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Fundamental momentum on the Johannesburg Stock Exchange

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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.

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ABSTRACT

Financial market anomalies are constant subjects of debate because of their deviation from the foundational financial theories. Fama and French (2008) referred to the momentum effect as the premier anomaly. Thus, this study sought to apply the concept of momentum to examine three investment strategies. The first strategy was price momentum, an existing investment strategy but which was used as a comparison to the returns of the second and third strategies. The second strategy applied momentum to return on equity, operating cash flow and earnings before interest, tax, depreciation and amortisation, whilst the third strategy combined stocks with momentum in both stock price and the respective fundamental variable.

Using a non-probability sampling method, a total of 109 stocks listed on the Johannesburg Stock Exchange over the period 1999-2010 were tested. Momentum in stock price and the respective fundamentals was used to rank stocks into quintiles. The viability of each investment strategy was measured by comparing its average and risk adjusted returns to the market.

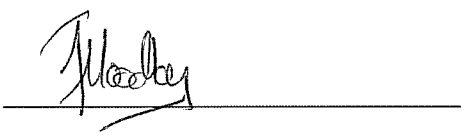
The results revealed that fundamental momentum can beat market returns, with the highest amount of significant differences found using momentum in return on equity. The combination strategy also reported results of beating the market, with the highest amount of significant differences found using the 12 month fundamental momentum combined with 6 month price momentum.

Keywords

Anomalies, momentum, fundamental

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 carry out this research.



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1.1 RESEARCH TITLE

Fundamental momentum on the Johannesburg Stock Exchange

1.2 RESEARCH PROBLEM

Foundational financial market theory has been challenged by the continued presence and success of financial market anomalies (Latif, Arshad, Fatima & Farooq, 2011).

In particular, the Efficient Market Hypothesis as defined by Fama (1970) as a market in which stock prices fully reflects available information. This theory has been the subject of much criticism for failing to fully explain anomalous returns.

The capital asset pricing model developed by Sharpe (1964) and Lintner (1965) which postulates that market beta (a single variable) explains expected stock returns. Amidst findings that this one variable may be insufficient, subsequent studies by Fama and French (1992) identified additional variables to explain stock returns (namely, low market capitalisation and high book to market ratios, which is referred to as the Fama-French three factor model). Both these models using variables as proxies for risk to explain stock returns, failed to explain the above average returns earned using a relative price momentum strategy (Jegadeesh and Titman, 1993). Later, Carhart (1997), added momentum as a fourth factor to the Fama-French three factor model. This addition of the "momentum" factor to asset pricing theory contributes to the explanatory power of the Fama-French three factor model and suggests its significance in explaining stock returns.

Asset pricing now includes adjustments for size, value and momentum. Whilst size and value reflects an adjustment for risk, momentum returns is found to be a compensation for both market mispricing and risk (Bernard, Thomas and Wahlen, 1996).

Evidence of anomalous returns on the JSE even after adjusting for risk supports the case against a strong or semi-strong form of the Efficient Market Hypothesis (Hoffman, 2012). In addition various studies indicate the prevalence of momentum on the JSE (Hoffman, 2012; Snyman, 2011; Friedrich, 2010; Van Rensburg and Robertson, 2003; Boshoff, 2008).

Thus, if the studies on the JSE reflects evidence of an inefficient market and the use of momentum in picking stocks yields above market returns which not only compensates for risk but also for market mispricing – why then can we not apply momentum to fundamentals ?

1.3 RESEARCH SCOPE

This research examined fundamental momentum on the South African equity market in two ways over the 12 year sample period. Firstly, by testing for the explanatory power of stock returns using momentum in only three fundamental variables namely, return on equity, operating cash flow and earnings before interest, tax, depreciation and amortisation.

In line with the basic principle on stock valuation, the future value of a stock is based on its ability to generate cash flows now and in the future. Bearing this in mind, ROE, OPCF and EBITDA were selected as proxies for growth, liquidity and profitability respectively.

