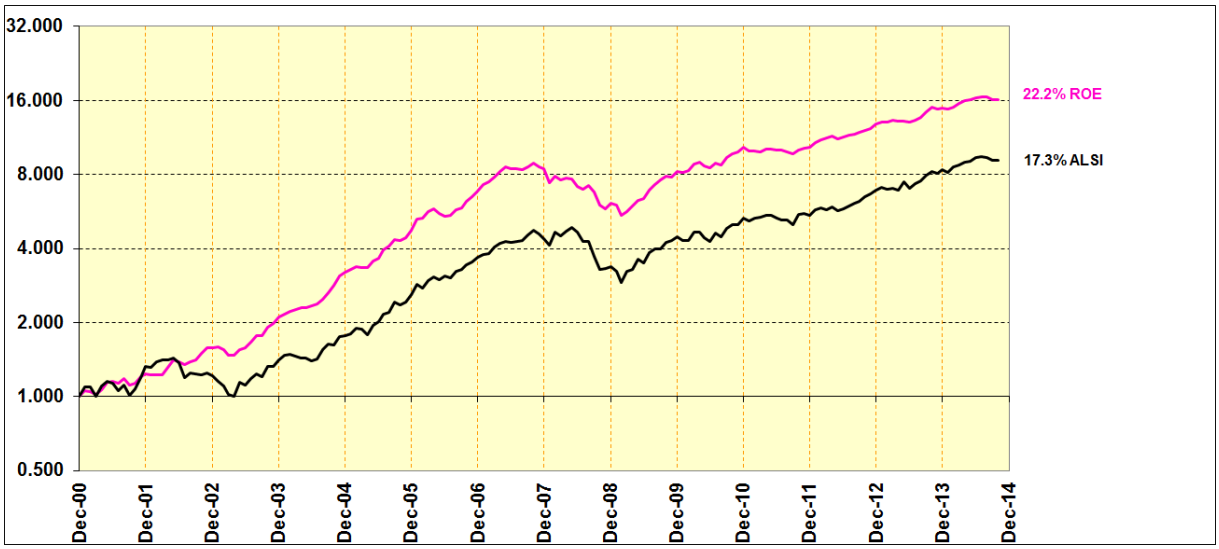


Figure 8: Above 2% five years average Return on Equity portfolio returns



Muller and Ward's (2013) research found that the best performing portfolio under the interest cover ratio investment style has a median of 3.7 times interest cover ratio

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(Muller & Ward, 2013). The four-dimension optimisation exercise showed that above zero interest cover ratio generated the highest return in the combination-based style during the period from 1984 to 2000. The following graphs provide the return profile and the portfolio characteristics of the parameters of the financial-ratio-based style from 2000 to 2014:

Figure 9: Above zero interest cover ratio portfolio characteristics

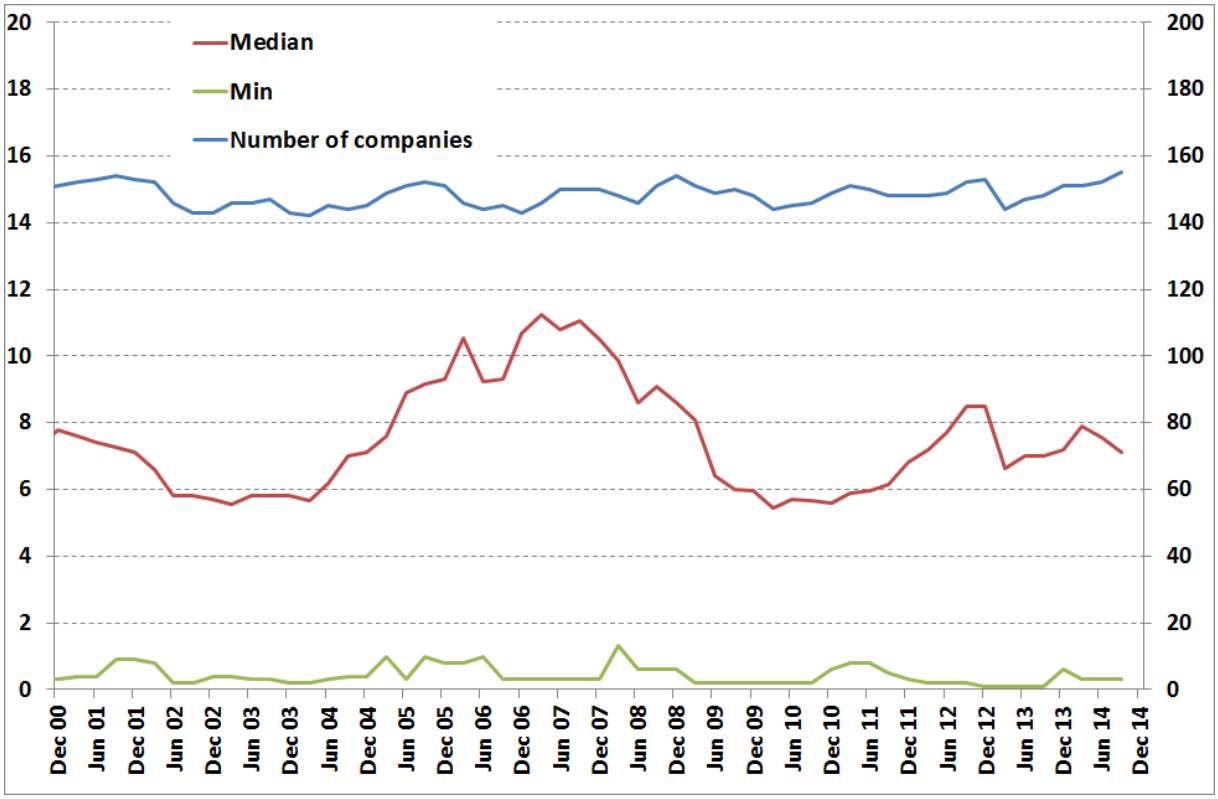

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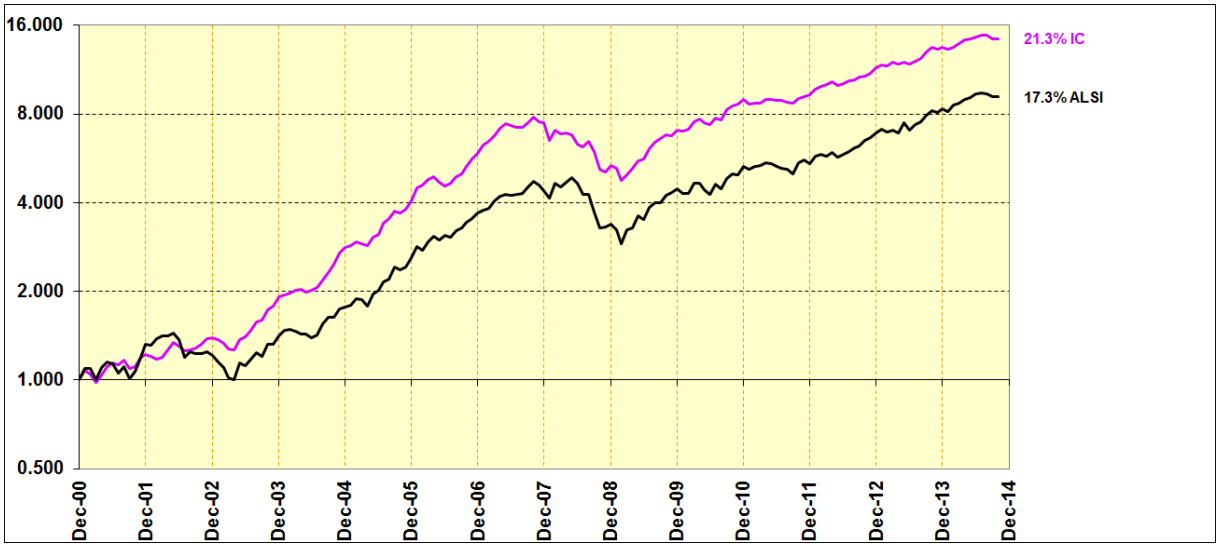
Figure 10: Above zero interest cover ratio portfolio returns



Financial ratio with market value of a share has been shown to differentiate style metrics such as value and growth, therefore in this research report, selected earning yield was carefully chosen as the vital parameter within the market-based style to differentiate between the value and growth styles. The four-dimension optimisation exercise indicated that the top 40th percentile of companies with the highest earnings yield generated the highest return in the combination-based style from 1984 to 2000. By investing in the 40th percentile of the highest of earnings yield companies, a compounded return of 20.3% compound annual growth from 2000 to 2014 would have been experienced.

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Figure 11: 40th percentile of the highest earnings yield portfolio characteristics

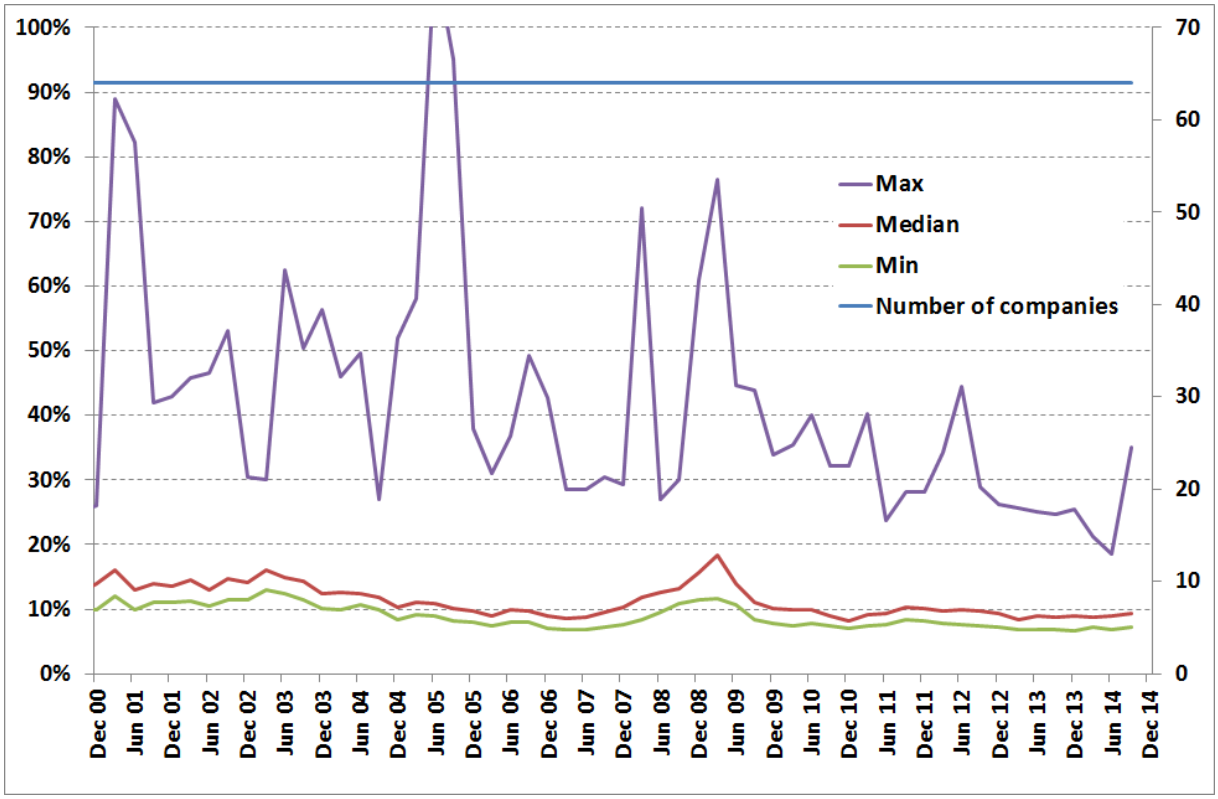
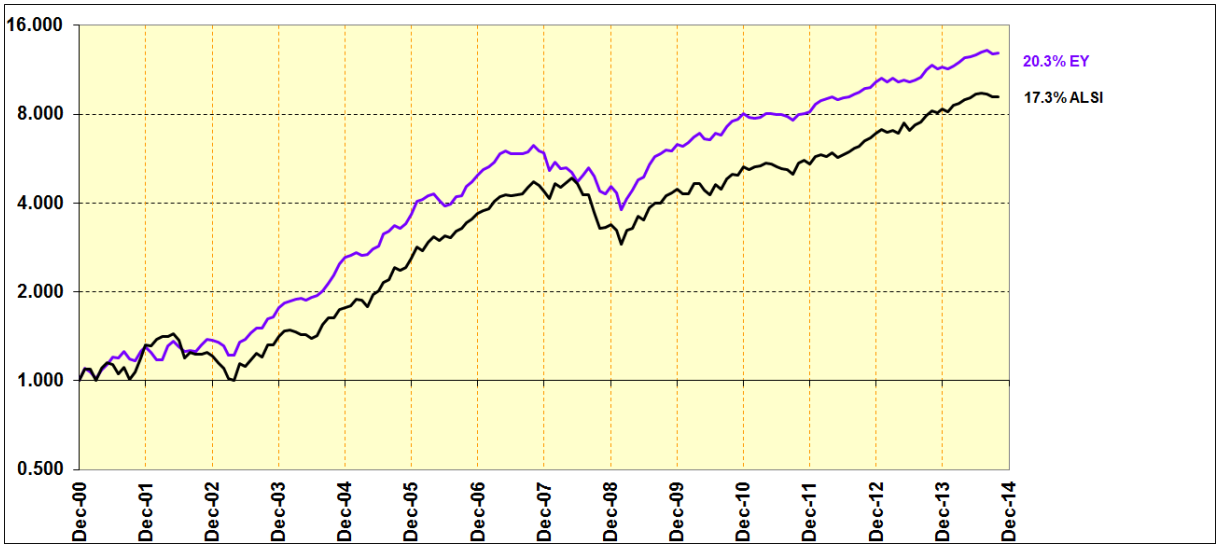


Figure 12: 40th percentile of the highest earnings yield portfolio returns



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In the list of behavioural-finance-based style parameters, momentum was selected as the pertinent parameter in the combined-based style. This selection was based on George and Hwang's (2004) findings that a momentum strategy based on the 52-week high provides superior returns (George & Hwang, 2004). The four-dimension optimisation exercise indicated that the companies in the eighth percentile of the highest positive share price return over the last four quarters generated the highest return in the combination-based style from 1984 to 2000. By investing in the eighth percentile of the momentum strategy alone, a compounded annual growth of 25.9% was generated in the period from 2000 to 2014.