The second application of fundamental momentum examined the predictive power of combination portfolios. Only two combinations had been tested due to time constraints. The first combination paired 12 month fundamental momentum with 6 month price momentum, and the second combination paired 24 month fundamental momentum with 12 month price momentum.

1.4 RESEARCH AIM

Momentum has been evidenced across US markets (Jegadeesh and Titman, 2001; Chen and Lee, 2011), in European markets (Rouwenhorst, K.G., 1998), emerging markets (Rouwenhorst, K.G., 1999), different international markets (Hu and Chen, 2011), as well as South African markets (Hoffman, 2012; Snyman, 2011; Friedrich, 2010; Van Rensburg and Robertson, 2003; Boshoff, 2008).

However, despite its success and widespread prevalence, momentum has remained a technical analysis tool. This paper aimed to change that by testing for explanatory power in fundamental momentum.

In so doing, it was envisaged that this research will add to academia by introducing further explanatory variables for stock returns. From a practical perspective, we hoped that this research will provide investors and portfolio managers trading on the Johannesburg Stock Exchange with information to enhance their investment strategy of choice.

2. LITERATURE REVIEW

2.1 INTRODUCTION

The objective of this paper was to test fundamental momentum for explanatory power in stock returns. In essence we used the existing momentum phenomenon, described by Fama and French (2008) as "the premier anomaly", as a tool for fundamental analysis with the aim of achieving above market returns.

Thus, the literature review that follows includes a discussion and empirical evidence of financial market anomalies as well as a discussion of the impact on the underlying financial market theories.

2.2 FINANCIAL MARKET ANOMALIES

Frankfurter and Mcgoun (2001) make reference to the definition of an anomaly in financial economics as an irregularity or deviation from the common or natural order or an exceptional condition. In this context, the natural order is prescribed by foundational financial theory which is discussed in section 2.4.

Latif, Arshad, Fatima and Farooq (2011), classify anomalies into three basic types, namely 1) fundamental anomalies, 2) technical anomalies, and 3) calendar anomalies.

Calendar anomalies relate to a particular time period, for example the "January effect" with evidence suggesting that risk adjusted returns are higher in January than in any other month. Fundamental anomalies reside in the pursuit of value versus growth, with Graham Dodd (1934) noting that value strategies outperform the market. Technical anomalies arise from using past trading data to predict future stock returns, for example, using trends in past stock prices to predict future stock prices (Jegadeesh and Titman, 1993).

How long does an anomaly persist for it to be an anomaly?

Marquering, Nisser and Valla (2006) examined anomalies before and after publication suggesting that some anomalies disappear over time because of data snooping or because of increased awareness which diminishes further profits. The study concluded with evidence of the weakening of anomalies like the "January effect" but found the momentum anomaly to be robust over time.

Thus, a more apt definition of an anomaly was defined by Tversky and Kahneman (1986), as "an anomaly is a deviation from the presently accepted paradigms that is too widespread to be

ignored, too systematic to be dismissed as random error and too fundamental to be accommodated by relaxing the normative system".

It is with this definition in mind that we chose to focus our discussion on some key fundamental and technical anomalies that have persisted over time.

2.2.1 FUNDAMENTAL ANOMALIES

Fundamental analysis itself, involves analysing an organisation's past performance on an economic, industry and company level. This comprehensive study of the current market conditions is meant to identify differences between the perceived future intrinsic value and the current market value of the company stock.

The explanatory power of fundamental analysis for future stock prices has long captured the interest of academics as evident by the array of literature across time (Abarbanell and Bushee, 1997; Piotroski, 2000; Mohanram, 2005; Elluech, 2009; Hand and Green, 2009; Richardson, Tuna and Wysocki, 2010; Lewellen, 2010; Hancock and Seng, 2012) with some of the earlier literature in this area published by Graham and Dodd (1934).