Figure 13: Eighth quintile of 12 months momentum portfolio characteristics

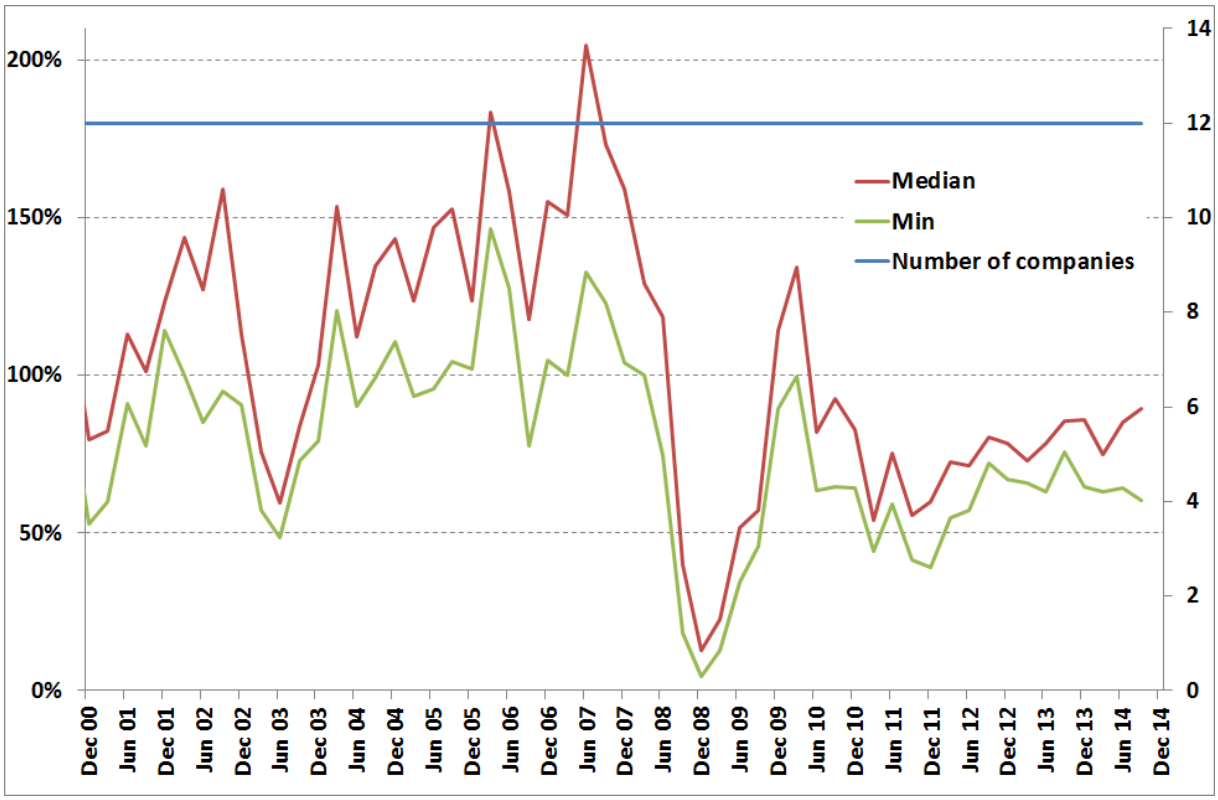

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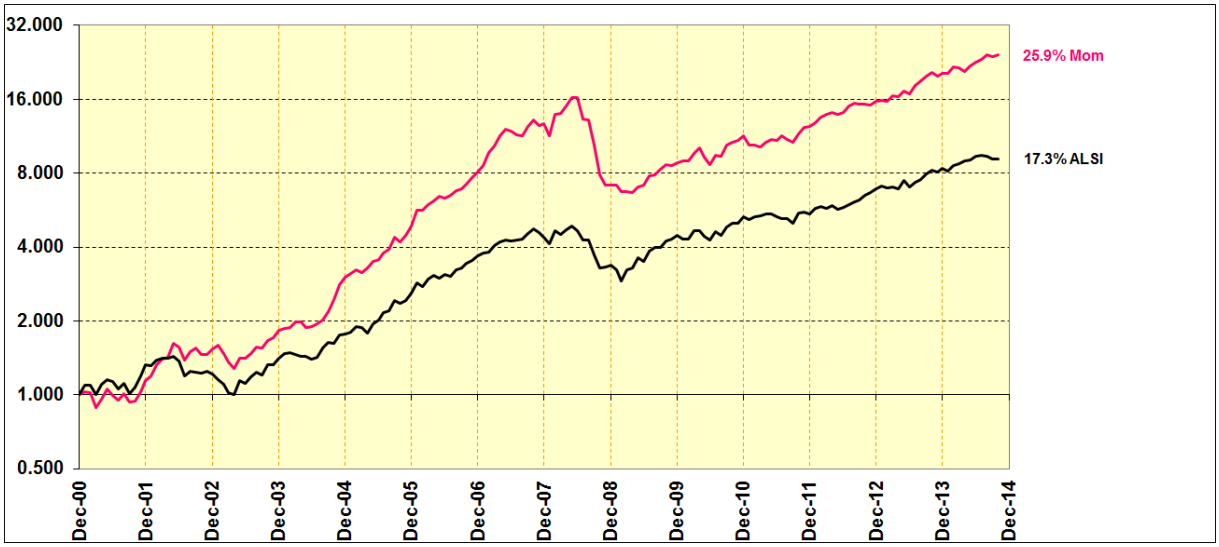
Figure 14: Eighth quintile of 12 months momentum portfolio returns



The final analysis in the different styles tested a combination-based style parameter. The parameters are as follows:

- above two percent of five years' average return on equity
- above zero interest cover ratio
- top 40th percentile of the highest earnings yield
- eighth percentile of the highest share price return over the last four quarters

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Figure 15: Combination of momentum and earnings yield portfolio characteristics

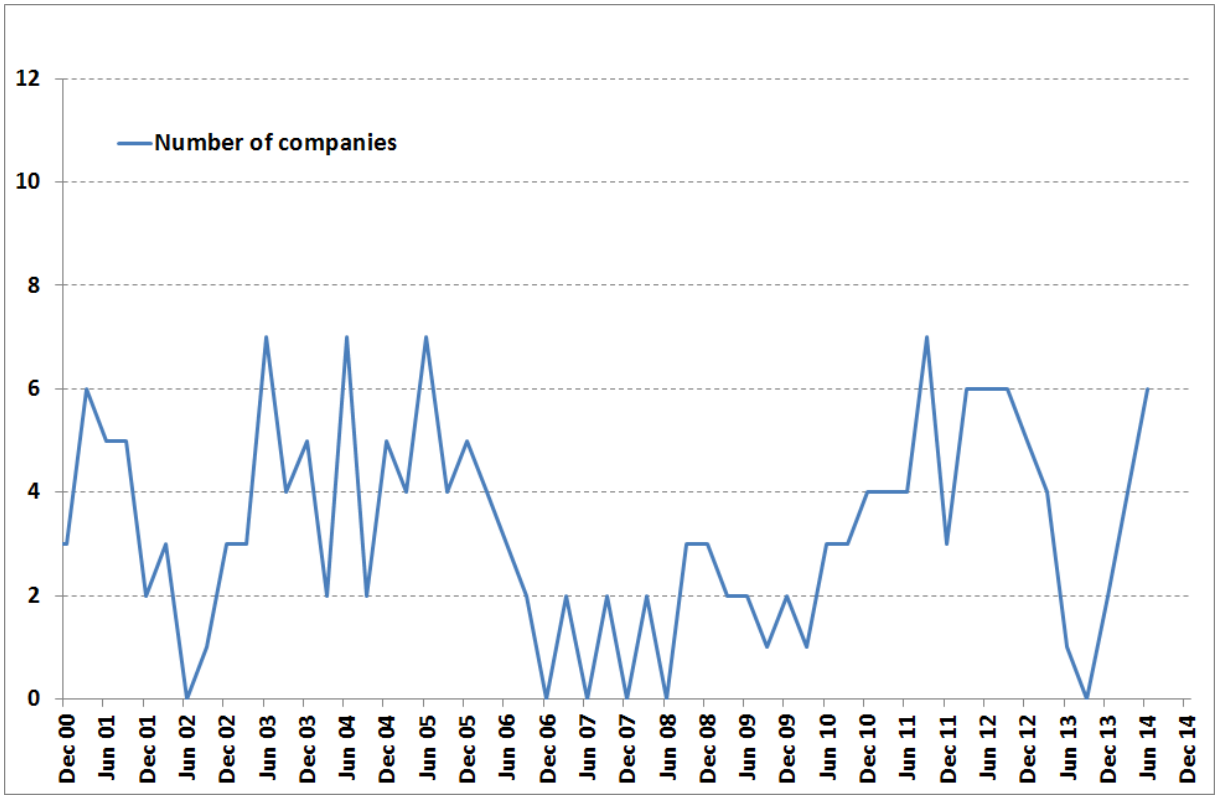

Figure 16: Combination of momentum and earnings yield portfolio returns

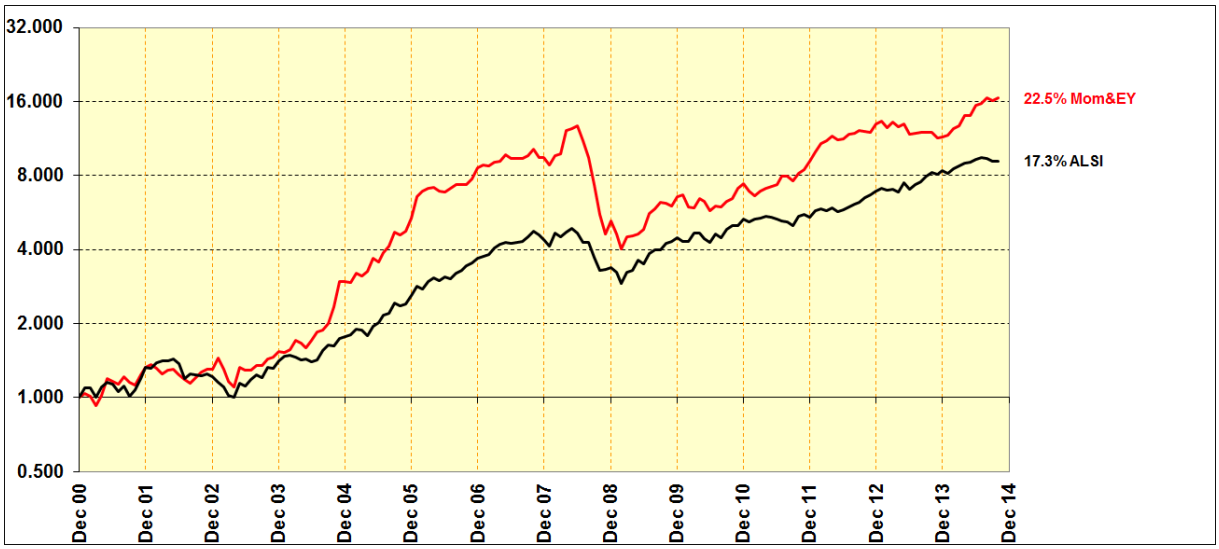

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Figure 17: Combination of momentum and interest cover portfolio characteristics

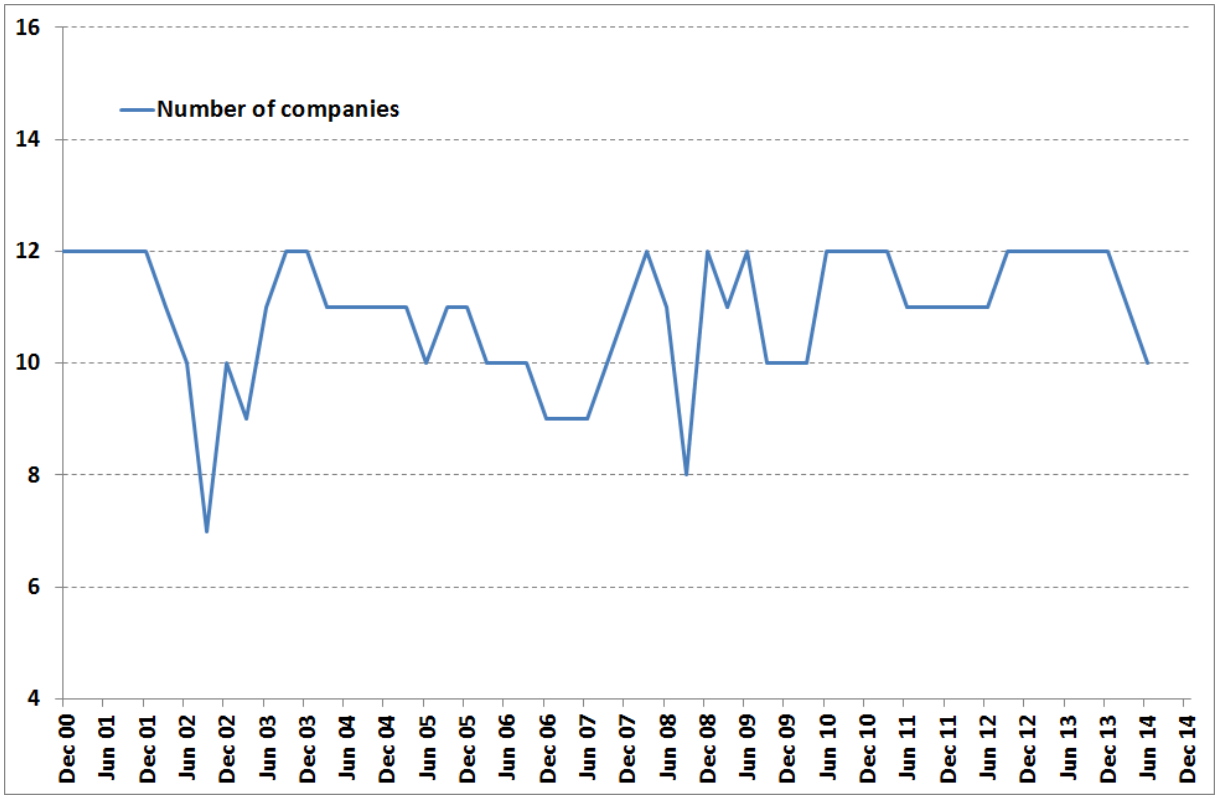

Figure 18: Combination of momentum and interest cover portfolio returns

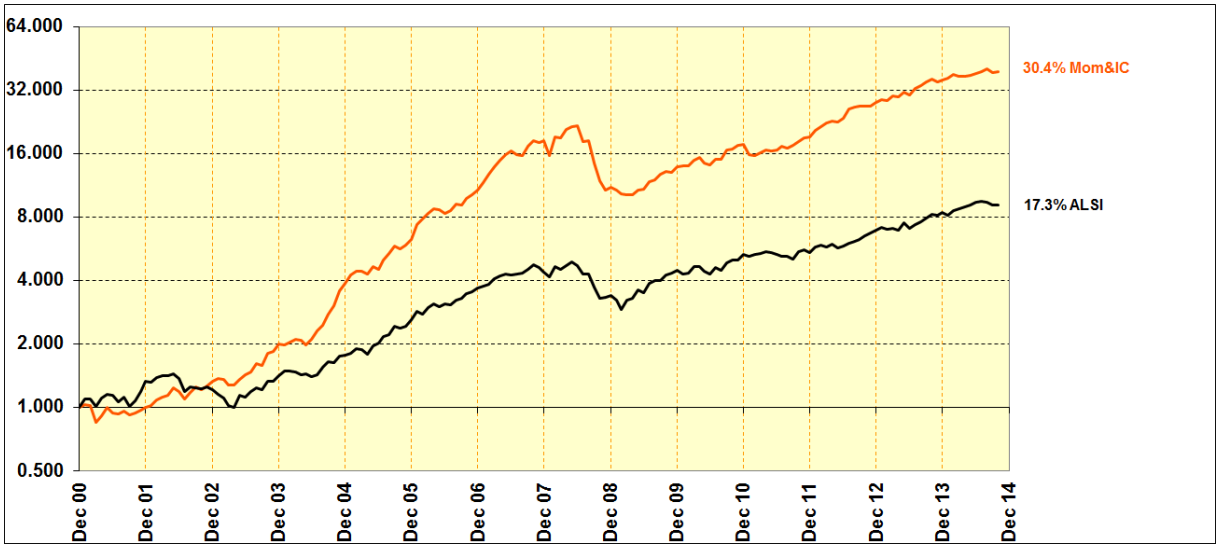

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Figure 19: Combination on momentum and five years' average return on equity portfolio characteristics

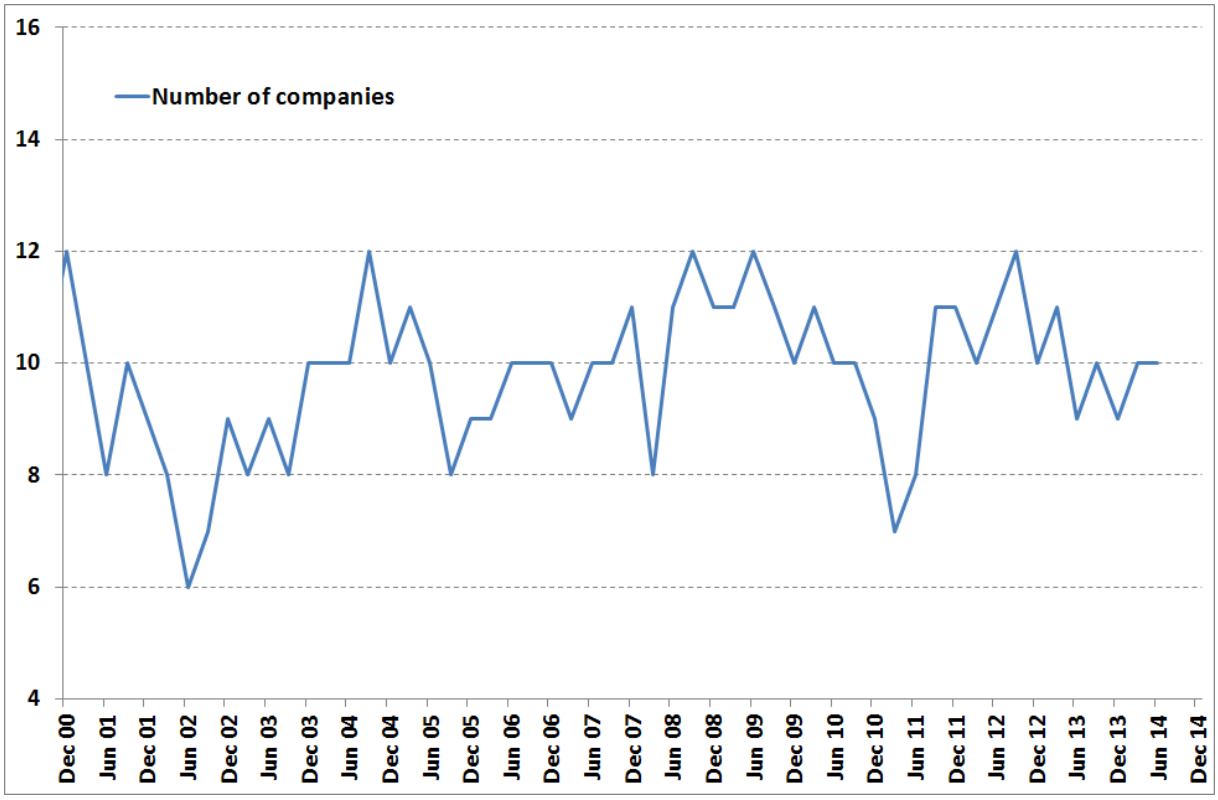

Figure 20: Combination of momentum and five years' average return on equity portfolio profiles

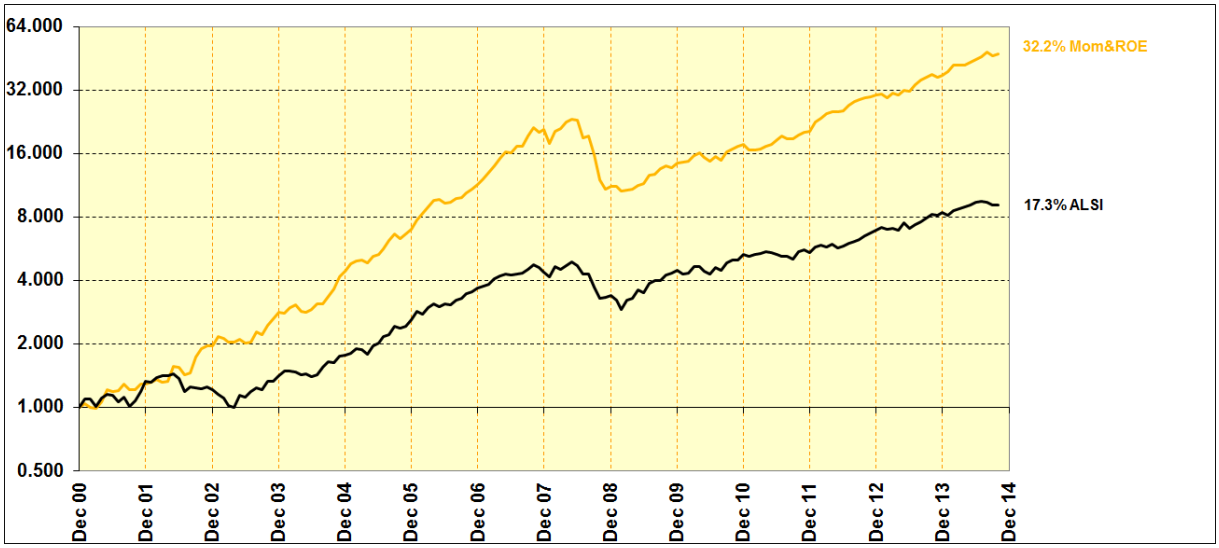

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Figure 21: Combination of momentum, earnings yield and five years' average return on equity portfolio characteristics

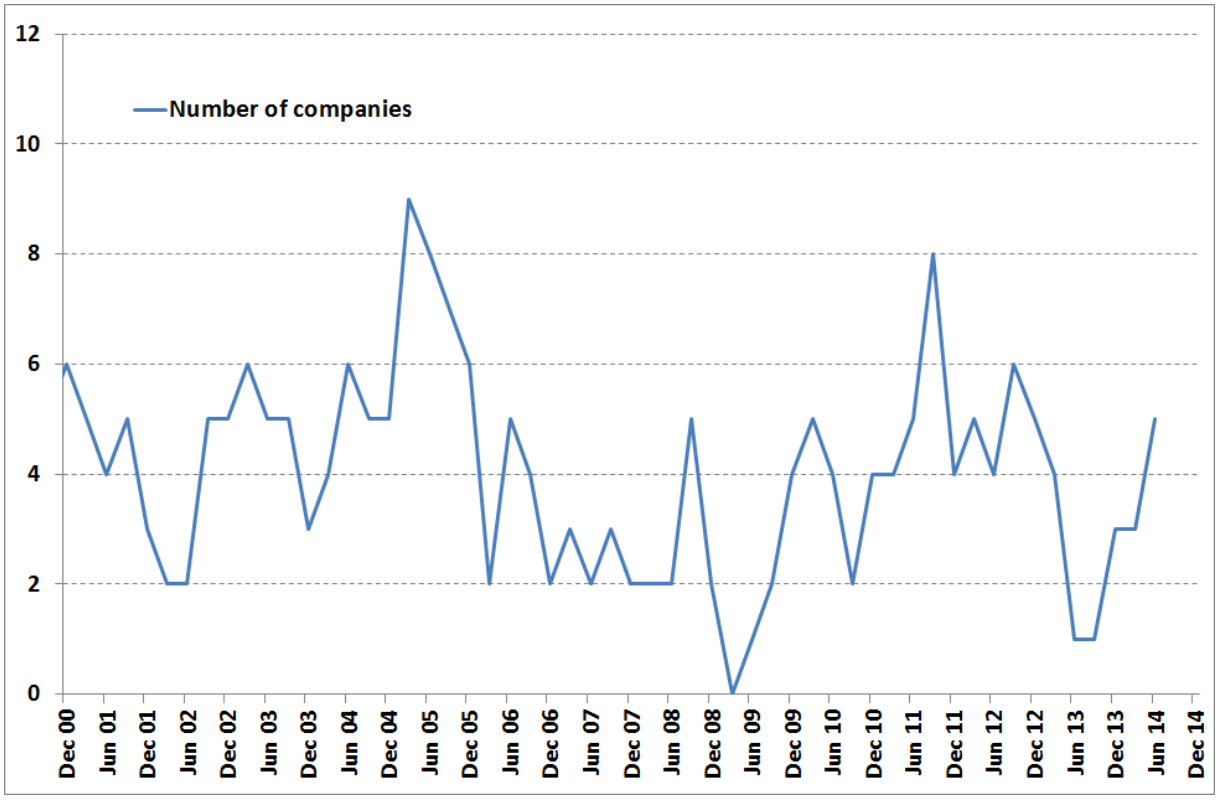

Figure 22: Combination of momentum, earnings yield and five years' average return on equity portfolio returns

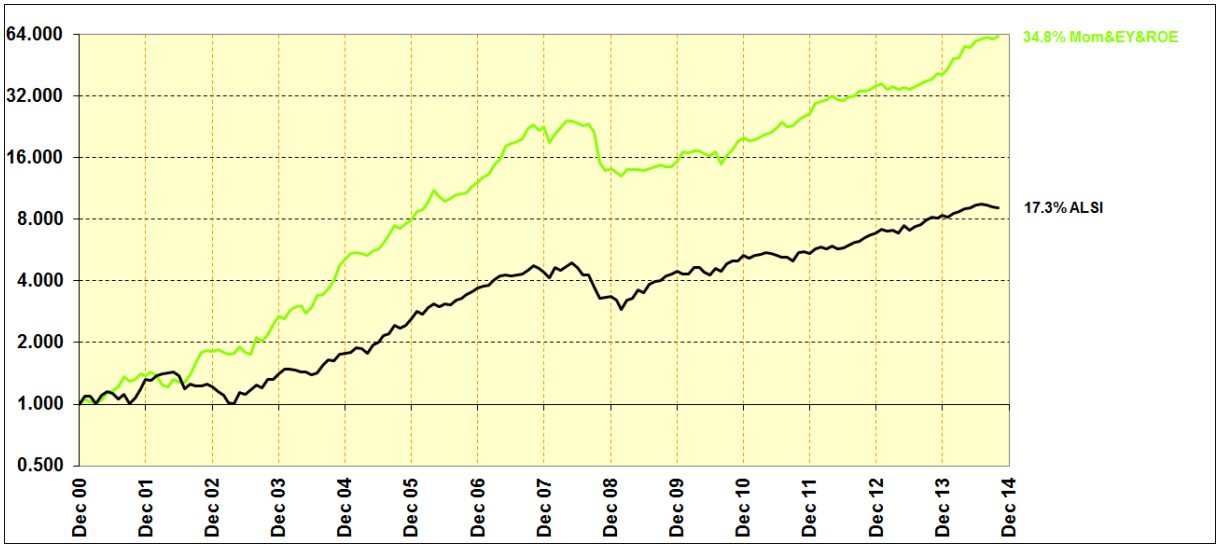

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Figure 23: Combination of momentum, earnings yield and interest cover portfolio characteristics

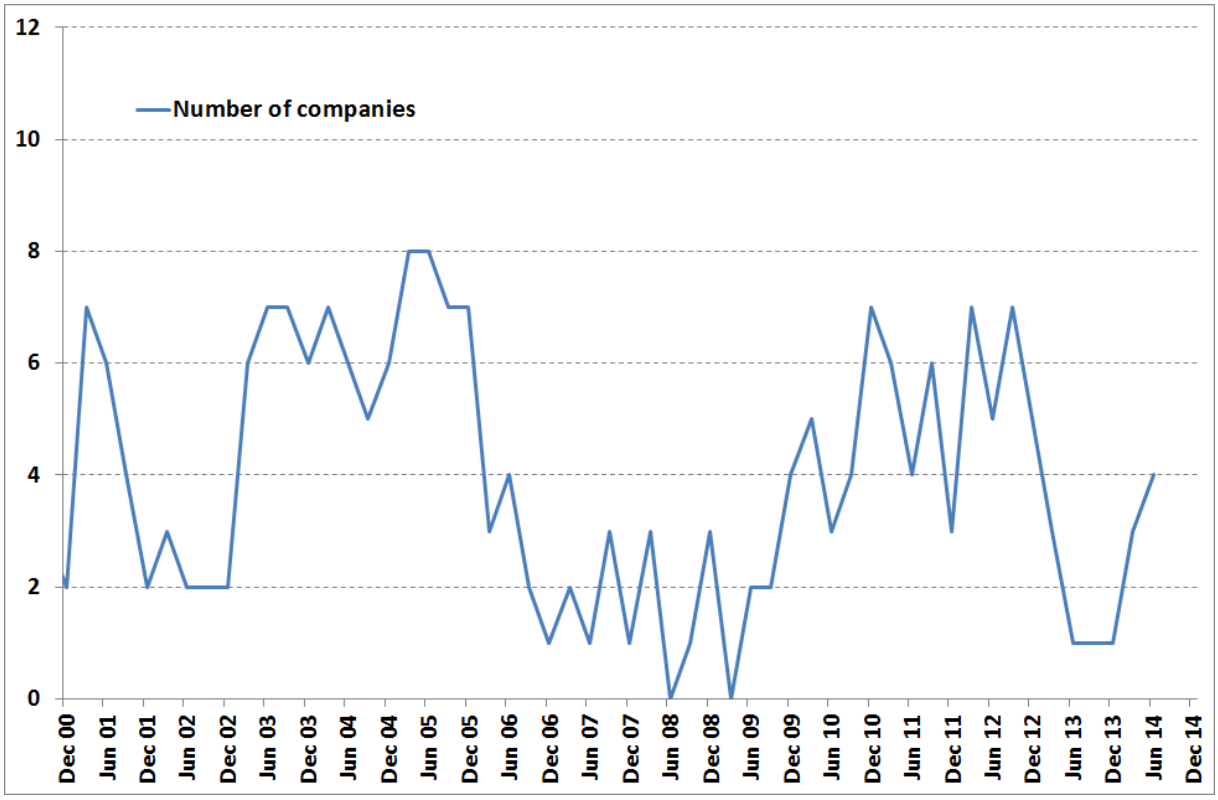

Figure 24: Combination of momentum, earnings yield and interest cover portfolio returns