Some examples of fundamental anomalies include:

Fundamental analysis anomaly

With each financial ratio holding content/information of its own, the very inter-relational nature of accounting transactions, gave rise to a composite of various fundamental indicators to better predict future stock returns. Earlier research by Abarbanell and Bushee (1997) used a list of fundamental variables identified by Lev and Thiagarajan (1993) in examining the relation between fundamentals and stock price.

Book to market anomaly

Piotroski (2000) and Mohanram (2005) developed two indicators, namely, the FSCORE and the GSCORE respectively. These two indicators comprised of fundamental variables that ultimately measured book-to-market ratios, which as was shown by Lakonishok, Shleifer and Vishny (1994) bears strong positive correlation to future stock performance. Piotroski (2000) focussed on identifying fundamentals typical of value stocks (high book to market ratio), whilst Mohanram (2005) extended the FSCORE to construct the GSCORE which focussed on identifying fundamentals typical of growth stocks (low book to market ratio). Both these indicators can be used to identify winners (top performing) and losers (poor performing) in terms of future stock performance.

Price-earnings anomaly

Studies show that stocks with low price earnings ratios return superior returns over stocks with high price earnings ratios. The low price earnings ratio stocks tend to be undervalued whilst the high price earnings ratio stocks tend to be overvalued. (De Bondt and Thaler,1985).

While most of the studies used data sets in the United States, Hancock and Seng (2012) confirmed fundamental signals as significant predictors for future earnings in a study using a global data set of at least 33 countries worldwide making it a viable analysis tool across markets.

2.2.2 TECHNICAL ANOMALIES

Technical analysis employs a different approach to differentiating between top and underperforming stocks. Contrary to fundamental analysis which is focussed on the intrinsic value of the company, technical analysts are of the view that demand and supply forces in the market gives rise to fluctuating stock prices and volume. With the use of different technical indicators (example, moving average ratios, relative strength indexes), technical analysts look for trends/patterns in past stock trading data to predict future activity.

Some examples of technical anomalies include:

Moving averages

An introductory paper to technical analysis by Sewell (2008) concluded on the usefulness of some technical analysis indicators (moving averages, momentum, support and resistance) with chart patterns working better on stock markets than currency markets. Interestingly, Sewell (2008), also concluded with the expectation that markets would become more efficient thereby diminishing the efficacy of technical analysis. However, later papers confirmed the contrary.

Zhu and Zhou (2009) explored the usefulness of the moving average trading rule from an asset allocation perspective, while Park (2010) found that the ratio of two variables commonly used in technical analysis, namely, short and long term moving averages held significant predictive power for future returns.

Hsu, Hsu and Kuan (2010) provided new evidence for the predictive ability of technical trading rules not only in emerging markets but also in growth markets. In fact, Marshall, Cahan and Cahan (2010) further concluded on evidence that technical trading rules performed better in emerging markets than developed markets.

Momentum effect

Jegadeesh and Titman (1993) in their seminal paper showed that a relative strength strategy which ranked stocks based on their past 3 to 12 month returns held predictive power for the relative performance over the next 3 to 12 months yielding abnormally high returns. Essentially, this meant that recent (last 3 to 12 month) stocks with high returns (winner stocks) are likely to continue yielding high returns for the subsequent 3 to12 months. The same trend can also be seen with recent (last 3 to 12 month) stocks with low returns (loser stocks) which continue to yield low returns in the subsequent 3 to 12 months. For investors, opting to exploit this trend, it meant taking long positions in upward trending stocks and short positions in downward trending stocks (Ghosh, 2008).

The 'discovery" of momentum in academia by Jegadeesh and Titman (1993) was followed by similar evidence documented by Asness (1994).