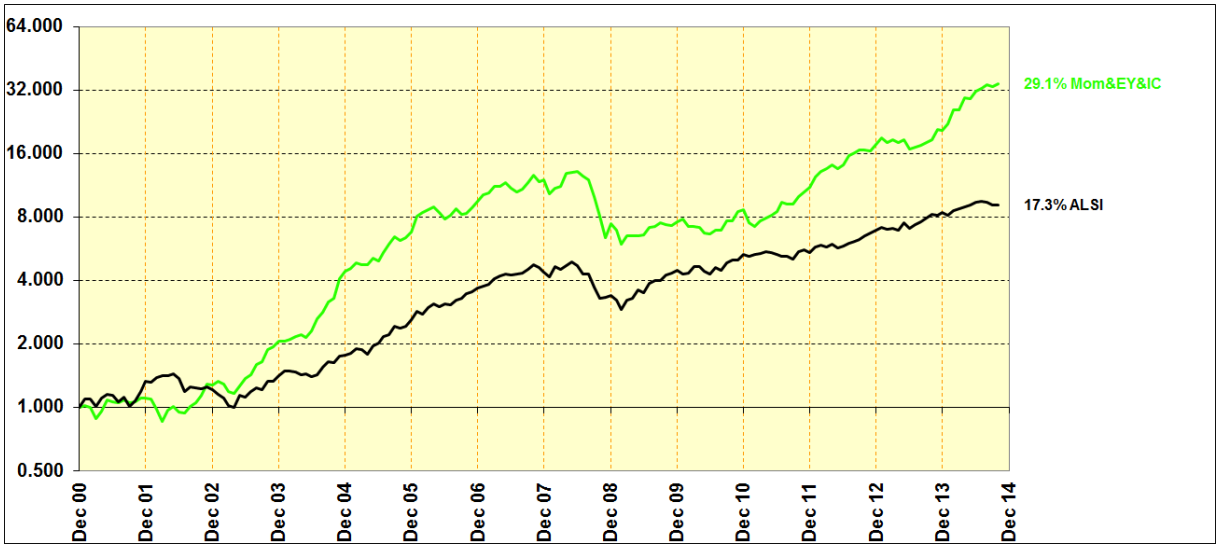

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Figure 25: Combination of momentum, five years' average return on equity and interest cover portfolio characteristics

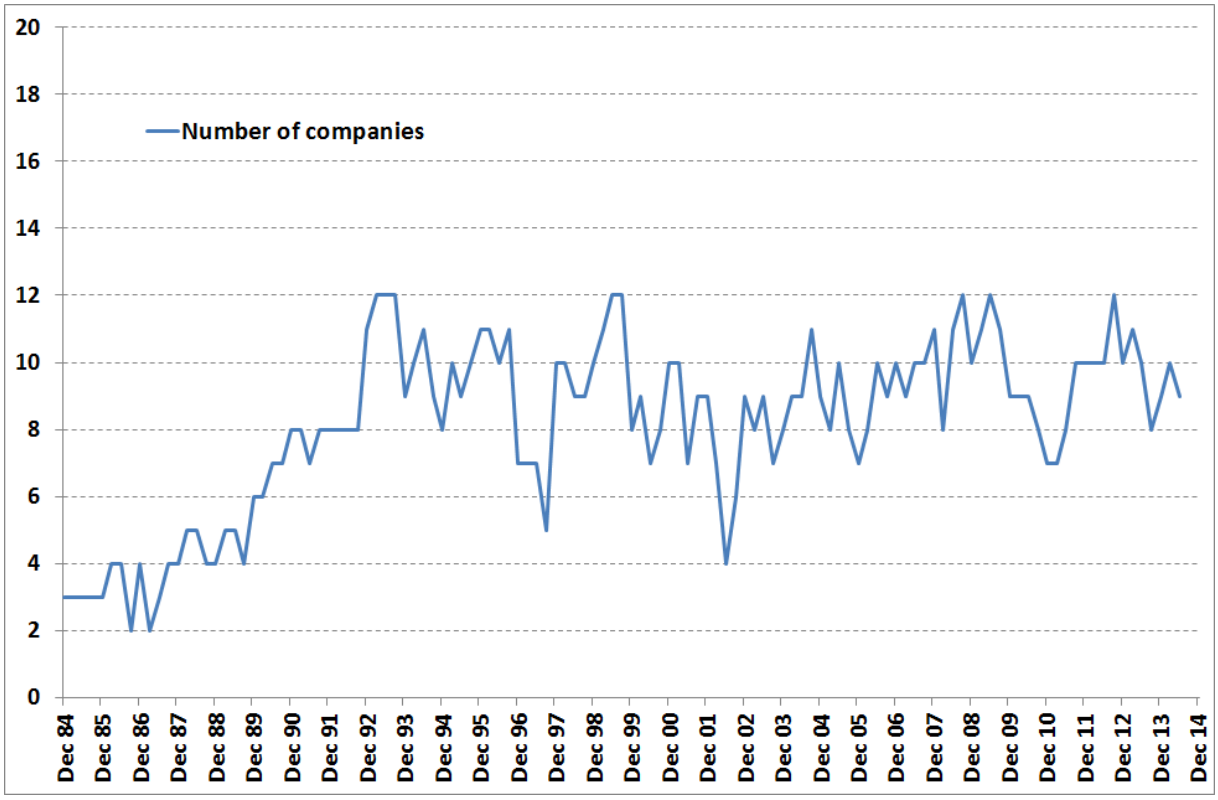
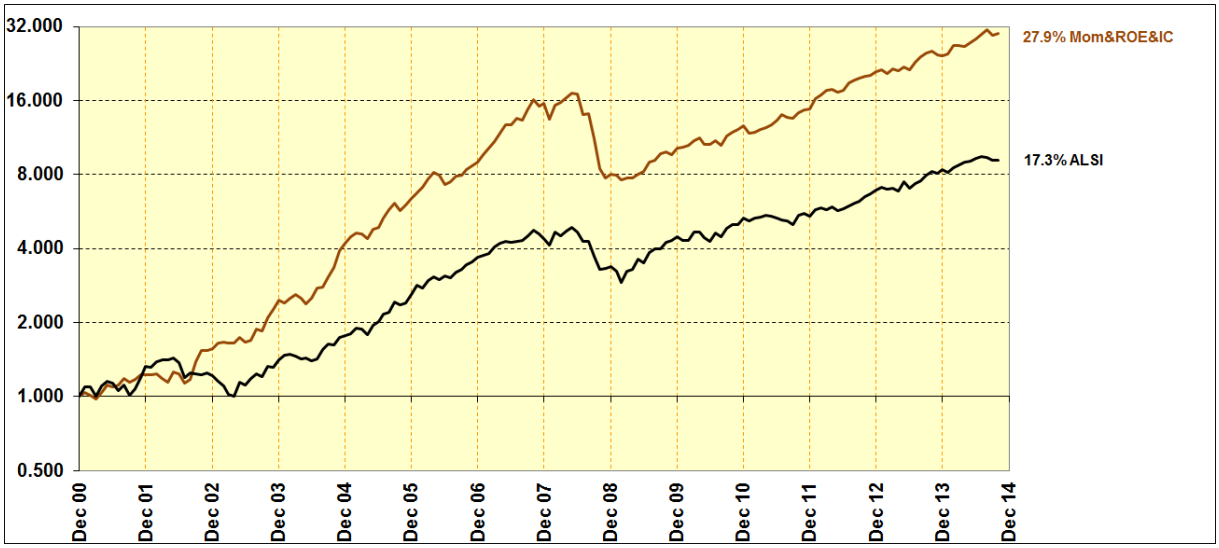


Figure 26: Combination of momentum, five years' average return on equity and interest cover portfolio returns



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The final result combined the four-dimension optimised parameters together to form a combination-based style.

Figure 27: Combination-based style on all parameters of portfolio characteristics

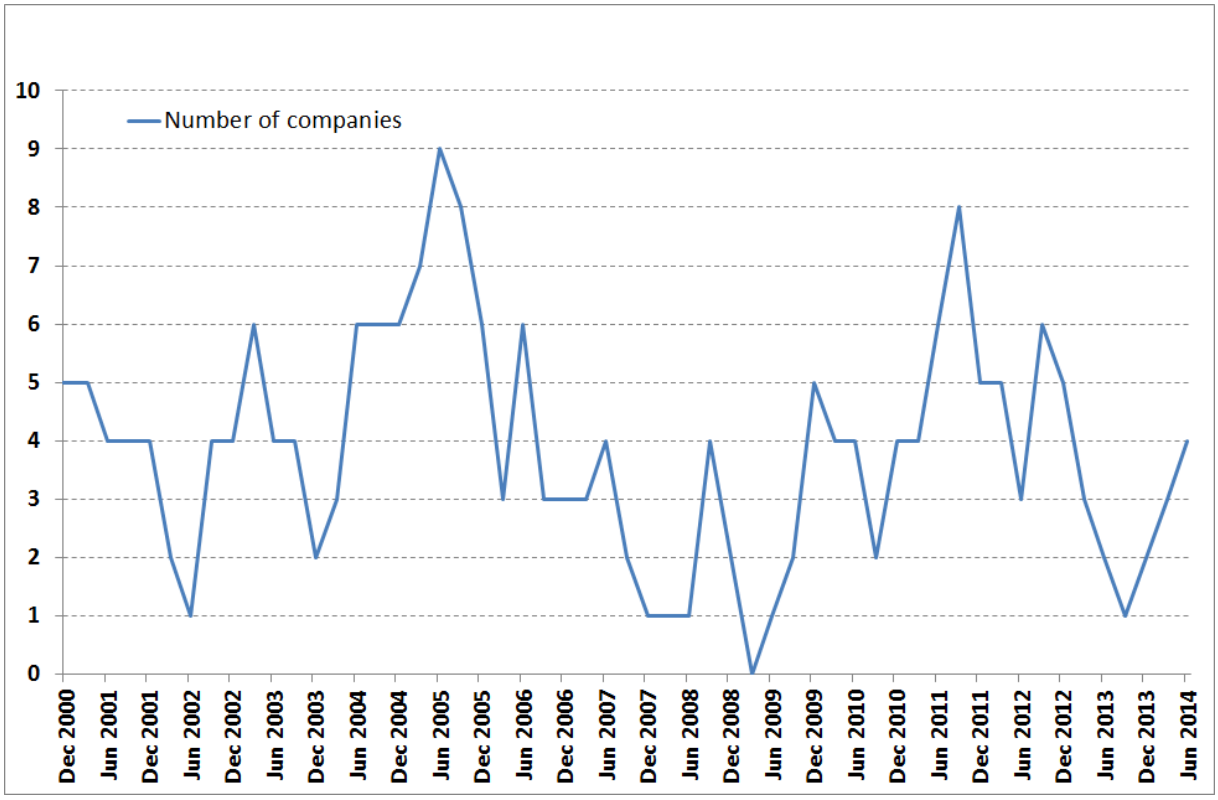

Figure 28: Combination-based style on all parameters of portfolio returns

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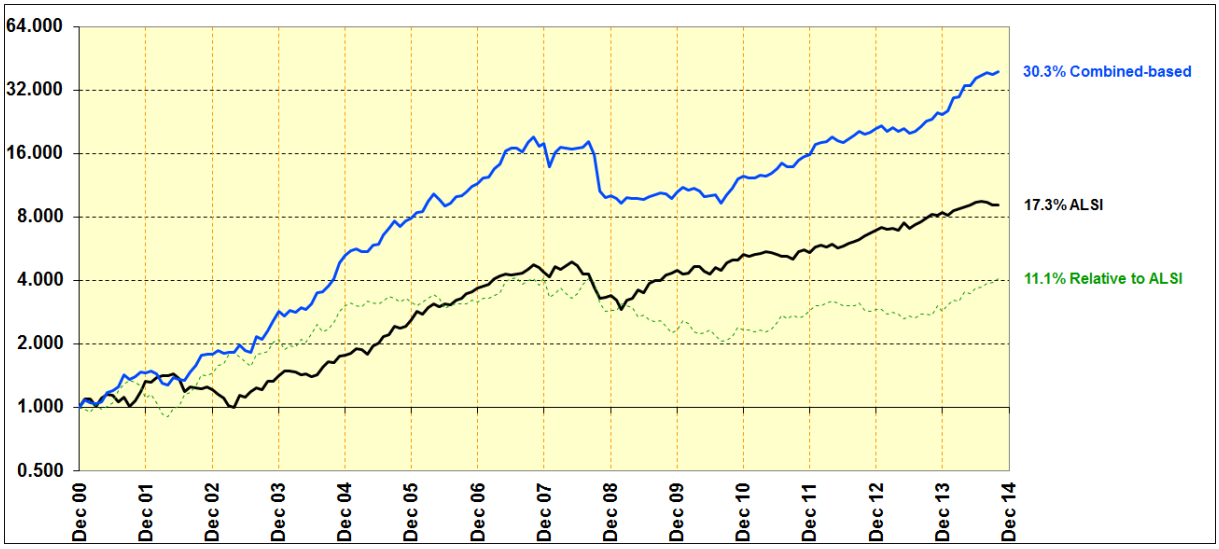

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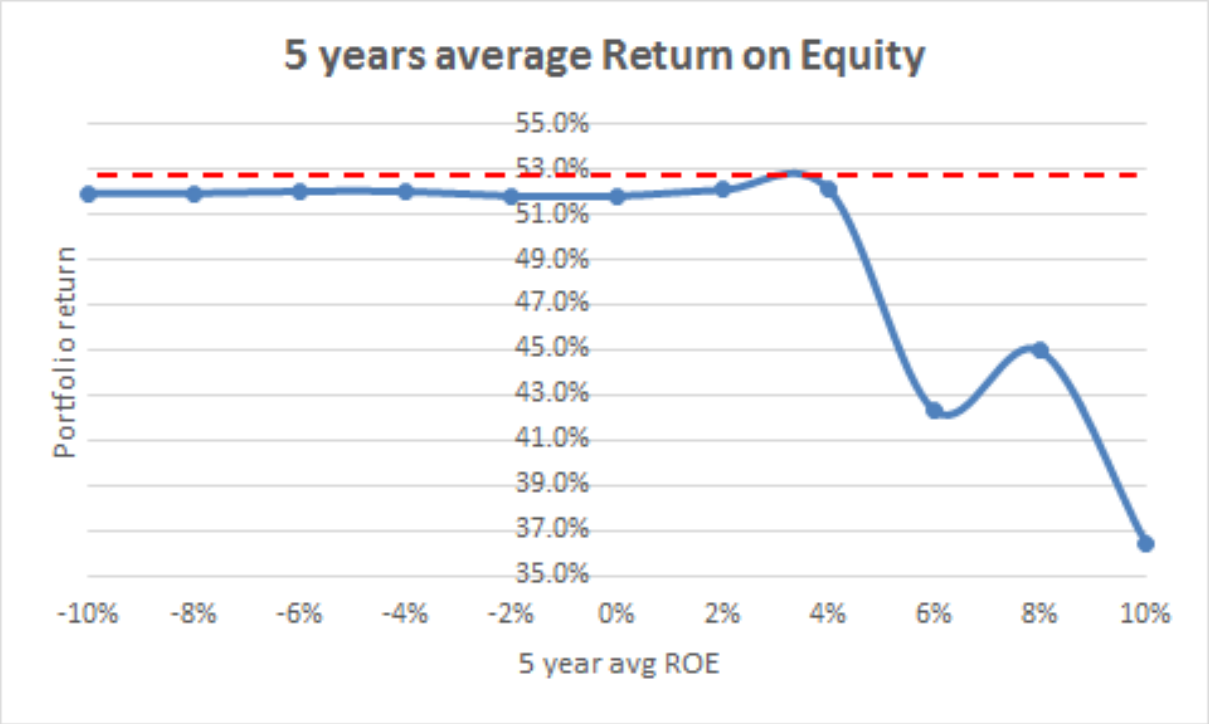
CHAPTER 6: DISCUSSION OF RESULTS

Tables 2, 3, 4 and 5 presented the four-dimension optimised parameter exercise results of the combination-based style for the period from 1984 to 2000; the return profile is colour coded with the lowest return to the highest return from the darker green to the brightest red. This exercise provided a four-dimension return profile based on one variable parameter and three fixed parameters in different combination-based styles simultaneously. This four-dimension optimisation exercise ensured the best possible portfolio return combination with the four parameters during the period.

Figure 29: Optimization return profile on 5 years average return on equity



The four-dimension optimisation exercises utilised one parameter as a variable and the other three parameters were fixed. By continuous rotation of the variable parameter among the four parameters, an optimal level was formed and the combination-based

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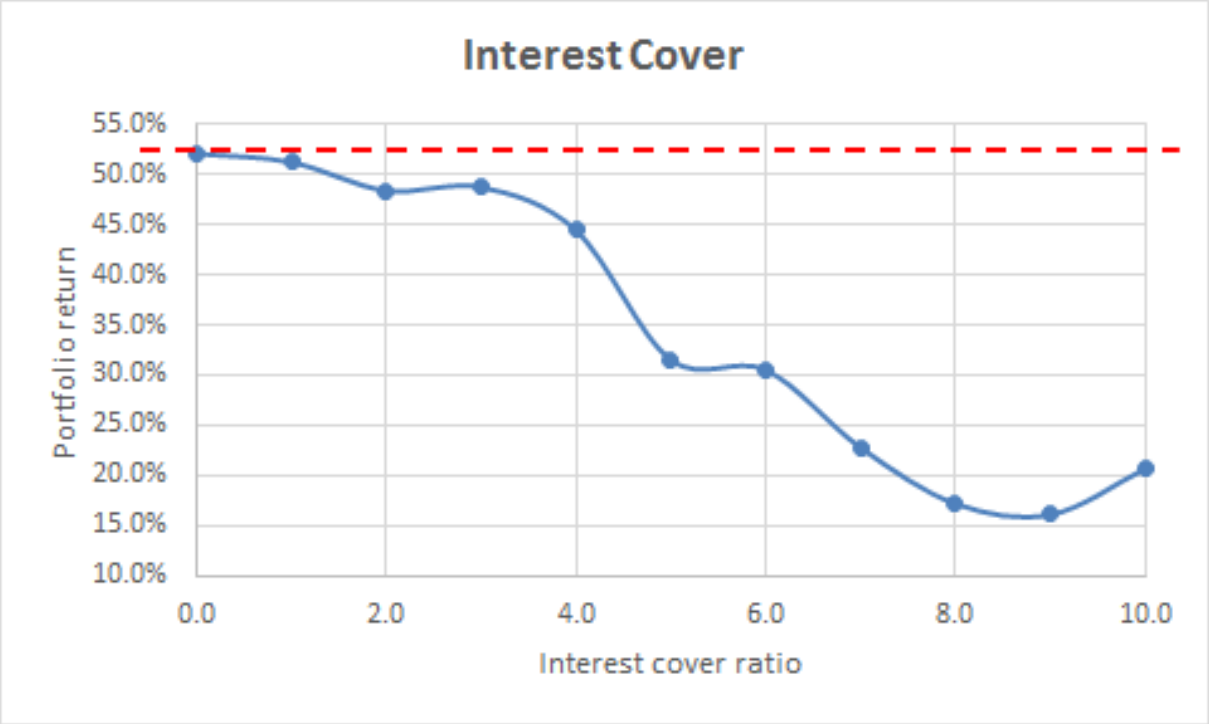
style portfolio return would not improve further. At that point the optimised parameter was created.

As indicated in the graph above, the optimal point in the five years' average return on equity was at two percent. With above zero interest cover ratio, top 40th percentile of the highest earnings yield and eighth percentile of the highest share price return over the four quarters the optimal level to generate the highest combination-based style portfolio return from 1984 to 2000 was specified.

Muller and Ward's (2013) research revealed that the third quintile of return on equity generated a superior return (Muller & Ward, 2013), but in this analysis it was found that the optimal levels were present in a combination of parameters and not individually.

Figure 30: Optimisation return profile on interest cover ratio



The optimisation exercise found the combination-based style portfolio's return peak at zero interest cover ratio in the period from 1984 to 2000. The return trended down as the interest cover ratio increased, given that the companies experience less financial distress and gear, which leads to the decrease in returns. This result corresponded

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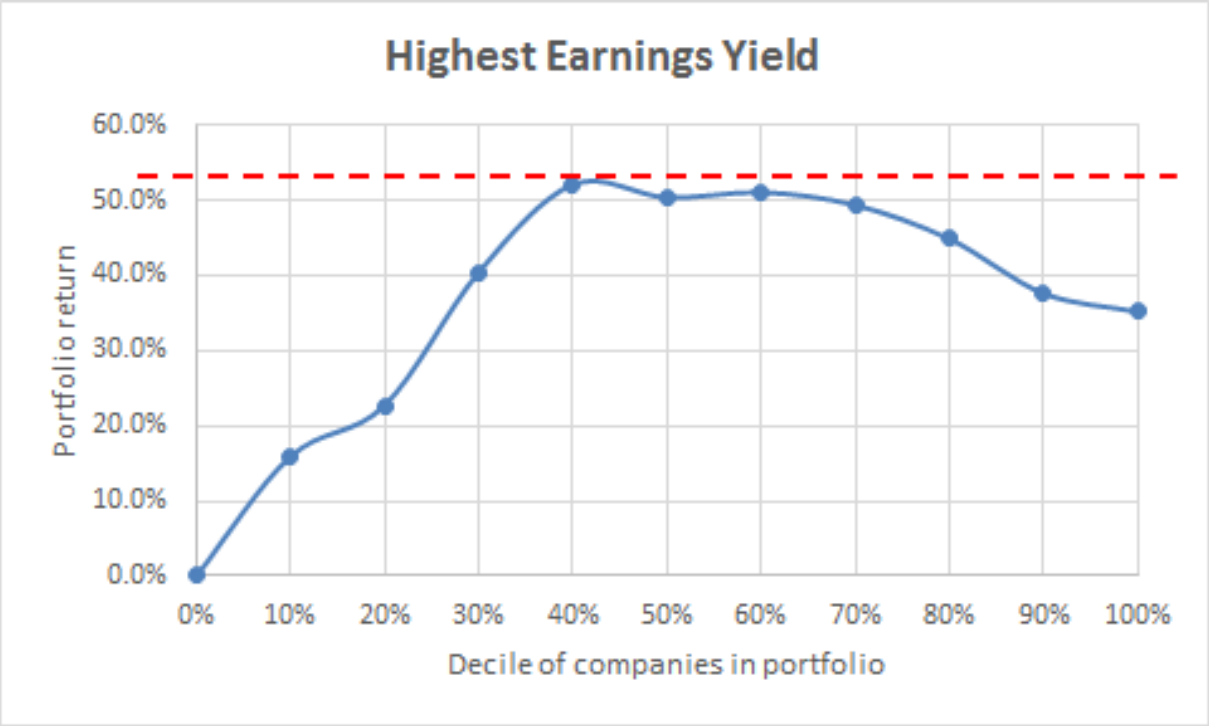
with Muller and Ward's (2013) findings that companies become less risky when interest cover ratio improved and share price performance reduced (Muller & Ward, 2013).

Figure 31: Optimisation return profile on earnings yield



The graph above is the result of the four-dimension optimisation exercise on earnings yield. It indicated that the 40th percentile of the highest earnings yield offered the highest portfolio returns in the combination-based style in the period from 1984 to 2000. This result is congruent with the findings of Christopherson and Williams (Christopherson & Williams, 1997). The result demonstrated that the portfolio return has a steep upward trend from the 10th percentile to 40th percentile, and it peaked with 52.1% portfolio return per annum from 1984 to 2000, thereafter by adding the next 10 percentile off the highest earnings yield companies until all companies included in the portfolio and the portfolio return reduced to 35.2% at a slower declining rate.

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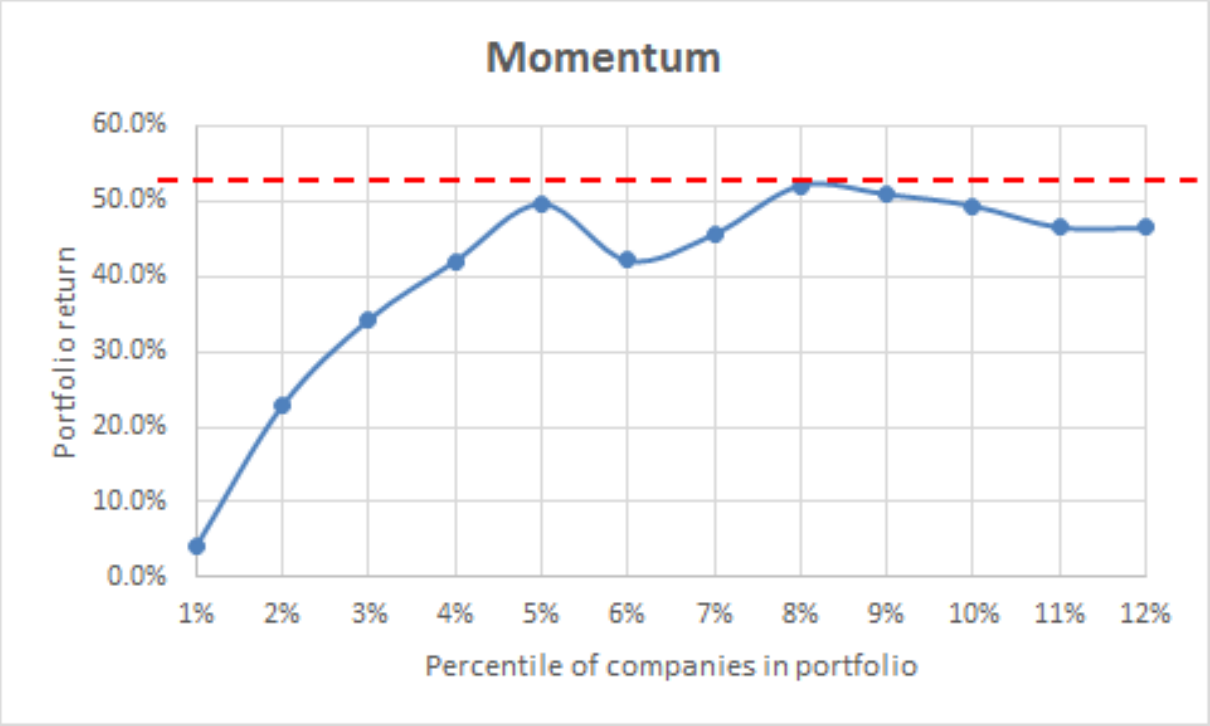
Figure 32: Optimisation return profile on momentum



In Figure 32 above, the result of the four-dimension optimisation on momentum through the behavioural-finance-based style is presented. The result suggested that the eighth percentile of the ALSI with the highest share price return in the last four quarters offered the highest portfolio return in the combination-based style from the between 1984 and 2000. The first percentile of the highest share price return in the last four quarters suggested that the share performance does not have the same momentum in the combination-based style going forward when compared to the eighth percentile of companies. This finding develops George and Hwang's research further to determine at which percentile companies with the 52-week high momentum strategy perform the best in the combination-based style (George & Hwang, 2004).

From the four-dimension optimisation exercise, the following was found as the optimal level of combination-based styles in the period from 1984 to 2000:

- Above two percent of five years' average return on equity.

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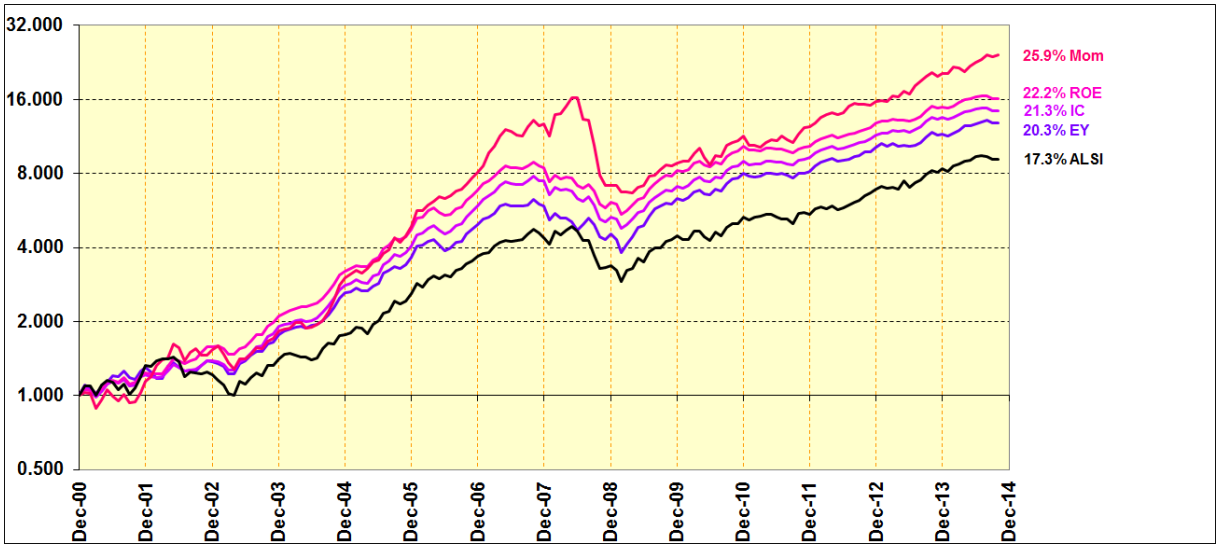
- Above zero interest cover ratio.

- Top 40th percentile of the highest earnings yield.