Decades later, empirical evidence on the persistence of the momentum anomaly has been documented by numerous further studies in United States (Jegadeesh and Titman, 2001; Bonenkamp, Homburg and Kempf, 2011; Chen and Lee, 2011), in European markets, namely, Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom (Rouwenhorst, K.G., 1998), in emerging markets, namely, Southern European, Asian, African and South American countries (Rouwenhorst, K.G., 1999), in different international stock markets (Griffin, Ji and Martin, 2005; Asness, Moskowitz abd Pedersen, 2009; Hu and Chen, 2011) and South Africa (Van Rensburg and Robertson, 2003; Boshoff, 2008; Friedrich ,2010 and Snyman, 2011).

Momentum was found to be present not only in stocks but across country indices (Asness, Liew and Stevens, 1997), and among industries (Moskowitz and Grinblatt, 1999; Ji and Giannikos, 2010).

2.2.3 COMBINATION ANOMALIES

While fundamental and technical analysis has both achieved academic and practical recognition, respectively, for its use in predicting future stock prices, there is no rule or reason which precludes why these two methods should be carried out in isolation. In fact, evidence and success of combination anomalies is prevalent in literature.

Asem (2009) found that buying historic top performing companies that increase dividends and selling historic poor performing companies that decrease dividends yields higher momentum profits. Shih (2010) combined fundamental indicators, FSCORE (Piotroski, 2000) and the

GSCORE (Mohanram, 2005) into the technical momentum strategy, the results of which outperformed the pure technical momentum strategy.

Chen and Lee (2011) found that a combined momentum strategy, leveraging off the inter-relationship between revenue, price and earnings momentum outperformed the individual momentum strategies. Indeed revenue and earnings bear the risk of manipulation, and as such Bonenkamp, Homburg and Kempf (2011), used a combination of price momentum and high operating cash flows instead, as their hybrid model which outperformed the pure momentum strategy.

Leivo and Patari (2011) combined 6 month price momentum with various value strategies during 1993-2008 in the Finnish stock market. The results indicated that the combination strategy enhanced the performance of the portfolio.

The combination of these two methods is both possible and successful as is evident in the work by Bettman, Sault and Schultz (2009), who proposed a hybrid stock valuation model using book value and earnings per share as the fundamental variables and price momentum as the technical variable, revealing superior explanatory power relative to considering either fundamental or technical analysis in isolation.

Similarly, Neely, Rapach, Tu and Zhou (2010), acknowledged that fundamental and technical analysis are conceptually different, however, evidence from their study indicates that each analysis method captures different sources of equity premium changes and as such the two approaches are complementary.

So much so that even though Marshall, Cahan and Cahan (2010) concluded on the predictive ability of technical trading rules, recognised the possibility that technical analysis can very well be used to compliment other investment strategies. With Bonenkamp, Homburg and Kempf (2011), suggesting that stock prices are determined simultaneously by various factors, which are to some extent unobservable, creates a plausible premise for a combined approach.

The explanatory power and increased returns from an enhanced momentum strategy is evident from the literature above. In fact, inter-relationships between the momentum stocks and other variables were evident even earlier on, with Chan, Jegadeesh ans Lakonishok (1996) documenting the correlation between earnings and price momentum. Lee and Swaminathan (2000) included the use of the technical indicator, trade volume, to better select momentum stocks.

Yu (2010) recognises that the upward trend in momentum stocks eventually reverse in the long term, and thus focusses their study on developing strategies to pick out those stocks which are most susceptible to reversal. This and the literature cited in this section highlights the fact that

the success in picking momentum stocks is much more than looking for upward trends in stock price, but that efforts to pick the "right" momentum stocks is a much more beneficial investment strategy.

2.3 CONCLUSION

A review of the literature bears testament to the existence of financial market anomalies. While it is not within the scope of this paper to explain anomalous return, the following section discusses the impact of financial market anomalies on the foundations of financial market theory.

2.4 FINANCIAL THEORY

The existence and success of financial market anomalies challenges the very core financial theories still being applied today. This could be indicative of inadequate underlying theories or the possibility that anomalies are more apparent than real (Schwert, 2002).