- Eighth percentile of the highest share price return over the last four quarters.

The individual portfolio return from each of the optimised parameters independently is now discussed, and then the portfolio returns with different combinations of the optimised parameters are mentioned.

Figure 33: Individual parameter portfolio return profile



By testing the parameters from the four-dimension optimisation exercise independently, it was found that all the parameters out-performed the benchmark over the 14 years from 2000. Though these parameters were not at their optimal levels independently, they were optimised based on the combination-based style as each parameter indicated the contribution to the portfolio return.

Momentum, the eighth percentile of the highest share price return over the last four quarters performed the best when compared to other parameters such as the above two percent on five years' average return on equity, above zero interest cover ratio and the 40th percentile of the highest earnings yield portfolios. It generated a 25.9%, 22.2%, 21.3% and 20.3% respective compounded annual growth over the out-of-sample

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period. The out-performance from momentum portfolio to the benchmark index was 8.6% annually, which is substantial for a long period of 14 years. The least performed parameter, earnings yield, still out-performed the benchmark index by 3% annually, which is impressive.

The examination of the portfolio returns with different combinations of the parameters is discussed next.

Figure 34: Different parameters' combination portfolio return

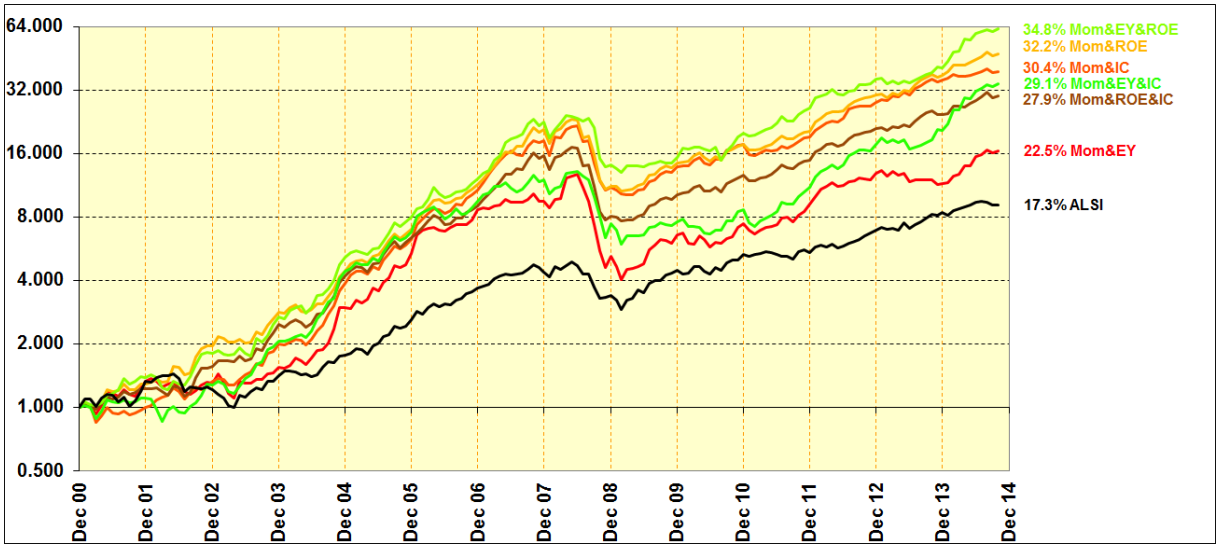

Figure 34 showed that the best combination was momentum, earnings yield and return on equity. By using the optimised parameters of momentum, earnings yield and return on equity, it generated a 34.8% compound annual growth in the out-of-sample period which is 17.5% more than the benchmark index. The worst performing portfolio combination is momentum and earnings yield, which resulted in a 22.5% compound annual growth and still out-performed the benchmark index by 5.2% annually.

The result also suggested that all these combination portfolios performed closely to each other in the years from 2000 to 2006, thereafter during the financial crisis the performance of all the portfolios diverged. The optimised parameters of momentum and earnings yield combination resulted the worst performance during the financial crisis and the performance has yet to be absorbed after six years of recovery. Therefore, it is

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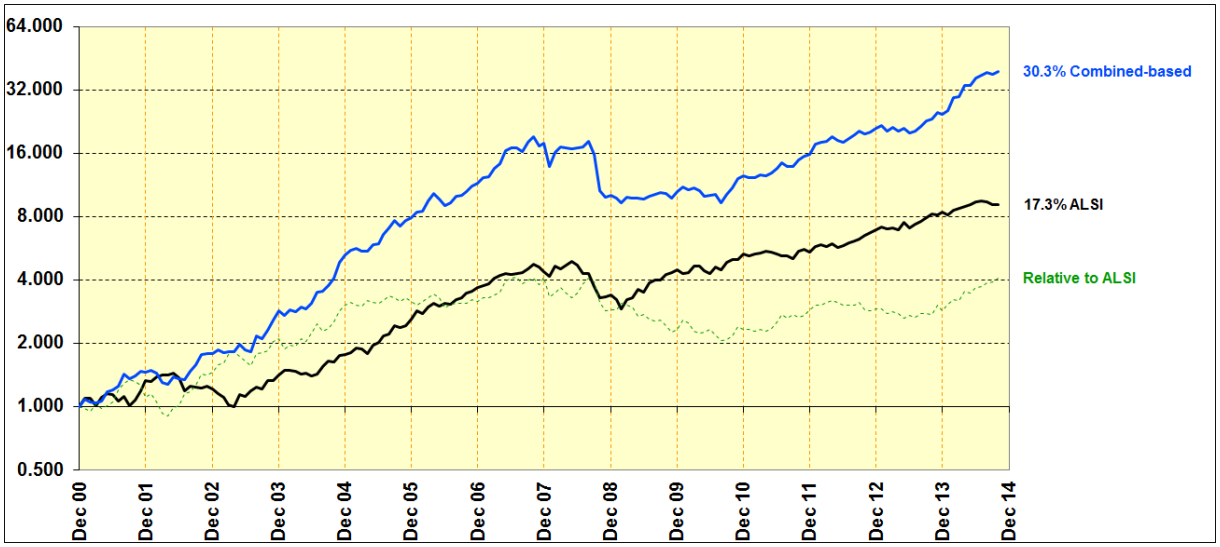
important to recalibrate the optimisation exercise through-out the years of investment to ensure the investment style learns from and incorporates with new data.

Figure 35: Combination-based style portfolio return



The final result examined the combination-based style on the optimised parameters' portfolio performance in the out-of-sample period from 2000 to 2014. As Figure 35 demonstrated, the combined-based style generated a 30.3% compound annual growth for 14 years which out-performed the benchmark index by 13% per annum. The green line in the graph denotes the trend line of the combined-based portfolio against the benchmark index. It indicated that the combined-based portfolio out-performed the benchmark index from 2000 to 2006 and it under-performed from 2008 to 2010, as the green line sloped downward. The combined-based portfolio recovered from the under-performance in the last three years in the out-of-sample period. As mentioned, it is important to recalibrate the optimisation exercise throughout the life of the portfolio. It enables the investment style to learn from and incorporate with new data.

Figure 36 provides a comparison of all combination-based style portfolios and the combined-based portfolio. It is evident that the combined-based portfolio was not the best performing portfolio during the sample period but it had substantially out-performed the benchmark index by 13% per annum.

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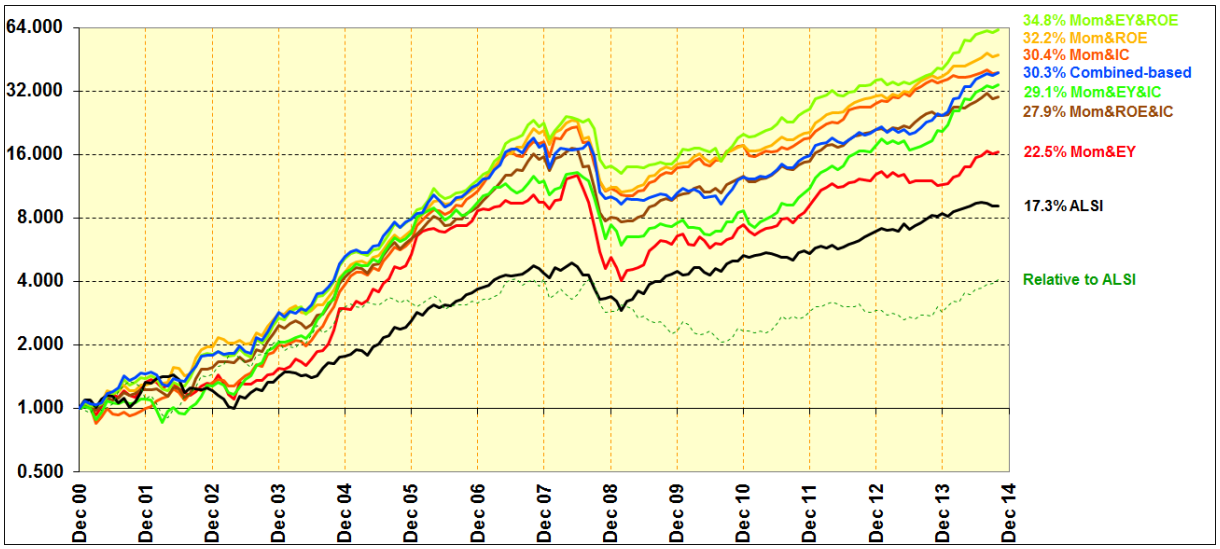
Figure 27 showed the number of companies held in the combined-based portfolio over the out-of-sample period and it found that there was a high concentration in the portfolio. The combination-based style portfolio has very few companies at any one time, the average number of companies held in the portfolio was four. This could raise serious concerns with both investors and regulatory bodies. Disputes regarding portfolio diversification, tracking error of the portfolio, credit risk on a single individual company and the Regulation 28 of the Pension Funds Act could also arise. The Act governed that pension funds should not invest with more than five percent in a listed equity that has market capitalisation of less than R2bn, or more than 10% with market capitalisation of between R2bn and R20bn, or more than 15% with market capitalisation of more than R20bn respectively.

Figure 36: Different parameters' combinations and combination-based style portfolio returns



Most of these parameters combination portfolios out-performed the individual parameter portfolio. For example Shih found that combining the fundamental into the technical momentum strategy resulted in an out-performance of pure technical momentum strategy (Shih, 2010). This research paper's results agreed with Shih finding, in that the result demonstrated momentum and five years' average return on equity combination portfolio out-performed the individual momentum portfolio by 6.3% annually from 2000 to 2014.

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The analysis that emanated from this research provided a different result when compared to Chen and Lee's (2011) findings. Chen and Lee found that the combination of behavioural-finance-based style and market-based style out-performed the individual momentum strategy (Chen & Lee, 2011), whereas the current research results demonstrated a behavioural-finance-based style and market-based style combination portfolio that under-performed when compared to the individual momentum portfolio by 3.4% per annum.

Inclusively, the analysis demonstrated that all combination portfolios out-performed the benchmark index and also out-performed the highest growth individual portfolio, except one combination parameter portfolio, namely the momentum and earnings yield combination portfolios. Inasmuch, the results also concurred with Bettman, Sault and Schultz's (2009) findings that a combination of different investment styles has a superior performance to individual strategies (Bettman, Sault & Schultz, 2009).

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CHAPTER 7: CONCLUSION

The objective of this research paper was to examine the possibility of active investment out-performing the passive investment by using a combination-based investment style of the following parameters; five years' average return on equity, interest cover ratio, the highest earnings yield and the highest share price returns over the last four quarters. The active investment was represented by active managers who manage investors' financial assets to achieve the financial goals of the investors. Active managers are responsible for certain levels of due diligence in the selection of investments, day-to-day accounting, statutory and fiduciary duties as well as other administrative activities. Often asset managers receive incentives to out-perform their benchmark; in South Africa the benchmark could include ALSI, SWIX, CAPI, index mutual funds or exchange-traded funds.

Turner Investments suggested that active managers are capable of out-performing the low-cost index funds and ETFs for an extended periods, but Gruber, Fama and French argued that active managers do not continuously out-perform their benchmarks. In addition, when they do, higher costs for this achievement diminish the real returns of any out-performance (Turner Investment Partners, 2010; Gruber, 1996; French, 2008; Fama & French, 2010).

According to Lyudvig's (2014) findings, in South Africa over the past 20 years an 23% average of South African active unit trust managers have out-performed the ALSI (Lyudvig, 2014). That means an individual has a 77% chance of underperforming in the market when choosing active managers. Much research has been performed on active managers' out-performance of the market but the results have been varied.

According to Clarke, de Silva and Throley (2001), the value added in an active managed portfolio is dependent on both the manager's forecasting skills and the ability to take appropriate positions in securities that reflect those forecasts (Clarke, de Silva & Throley, 2001). This research paper analysed the best combination-based style

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investment strategy based on the historic data, to enable the researcher to predict the future performance of the portfolio. In doing so, the analysis has taken managers' forecasting skills and their ability to take appropriate position in securities out of the equation. This analysis has eradicated the responsibility of active managers for any possibilities in making any irrational or emotional decisions.

In the combination-based investment style, the analysis combined financial-ratio-based style, market-based style and behavioural-finance-based style as a single investment style. Under the financial-ratio-based style, returns on equity and interest cover ratio were selected as the primary parameters. Earnings yield and momentum were selected as the primary parameters under market-based style and behavioural-finance-based style respectively.

This analysis was performed in the form of a quantitative study. Initially, the portfolio return from the combination of the different parameters for the period from 1984 to 2000 was optimised The results found that above two percent of five years' average return on equity, above zero interest cover ratio, top 40^{th} percentile of the highest earnings yield and the eighth percentile of the highest share price returns over the last four quarters were the optimised parameters during the in sample period (illustrated in in Tables 2, 3, 4 and 5). The optimised parameters showed a 52.1% per annum portfolio return was achieved during the in sample period. In the analysis, the four-dimension optimisation exercise was only performed once during the sample period.

Second, the optimised parameters in the out-of-sample period, namely from 2000 to 2014 was tested. The research tested each parameter as an individual investment style and then tested the different combination among the parameters. Amongst the individual parameter portfolios, the eighth percentile of the highest share price returns over the last four quarters performed the best and was followed by the above two percent of five years' average return on equity. The results suggested that the majority of the combination parameters portfolios out-performed the individual parameter portfolios in the out-of-sample period and they all out-performed the benchmark index by a substantial percentage annually over an extended period (in Figure 33-36). The highest combination parameters portfolio return were; above two percent of five years'

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average return on equity, top 40th percentile of the highest earnings yield and the eighth percentile of the highest share price returns over the last four quarters with 34.8% per annum return in the out-of-sample period (illustrated in Figure 36).

By follow the suggested combination-based-style parameters and the four-dimension optimisation exercise, the results revealed that above two percent five years' average return on equity, above zero interest cover ratio, top 40th percentile of the highest earnings yield and the eighth percentile of the highest share price returns over the last four quarters generated a 30.3% per annum portfolio return during the out-of-sample period, which ranked fourth amongst the different combination of parameters portfolios (in Figure 36).