On the other hand these challenges to the theory can be viewed as positive input to more robust financial models in line with the suggestion by Basiewicz and Auret (2010) that the focus of asset pricing has shifted from theoretical modelling towards empirical analysis.

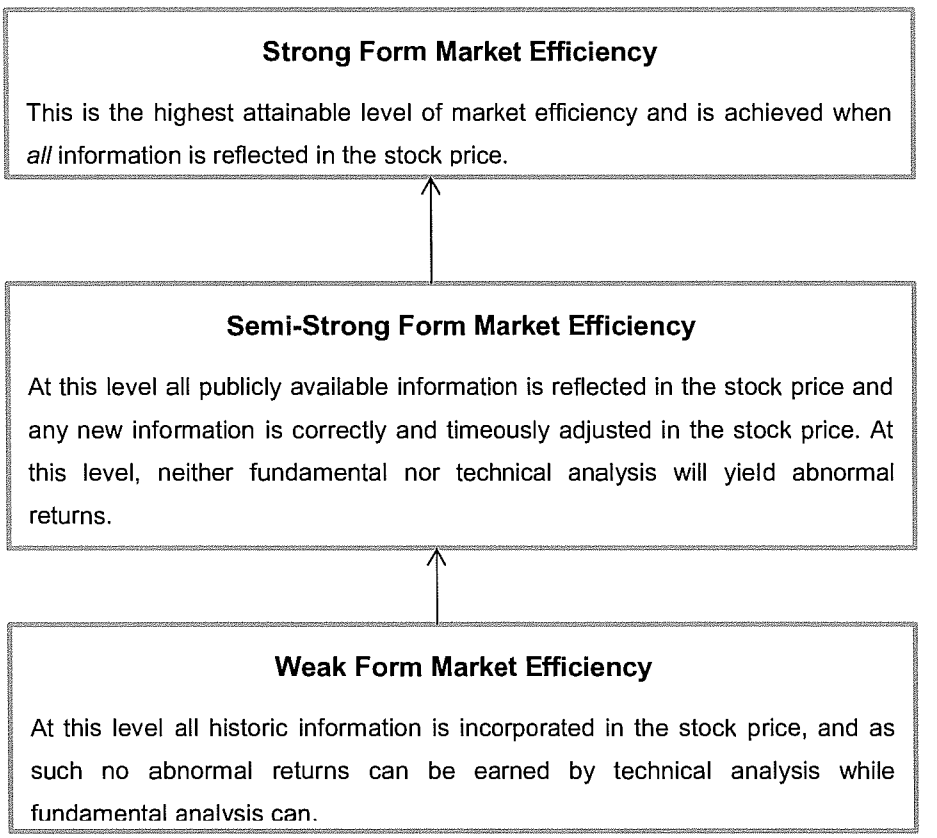
2.4.1 THE EFFICIENT MARKET HYPOTHESIS

Fama (1970) defined an efficient market as, "A market in which prices always "fully reflect" available information is called "efficient".

The Efficient Market Hypothesis (Fama, 1970), says that all fundamental information is already contained in the market price of a stock, and as such neither technical nor fundamental analysis can generate abnormal returns for investors. Only new information can impact the stock prices, and since new information arrives randomly, it stands to reason that the stock prices should also exhibit random behaviour (Malkiel 1973).

The Efficient Market Hypothesis assumes rational investor expectations and that as and when new information becomes available such expectations will be adjusted accordingly. Figure 2.1 depicts the three levels market efficiency:

Figure 2.1: Three levels of market efficiency



It would appear that the semi-strong form of market efficiency is not evident, given the abnormal returns earned by both fundamental and technical analysis methods. Further, the weak form of market efficiency also appears to be challenged since technical analysis (example, momentum investing) has and continues to report abnormal profits. The strong form of market efficiency also lacks conviction, since at this level no specific investment strategy would be required, neither would it earn abnormal profits and picking stocks would equate to a random selection (Malkiel, 1973).

The efficacy of information in the market has implications for the success of investment strategies, and is for this reason it is introduced in the paper. Despite the literary account of support and criticisms of the efficient market hypothesis (Sewell, 2011), investors today continue to make investment decisions based on their own philosophies, whether it be fundamental or technical analysis. Perhaps there is some truth in that the efficient market hypothesis is not a falsifiable theory and that one should practice caution when interpreting any empirical evidence that attempts to "test" the hypothesis (Alajbeg, Bubas and Sonje, 2012).

2.4.2 THE CAPITAL ASSET PRICING MODEL

The capital asset pricing model developed by Sharpe (1964) and Lintner (1965) postulates that market beta (a single variable) explains expected stock returns. The model is captured in the following equation:

$$E\ Ri = Rfr + \beta i\ (Rm - Rfr) \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:

$E\ Ri$ = Expected return of asset *i* or portfolio *i*

Rfr = Risk-free rate

Rm = The return on the market portfolio

$$\beta i = \frac{C(Ri,Rm)}{\sigma^2 m} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where:

$C(Ri,Rm)$ = The covariance of the asset or portfolio's returns with the returns of the market portfolio.

$\sigma m2$ = The variance of the market portfolio[3].

Essentially, this model denotes that the expected return on a stock or a portfolio is proportional to the market returns in excess of the risk free rate. Beta used in this calculation represents a measure of the extent at which the stock moves together with the market.

However, following the discovery of the other variables including size and momentum (discussed in the next section) to explain stock returns, the single variable (beta) used in the CAPM model was inadequate. Avramov and Chordia (2006) attribute the failure of CAPM to explain anomalous returns to its static nature making it an incomplete description of asset prices. Fama and French (2004) argue that irrespective of whether there is a weakness in the underlying theory or in the empirical implementation – failure of CAPM in empirical tests renders the model invalid.

These findings along with studies showing anomalous returns even after adjusting for risk (Hoffman, 2012) creates a platform for further explanatory variables, making this a key concept in this paper.

2.4.3 THE FAMA FRENCH THREE FACTOR MODEL

Amidst findings that the single variable (beta) in the CAPM model may be insufficient in explaining stock returns, subsequent studies by Fama and French (1992) identified additional variables to explain stock returns (namely, low market capitalisation and high book to market ratios, which is referred to as the Fama-French three factor model).

The model is captured in the following equation:

$$r = R_f + \beta_3(K_m - R_f) + b_s \cdot SMB + b_v \cdot HML + \alpha$$

Where:

Here r is the portfolio's expected rate of return,

R_f = the risk free rate

K_m = the return of the whole stock market

The "three factor" β is similar to β used in CAPM but not equal to it because two additional factors have been added to explain stock returns. The two additional factors are small market capitalization ("SMB") and high book-to-market ratios ("HML").

Both these models (CAPM and the above-mentioned Fama French model) using variables as proxies for risk to explain stock returns, failed to explain the above average returns earned using a relative price momentum strategy (Jegadeesh and Titman, 1993).

In fact, Fama & French (1996) studied the market anomalies by comparing them to the Fama-French 3 factor model, which focussed on the three risk adjustment elements, namely, a market index, a size factor and a value factor. In this study, Fama and French (1996), found that the only anomaly which was not captured by the Fama-French 3 factor model was momentum.

Later, Carhart (1997), added momentum as a fourth factor to the Fama-French three factor model. This addition of the momentum factor to asset pricing theory contributes to the explanatory power of the Fama-French three factor model and suggests its significance in explaining stock returns.

Subsequently, asset pricing now includes adjustment for size, value and momentum.

While this paper is not aiming to explain the momentum effect, this literature highlights the relevance of momentum in financial markets and supports this study to extend the predictive power of momentum to fundamentals in the hope that new profitable investment strategies will be uncovered.

2.5 CONCLUSION

The anomalies discussed above showcase the use of technical and fundamental indicators either in isolation or in combinations to outperform the market. This phenomenon has challenged many of the traditional financial theories.