Evidence was found that it is possible for active investment to out-perform passive investment over an extended period (in Figure 36). Active managers who followed the combination-based style by using the four-dimension optimisation exercise were able to out-perform passive investment such as index mutual funds or exchange traded funds. As the passive investment should have close to zero tracking errors, it meant the performance should have been consistent with the market index, as results demonstrated the combination-based style out-performed the benchmark index. The combination-based style exhibited a 13% annual out-performance against the benchmark index over the 14 years, from 2000 to 2014. This out-performance is explained by corresponding the best quality from the four different parameters.

Figure 37: Combination-based style, overlapping elements

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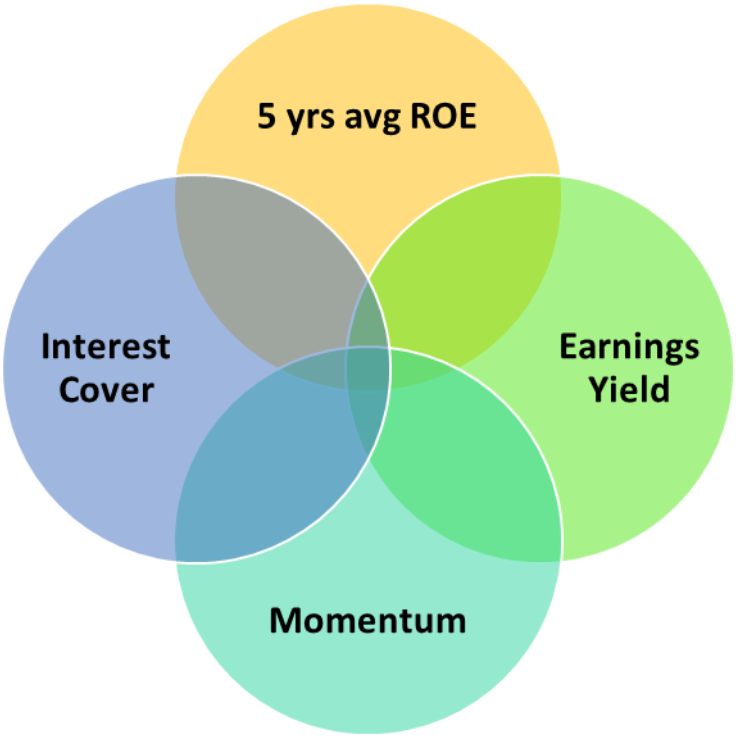

Furthermore, to improve the combination-based style portfolio returns, recommendations for further study can be done by recalibrating the optimisation exercise throughout the out-of-sample period to ensure the investment style learns from and incorporates with new data as well as extend the sample to the global stock markets. As evident from the analysis, the four-dimension optimisation exercise was incurred once in the sample period. By recalibrating the optimisation exercise, it was anticipated that the results would confirm a better technique that asset managers could employ to out-perform the passive investment over an extended period.

The suggestion from the research findings is that active managers should follow this combination-based investment style to remove any irrational and emotional decision-making process to ensure the active manager out-performs the benchmark consistently over an extensive period. Based on the conservative assumptions and findings, results suggested that active managers should present these findings to pension fund institutions as a sales pitch in the hope of receiving an investment mandate from.

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APPENDIX

Appendix 1: List of companies in the All Share Index (ALSI) (JSE, 2014)

Code	Company Name
BTI	BATS
SAB	SABMiller
BIL	Bhpbill
NPN	Naspers
CFR	Richemont
MTN	MTN Group
SOL	Sasol
AGL	Anglo
FSR	Firstrand
SBK	Stanbank
VOD	Vodacom
OML	Old Mutual
APN	Aspen
SLM	Sanlam
SHF	Steinhoff
BGA	B-Africa
REM	Remgro
NED	Nedbank
AMS	Amplats
BVT	Bidvest
KIO	Kumba
SHP	Shoprite
RMH	RMBH
MDC	Mediclinic
ITU	Intuprop
WHL	Woolworths
MNP	Mondi Plc
TBS	Tigerbrands
INP	Investec Plc
DSY	Discovery
GRT	Growthpoint
ANG	Anglogold Ashanti
IMP	Implats
MPC	Mr Price
RMI	RMI Holdings
CCO	CapCo
REI	Reinet Inv
NTC	Netcare
LHC	LifeHC
EXX	Exxaro

Code	Company Name
MMI	MMI Holdings
BAT	Brait
IPL	Imperial
LBH	Liberty
GFI	Gold Fields
RDF	Redefine
CML	Coronation
ARI	African Rainbow
ASR	Assore
NPK	Nampak
TRU	Truworths
TKG	Telkom
CPI	Capitec
PFG	Pioneer Foods
INL	Investec
NEP	New Europe
TSH	TsogoSun
MSM	Massmart
TFG	TFG
PIK	Pick 'n Pay
SNT	Santam
AVI	AVI
SAP	Sappi
RES	Resilient
SGL	Sibanye
MND	Mondi
SPP	Spar
BAW	Barworld
HYP	Hyprop
TON	Tongaat
PSG	PSGI
CPF	CapProp
LON	Lonmin
HCI	HCI
PPC	PPC
GND	Grindrod
ACL	Arcelormittal
CLS	Clicks
OMN	Omnia
AFE	AECI

Code	Company Name
RCL	RCL
NHM	Northam
ATT	Attacq
SUI	Sun International
ILV	Illovo
RPL	Redefine
TRE	Trencor
RBP	RBPlats
EOH	EOH
MUR	M&R
RLO	Reunert
ACP	Acucap
HAR	Harmony
DTC	Datatec
FBR	FamBrands
SPG	Super Group
KAP	KAP
AEG	Aveng
WBO	WBHO
VKE	Vukile
FPT	Fountainhead
OCE	Oceana
SAC	SA Corp
JSE	JSE
AIP	Adcock
COH	Curro
EMI	Emira
IVT	Invicta
CVH	Capevinh
NT1	Net1
FFA	Fortress A
MTA	Metair
ARL	Astral
ATNP	Altron Pref
AFX	Afrox
BLU	Blue Label
IPF	Investec Prop
CLI	Clientele
ZED	Zeder
MPT	MPact

Code	Company Name
LEW	Lewis
CLH	City Lodge
AQP	Aquarius
OCT	Octodec
PGR	Peregrine
CIL	CIL
GRF	Group 5
REB	Rebosis
RBX	Raubex
TCP	Transcap
ASC	Ascendis
PAN	Pan African
BRN	Brimstone-N
NIV	Niveus
PGL	Pallinghurst
GPL	Grand Parade
CSB	Cashbuild
ADH	Advtech
DLT	Delprop
HDC	Hudaco
ADR	Adcorp
CLR	Clover
SUR	Spurcorp
AWB	Arrowhead B
AWA	Arrowhead A
HWN	Howden
PMM	Premium
ATN	Altron
BCX	Business Connexion
AFT	Afrimat
TMG	TimesG
EQS	Eqstra
HPA	Hospitality-A
MFL	Metrofile
PNC	Pinnacle
FGL	Finbond
HSP	Holdsport
SSK	StefStock
AIA	Ascension A
BEL	Bell
AIB	Ascension B
ELI	Ellies
HPB	Hospitality-B

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Appendix 2: Market capitalisation of each company

Code	Company Name
BTI	1 291 665.15
SAB	1049502.384
BIL	668198.81
NPN	519146.025
CFR	481284
MTN	440500.1755
SOL	399130.6835
AGL	354768.1922
FSR	242544.2515
SBK	211478.1495
VOD	193434.02
OML	161937.8446
APN	153561.2827
SLM	141470.6089
SHF	133030.3478
BGA	130663.8122
REM	109701.8745
NED	109277.5488
AMS	98727.84165
BVT	94667.59719
KIO	85845.57465
SHP	80184.88824
RMH	80043.57246
MDC	79843.39433
ITU	77489.64487
WHL	70945.0158
MNP	68027.68672
TBS	60527.00095
INP	58343.21626
DSY	58198.81211
GRT	57433.91039
ANG	55887.66498
IMP	55002.64201
MPC	53333.87048
RMI	52593.36745
CCO	50240.76701
REI	49357.60994
NTC	46726.53502
LHC	46420.02227
EXX	45953.3816

Code	Company Name
MMI	41 144.55
BAT	37615.96808
IPL	36149.55023
LBH	35265.8564
GFI	34276.39436
RDF	33994.84098
CML	33808.08321
ARI	31092.25489
ASR	30015.505
NPK	28820.101
TRU	28718.31822
TKG	28450.42435
CPI	28201.88958
PFG	27339.64196
INL	27114.68684
NEP	27033.8321
TSH	26911.50263
MSM	26651.13556
TFG	26018.99233
PIK	25720.8721
SNT	25127.19464
AVI	24122.59045
SAP	24083.528
RES	23848.5562
SGL	22015.34117
MND	21897.36541
SPP	21754.35513
BAW	21377.32877
HYP	21107.3311
TON	21076.19981
PSG	21053.43783
CPF	20200.00159
LON	19316.8673
HCI	18404.1598
PPC	17895.02239
GND	17199.5433
ACL	16577.52179
CLS	16491.23012
OMN	15507.80965
AFE	15324.81623

Code	Company Name
RCL	14 733.74
NHM	14639.11983
ATT	14347.86294
SUI	13661.29576
ILV	13130.82087
RPL	12118.51021
TRE	11824.60177
RBP	11654.61252
EOH	11236.49052
MUR	11207.35017
RLO	11158.60266
ACP	11066.82029
HAR	10764.88854
DTC	10705.76002
FBR	9792.758241
SPG	9756.436466
KAP	9478.599068
AEG	9258.428087
WBO	9239.34
VKE	9215.853421
FPT	8952.86506
OCE	8844.935618
SAC	8828.485542
JSE	8556.574824
AIP	8469.589749
COH	7946.056335
EMI	7945.821213
IVT	7932.896265
CVH	7304.8571
NT1	6925.301196
FFA	6898.960083
MTA	6546.635649
ARL	6504.909416
ATNP	6407.362549
AFX	6284.49384
BLU	6151.522463
IPF	5817.359925
CLI	5603.044705
ZED	5587.073487
MPT	5581.068106

Code	Company Name
LEW	5 540.27
CLH	5316.128019
AQP	4995.216586
OCT	4973.927599
PGR	4885.81542
CIL	4802.017825
GRF	4484.23628
REB	4441.24782
RBX	4153.109758
TCP	3937.232254
ASC	3936.625313
PAN	3934.48874
BRN	3933.865296
NIV	3742.61664
PGL	3688.19526
GPL	3652.190655
CSB	3552.015249
ADH	3484.00563
DLT	3409.880862
HDC	3333.384626
ADR	3290.509023
CLR	3041.918079
SUR	3036.381106
AWB	2987.031065
AWA	2975.65912
HWN	2793.487133
PMM	2694.929744
ATN	2631.161362
BCX	2591.823795
AFT	2492.765969
TMG	2478.000798
EQS	2385.934058
HPA	2208.560432
MFL	2052.713971
PNC	2012.549539
FGL	1760.623478
HSP	1730.323822
SSK	1502.765161
AIA	1451.646037
BEL	1332.05639
AIB	884.4436829
ELI	537.2050731
HPB	527.5223963

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Appendix 3: Combination-based style sub-portfolio holdings

Sub-Portfolio	Company code	Date
1	BEL	Dec-00
1	PMM	Dec-00
1	RPR	Dec-00
1	SBL	Dec-00
1	SNR	Dec-00
1	CLC	Mar-01
1	MTA	Mar-01
1	GND	Mar-01
1	RPR	Mar-01
1	CLY	Mar-01
1	CLC	Jun-01
1	MTA	Jun-01
1	RPR	Jun-01
1	SOV	Jun-01
1	TRE	Sep-01
1	MTA	Sep-01
1	CSB	Sep-01
1	SOV	Sep-01
1	TRE	Dec-01
1	GRF	Dec-01
1	CSB	Dec-01
1	SOV	Dec-01
1	TRE	Mar-02

Sub-Portfolio	Company code	Date
2	CLC	Jan-01
2	BEL	Jan-01
2	PMM	Jan-01
2	RPR	Jan-01
2	SNR	Jan-01
2	CLY	Jan-01
2	CLC	Apr-01
2	TRE	Apr-01
2	MTA	Apr-01
2	GND	Apr-01
2	WNH	Jul-01
2	TRE	Jul-01
2	MTA	Jul-01
2	CMH	Jul-01
2	GND	Jul-01
2	RPR	Jul-01
2	SOV	Jul-01
2	MTA	Oct-01
2	GRF	Oct-01
2	CSB	Oct-01
2	SOV	Oct-01
2	CSB	Jan-02
2	SOV	Jan-02

Sub-Portfolio	Company code	Date
3	CLC	Feb-01
3	PMM	Feb-01
3	CLY	Feb-01
3	GMF	May-01
3	CLC	May-01
3	MTA	May-01
3	RPR	May-01
3	SOV	May-01
3	SOV	Aug-01
3	CLY	Aug-01
3	TRE	Aug-01
3	MTA	Aug-01
3	GND	Aug-01
3	ART	Aug-01
3	TRE	Nov-01
3	GRF	Nov-01
3	CSB	Nov-01
3	SOV	Nov-01
3	MLN	Nov-01
3	TRE	Feb-02
3	GND	Feb-02
3	CSB	Feb-02
3	CRG	May-02

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1	CSB	Mar-02	2	TRE	Jan-02	3	CAC	May-02
1	CAC	Jun-02	2	OZZ	Apr-02	3	TRE	May-02
1	MAS	Sep-02	2	CSB	Apr-02	3	CSB	May-02
1	JSC	Sep-02	2	CSB	Jul-02	3	JSC	May-02
1	TPC	Sep-02	2	JSC	Jul-02	3	MAS	Aug-02
1	CRG	Sep-02	2	CRG	Jul-02	3	JSC	Aug-02
1	MAS	Dec-02	2	CAC	Jul-02	3	TPC	Aug-02
1	TPC	Dec-02	2	TPC	Oct-02	3	CRG	Aug-02
1	ART	Dec-02	2	CRG	Oct-02	3	CAC	Aug-02
1	JSC	Dec-02	2	JSC	Oct-02	3	MAS	Nov-02
1	RNG	Mar-03	2	MAS	Oct-02	3	JSC	Nov-02
1	DAW	Mar-03	2	MAS	Jan-03	3	TPC	Nov-02
1	CRG	Mar-03	2	JSC	Jan-03	3	CRG	Nov-02
1	WNH	Mar-03	2	CRG	Jan-03	3	JSC	Feb-03
1	TPC	Mar-03	2	TPC	Jan-03	3	TPC	Feb-03
1	JSC	Mar-03	2	RNG	Apr-03	3	CRG	Feb-03
1	IVT	Jun-03	2	CSB	Apr-03	3	RNG	Feb-03
1	GRF	Jun-03	2	DAW	Apr-03	3	MST	Feb-03
1	TPC	Jun-03	2	TPC	Apr-03	3	IVT	Feb-03
1	INM	Jun-03	2	JSC	Apr-03	3	DAW	Feb-03
1	CSB	Sep-03	2	MAS	Apr-03	3	ART	Feb-03
1	DAW	Sep-03	2	RNG	Jul-03	3	IVT	May-03
1	SNU	Sep-03	2	APK	Jul-03	3	DAW	May-03
1	BEG	Sep-03	2	DAW	Jul-03	3	TPC	May-03
1	BRT	Dec-03	2	TPC	Jul-03	3	JSC	May-03
1	MTO	Dec-03	2	WNH	Oct-03	3	RNG	Aug-03
1	GND	Mar-04	2	INM	Oct-03	3	SNU	Aug-03

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1	DAW	Mar-04	2	APK	Oct-03	3	TPC	Aug-03
1	INM	Mar-04	2	DAW	Oct-03	3	WNH	Nov-03
1	GND	Jun-04	2	BRC	Jan-04	3	INM	Nov-03
1	AMA	Jun-04	2	DAW	Jan-04	3	DAW	Nov-03
1	VLE	Jun-04	2	INM	Jan-04	3	TPC	Nov-03
1	CNL	Jun-04	2	GND	Apr-04	3	GND	Feb-04
1	WNH	Jun-04	2	AMA	Apr-04	3	DAW	Feb-04
1	TMT	Jun-04	2	DAW	Apr-04	3	INM	Feb-04
1	GND	Sep-04	2	TMT	Apr-04	3	GND	May-04
1	BRC	Sep-04	2	SNU	Apr-04	3	AMA	May-04
1	DGC	Sep-04	2	WNH	Apr-04	3	DAW	May-04
1	WNH	Sep-04	2	INM	Apr-04	3	VLE	May-04
1	SIR	Sep-04	2	GND	Jul-04	3	SNU	May-04
1	OLG	Sep-04	2	CNL	Jul-04	3	INM	May-04
1	EHS	Dec-04	2	WNH	Jul-04	3	GND	Aug-04
1	GND	Dec-04	2	INM	Jul-04	3	WNH	Aug-04
1	ART	Dec-04	2	EHS	Oct-04	3	LAR	Aug-04
1	SOV	Dec-04	2	GND	Oct-04	3	OLG	Aug-04
1	KIR	Dec-04	2	DGC	Oct-04	3	GND	Nov-04
1	OLG	Dec-04	2	SOV	Oct-04	3	ART	Nov-04
1	ART	Mar-05	2	KIR	Oct-04	3	DGC	Nov-04
1	SNU	Mar-05	2	OLG	Oct-04	3	SOV	Nov-04
1	HWN	Mar-05	2	EXL	Jan-05	3	OLG	Nov-04
1	SOV	Mar-05	2	LAR	Jan-05	3	KIR	Nov-04
1	PNC	Mar-05	2	KIR	Jan-05	3	ART	Feb-05
1	KIR	Mar-05	2	EHS	Jan-05	3	DGC	Feb-05
1	YRK	Mar-05	2	GND	Jan-05	3	SOV	Feb-05

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1	BDM	Jun-05	2	ART	Jan-05	3	JSC	Feb-05
1	CMA	Jun-05	2	SOV	Jan-05	3	LAR	Feb-05
1	EHS	Jun-05	2	EHS	Apr-05	3	KIR	Feb-05
1	HCI	Jun-05	2	PNC	Apr-05	3	SNU	May-05
1	HWN	Jun-05	2	KIR	Apr-05	3	SOV	May-05
1	SOV	Jun-05	2	ART	Apr-05	3	PNC	May-05
1	PNC	Jun-05	2	HWN	Apr-05	3	KIR	May-05
1	KIR	Jun-05	2	SOV	Apr-05	3	EHS	May-05
1	CAE	Jun-05	2	EHS	Jul-05	3	HCI	Aug-05
1	HCI	Sep-05	2	HCI	Jul-05	3	SNU	Aug-05
1	SNU	Sep-05	2	CMA	Jul-05	3	HWN	Aug-05
1	BDM	Sep-05	2	HWN	Jul-05	3	SOV	Aug-05
1	HWN	Sep-05	2	SOV	Jul-05	3	PNC	Aug-05
1	PNC	Sep-05	2	PNC	Jul-05	3	KIR	Aug-05
1	YRK	Sep-05	2	KIR	Jul-05	3	YRK	Aug-05
1	CAE	Sep-05	2	BDM	Jul-05	3	SNU	Nov-05
1	KIR	Sep-05	2	SNU	Oct-05	3	HWN	Nov-05
1	SNU	Dec-05	2	PNC	Oct-05	3	PNC	Nov-05
1	PNC	Dec-05	2	YRK	Oct-05	3	YRK	Nov-05
1	TMT	Dec-05	2	BDM	Oct-05	3	CAE	Nov-05
1	YRK	Dec-05	2	CAE	Oct-05	3	BDM	Nov-05
1	CAE	Dec-05	2	SNU	Jan-06	3	ADW	Feb-06
1	BDM	Dec-05	2	TMT	Jan-06	3	FRT	Feb-06
1	BDM	Mar-06	2	YRK	Jan-06	3	CAE	Feb-06
1	PNC	Mar-06	2	CAE	Jan-06	3	PNC	May-06
1	BRT	Mar-06	2	BDM	Jan-06	3	BRT	May-06
1	MVL	Jun-06	2	BRT	Apr-06	3	CAE	May-06

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1	SNU	Jun-06	2	ADW	Apr-06	3	OLG	May-06
1	PNC	Jun-06	2	BDM	Apr-06	3	ADW	May-06
1	BRT	Jun-06	2	PNC	Apr-06	3	MVL	Aug-06
1	CAE	Jun-06	2	MVL	Jul-06	3	PNC	Aug-06
1	OLG	Jun-06	2	PNC	Jul-06	3	BRT	Aug-06
1	BRT	Sep-06	2	BRT	Jul-06	3	CRG	Aug-06
1	ADW	Sep-06	2	CAE	Jul-06	3	ADW	Aug-06
1	SBV	Sep-06	2	ADW	Jul-06	3	CAE	Nov-06
1	CAE	Dec-06	2	BRT	Oct-06	3	BRT	Nov-06
1	ADW	Dec-06	2	ADW	Oct-06	3	BEG	Nov-06
1	CAP	Dec-06	2	FRT	Oct-06	3	CAP	Nov-06
1	BEL	Mar-07	2	CAE	Jan-07	3	SBL	Feb-07
1	CAE	Mar-07	2	FRT	Jan-07	3	CAE	Feb-07
1	ADW	Mar-07	2	SBL	Jan-07	3	COM	May-07
1	CAE	Jun-07	2	CAE	Apr-07	3	CAE	May-07
1	ADW	Jun-07	2	ADW	Apr-07	3	ADW	May-07
1	YRK	Jun-07	2	CAE	Jul-07	3	PGR	Aug-07
1	BEG	Jun-07	2	BEG	Jul-07	3	BEL	Aug-07
1	CAE	Sep-07	2	CAE	Oct-07	3	CAE	Aug-07
1	ADW	Sep-07	2	YRK	Jan-08	3	YRK	Nov-07
1	YRK	Dec-07	2	ADW	Apr-08	3	EHS	Feb-08
1	ADW	Mar-08	2	ADW	Jul-08	3	ADW	May-08
1	ADW	Jun-08	2	ASR	Oct-08	3	EHS	Aug-08
1	ARI	Sep-08	2	VLE	Oct-08	3	ADW	Aug-08
1	ASR	Sep-08	2	SPO	Oct-08	3	ASR	Nov-08
1	EHS	Sep-08	2	VLE	Jan-09	3	VLE	Nov-08
1	ADW	Sep-08	2	GIJ	Oct-09	3	SPO	Nov-08

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1	ASR	Dec-08	2	SOV	Oct-09	3	VLE	May-09
1	VLE	Dec-08	2	TPC	Oct-09	3	CSB	Aug-09
1	LEW	Jun-09	2	MVL	Jan-10	3	CDZ	Aug-09
1	CDZ	Sep-09	2	GIJ	Jan-10	3	TPC	Aug-09
1	TPC	Sep-09	2	MAS	Jan-10	3	TPC	Nov-09
1	MVL	Dec-09	2	GIJ	Apr-10	3	MVL	Nov-09
1	MTX	Dec-09	2	BRT	Apr-10	3	CDZ	Nov-09
1	GIJ	Dec-09	2	MST	Apr-10	3	IPL	Feb-10
1	CDZ	Dec-09	2	TPC	Apr-10	3	MRF	Feb-10
1	MAS	Dec-09	2	MTA	Jul-10	3	GIJ	Feb-10
1	GIJ	Mar-10	2	PNC	Jul-10	3	MTA	May-10
1	EOH	Mar-10	2	BRT	Jul-10	3	PNC	May-10
1	PNC	Mar-10	2	MST	Jul-10	3	HWN	May-10
1	BRT	Mar-10	2	ELR	Jul-10	3	BRT	May-10
1	EOH	Jun-10	2	EOH	Jul-10	3	MST	May-10
1	PNC	Jun-10	2	IVT	Oct-10	3	TPC	May-10
1	BRT	Jun-10	2	MTA	Oct-10	3	PNC	Aug-10
1	MST	Jun-10	2	CMH	Oct-10	3	NWL	Aug-10
1	MTA	Sep-10	2	PNC	Oct-10	3	MTA	Aug-10
1	NWL	Sep-10	2	MTA	Jan-11	3	IVT	Nov-10
1	MTA	Dec-10	2	PNC	Jan-11	3	MTA	Nov-10
1	PNC	Dec-10	2	MST	Jan-11	3	PNC	Nov-10
1	NWL	Dec-10	2	OLG	Jan-11	3	MTA	Feb-11
1	MST	Dec-10	2	MTA	Apr-11	3	PNC	Feb-11
1	MTA	Mar-11	2	EOH	Apr-11	3	OLG	Feb-11
1	PNC	Mar-11	2	PNC	Apr-11	3	ASR	May-11
1	ELR	Mar-11	2	ELR	Apr-11	3	EOH	May-11

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1	MST	Mar-11	2	MST	Apr-11	3	PNC	May-11
1	EXX	Jun-11	2	EOH	Jul-11	3	ELR	May-11
1	MTA	Jun-11	2	PNC	Jul-11	3	MTA	May-11
1	PNC	Jun-11	2	ELR	Jul-11	3	EXX	Aug-11
1	EOH	Jun-11	2	TTO	Jul-11	3	ELR	Aug-11
1	ELR	Jun-11	2	EXX	Jul-11	3	TTO	Aug-11
1	TTO	Jun-11	2	MTA	Jul-11	3	ASR	Aug-11
1	EOH	Sep-11	2	MTA	Oct-11	3	MTA	Aug-11
1	PNC	Sep-11	2	EOH	Oct-11	3	PNC	Aug-11
1	HWN	Sep-11	2	PNC	Oct-11	3	EXX	Nov-11
1	CBH	Sep-11	2	HWN	Oct-11	3	PNC	Nov-11
1	ELR	Sep-11	2	CBH	Oct-11	3	CBH	Nov-11
1	EXX	Sep-11	2	TTO	Oct-11	3	TTO	Nov-11
1	IVT	Sep-11	2	MST	Oct-11	3	MST	Nov-11
1	MTA	Sep-11	2	PNC	Jan-12	3	DRD	Feb-12
1	MTA	Dec-11	2	TTO	Jan-12	3	PNC	Feb-12
1	PNC	Dec-11	2	AFT	Jan-12	3	AFT	Feb-12
1	CBH	Dec-11	2	ACT	Jan-12	3	ACT	Feb-12
1	TTO	Dec-11	2	MTA	Jan-12	3	BRT	Feb-12
1	TPC	Dec-11	2	MTA	Apr-12	3	MTA	Feb-12
1	DRD	Mar-12	2	PNC	Apr-12	3	MTA	May-12
1	AFT	Mar-12	2	BEL	Apr-12	3	PNC	May-12
1	MTA	Mar-12	2	AFT	Apr-12	3	ACT	May-12
1	PNC	Mar-12	2	IVT	Jul-12	3	IVT	Aug-12
1	BEL	Mar-12	2	PNC	Jul-12	3	MTA	Aug-12
1	IVT	Jun-12	2	ASR	Oct-12	3	PNC	Aug-12
1	PNC	Jun-12	2	MTA	Oct-12	3	AFT	Aug-12

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1	DRD	Jun-12	2	ACT	Oct-12	3	ACT	Aug-12
1	IPL	Sep-12	2	CGR	Oct-12	3	AMA	Nov-12
1	IVT	Sep-12	2	HWN	Oct-12	3	CGR	Nov-12
1	MTA	Sep-12	2	ASR	Jan-13	3	ASR	Nov-12
1	PNC	Sep-12	2	TRE	Jan-13	3	MTA	Nov-12
1	HWN	Sep-12	2	IVT	Jan-13	3	HWN	Nov-12
1	AFT	Sep-12	2	MTA	Jan-13	3	ACT	Nov-12
1	ASR	Dec-12	2	HWN	Jan-13	3	TRE	Feb-13
1	HWN	Dec-12	2	ACT	Jan-13	3	IVT	Feb-13
1	ACT	Dec-12	2	HWN	Apr-13	3	HWN	Feb-13
1	AFT	Dec-12	2	COM	Apr-13	3	ACT	Feb-13
1	CGR	Dec-12	2	COM	Jul-13	3	COM	May-13
1	TRE	Mar-13	2	COM	Oct-13	3	COM	Aug-13
1	OMN	Mar-13	2	OLG	Oct-13	3	OLG	Aug-13
1	ACT	Mar-13	2	COM	Jan-14	3	COM	Nov-13
1	COM	Jun-13	2	SHF	Jan-14	3	SHF	Feb-14
1	OLG	Jun-13	2	TKG	Jan-14	3	TKG	Feb-14
1	COM	Sep-13	2	SHF	Apr-14	3	COM	Feb-14
1	COM	Dec-13	2	TKG	Apr-14	3	SHF	May-14
1	PHM	Dec-13	2	PGR	Apr-14	3	TKG	May-14
1	SHF	Mar-14	2	SHF	Jul-14	3	PGR	May-14
1	TKG	Mar-14	2	TKG	Jul-14	3	AFT	May-14
1	COM	Mar-14	2	PGR	Jul-14	3	SHF	Aug-14
1	SHF	Jun-14	2	MRF	Jul-14	3	TKG	Aug-14
1	TKG	Jun-14	2	TTO	Jul-14	3	PGR	Aug-14
1	PGR	Jun-14	2	TTO	Oct-14	3	MRF	Aug-14
1	TTO	Jun-14	2	SBV	Oct-14	3	TTO	Aug-14

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1	TKG	Sep-14
1	PGR	Sep-14
1	MRF	Sep-14
1	TTO	Sep-14

2	TKG	Oct-14
2	PGR	Oct-14
2	MRF	Oct-14

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