The random walk theory popularised by Malkiel (1973), says that the past movements or trends in stock prices cannot predict its future movements, yet Jegadeesh and Titman (1993) documented evidence showing that the momentum/trend in stock prices over the past 3 to 12 months persists over the subsequent 3 to 12 months making it a profitable investment strategy. This trend is still evident today.

Furthermore, as was published by Jegadeesh and Titman (1993), price momentum investing strategies also earned abnormally higher returns. Evidence of these above average returns still exists today.

Theorising market behaviours in a sense allows us to rationalise what we see in practice and essentially adds to the body of understanding the financial market. Thus, when anomalies like momentum investing which defies the Efficient Market Hypothesis (Fama, 1970) which represents a paradigm in traditional financial theory, the natural reaction would be to discount this anomaly as an outlier which will probably not sustain. Yet, literature as is noted in this paper, confirms momentum investing is still evident in markets and is one of the profitable investment strategies for technical analysts.

While this paper does not attempt to provide a complete account of all financial theories, the discussion is contained to three theories namely EMH, CAPM and the Fama French Model which has been impacted by the momentum anomaly evidencing its continued relevance in the market today.

3. RESEARCH HYPOTHESES

3.1 INTRODUCTION

The objective of this paper was to test for predictive power in the 'momentum' of the following fundamental variables: operating cash flow ("OPCF"), return on equity ("ROE") and earnings before interest, tax, depreciation and amortisation ("EBITDA").

To complement the testing of this strategy we also compared the results against a pure price momentum strategy (Jegadeesh and Titman, 1993) and a combination strategy incorporating both fundamental and technical analysis (Shih, 2010; Chen and Lee, 2011; Bonenkamp, Homburg and Kempf, 2011).

In sum, the following portfolios were created to monitor results:

Table 3.1: Investment strategy tested per stage

STAGES	CATEGORY	INVESTMENT STRATEGY
1	Portfolio 1	Price Momentum only
2	Portfolio 2	ROE Momentum only
	Portfolio 3	OPCF Momentum only
	Portfolio 4	EBITDA Momentum only
3	Portfolio 5	Price & ROE Momentum
	Portfolio 6	Price & OPCF Momentum
	Portfolio 7	Price & EBITDA Momentum

3.2 HYPOTHESIS 1

Based on the seminal paper by Jegadeesh and Titman (1993) on the success of price momentum, and similar studies done on the Johannesburg Stock Exchange (Van Rensburg and Robertson, 2003; Boshoff, 2008; Friedrich ,2010 and Snyman, 2011), we construct a portfolio based on the pure price momentum strategy to test for above market returns.

H_0: Average returns in portfolio 1 = Average market returns

H_1: Average returns in portfolio 1 > Average market returns

3.3 HYPOTHESIS 2

The Fama French three factor model incorporated "momentum" as a factor to explain anomalous returns (Fama and French, 1996; Carhart, 1997). However, "momentum" has primarily been used as a technical analysis tool. In this study we hypothesise that "momentum" can also be used as a fundamental analysis tool to predict stock returns.

H_O: Average returns in portfolio 2 = Average market returns

H_1: Average returns in portfolio 2 > Average market returns

H_O: Average returns in portfolio 3 = Average market returns

H_1: Average returns in portfolio 3 > Average market returns

H_O: Average returns in portfolio 4 = Average market returns

H_1: Average returns in portfolio 4 > Average market returns

3.4 HYPOTHESIS 3

Whilst empirical evidence exists for above average returns from pure price momentum and combined strategies, we test whether our combination portfolio of momentum in the chosen fundamentals and stock price can beat the market return.

H_O: Average returns in portfolio 5 = Average market returns

H_1: Average returns in portfolio 5 > Average market returns

H_O: Average returns in portfolio 6 = Average market returns

H_1: Average returns in portfolio 6 > Average market returns

H_O: Average returns in portfolio 7 = Average market returns

H_1: Average returns in portfolio 7 > Average market returns

The following chapter describes the methodology that was used to the test the above-mentioned hypotheses.

4. RESEARCH METHOD

4.1 RESEARCH DESIGN

Investment decisions vary across the different strategies, with value investing seeking to find stocks that the market has undervalued, growth investing which aims to find stocks that have above average growth and momentum investing which picks stocks based on past price performance. All of these strategies differ by their respective selection criteria, but with one similarity – all of these investment strategies are built on some causal relationship between stock returns and an explanatory variable(s).

The purpose of this study was to test for a causal relationship between the 'momentum' in selected fundamental variables and stock returns. In order to do this, a quasi- experimental approach had been selected for this study.

The quasi-experimental approach was defined by Welman and Kruger (2005) as research when the researcher cannot randomly assign units of analysis. This approach is best suited for this study because the units of analysis are subject to pre-determined characteristics, and as such no random selection can be made.

Despite non-randomisation, which is what differentiates the quasi-experimental design from a true experimental design, this method was appropriate for this study given the following reasons:

- Higher external validity (Jensen, Fast, Taylor and Maier, 2008). This is important because it suggests that conclusions drawn from quasi-experimental designs are much more practical in the 'real' world making this study relevant for investment practitioners.
- Strong causal conclusions can be drawn from existing data sets (Jensen, Fast, Taylor and Maier, 2008). This makes it a feasible and valid research design choice given the time constraints to complete this study.

4.2 UNIT OF ANALYSIS

The unit of analysis as defined by Welman and Kruger (2005) are members or elements of a population.

In this study the unit of analysis was all stocks on the Johannesburg Stock Exchange during the sample period (1999 – 2010) with a full two year listing history.

4.3 POPULATION OF RELEVANCE

The population as defined by Welman and Kruger (2005) is the entire collection of cases or units about which one wishes to make conclusions.

In this study the population of relevance was all stocks listed/delisted on the Johannesburg Stock Exchange during the sample period (1999 – 2010).

4.4 SAMPLE METHOD

The sampling method chosen for this study was "non-probability" purposive sampling. Saunders and Phillips (2012) defined this method as when a researcher's judgement is used to select the sample members based on a range of possible reasons and premises. This method was appropriate for this study as it assisted to reduce the population to a sample subject to the characteristics which were the prime focus of this study.

4.5 SAMPLE SIZE

Stocks excluded from this study included resource and commodity based stocks because of their high variability and financial stocks which are characterised by unique forms of revenue. From a total population of 627 listed stocks, 321 were excluded based on the above-mentioned industry classification.

Furthermore, similar to the study by Hoffman (2012), stocks with less than two years of historical published financial data were excluded from this study. This was done to ensure that comparative data was available and some systematic behaviour could be observed during the sample period. Based on this criterion, a further 197 stocks were excluded.

Delisted stocks during the period of review were included and recorded at nil values subsequent to delisting. Inclusion of stocks delisted during the sample period aimed to remove the survivorship bias identified by Gilbert and Strugnell (2008).

The final sample size was 109 stocks. This sample size was sufficient to perform a statistical analysis, and as such there was no need to extend the data set to further limit selection bias in the sample.

This research extends over a 12 year sample period from 1999 – 2010.This period overlaps with a previous study investigating for price momentum on the Johannesburg Stock Exchange (Snyman, 2011). The study concluded with evidence that price momentum is prevalent on the

Johannesburg Stock Exchange during the period 1990- 2009, which makes it a source of reference for the existence of price momentum since the aim of this study was not to test primarily for pure price momentum. The aim of this paper however, was to investigate returns using fundamental momentum independently and in combination with pure price momentum.

Unlike the study by Snyman (2011) which tests over a 19 year period, this study tests a 12 year time period. The choice of time period was reasonable for this study because: 1) a 12 year (144 month) time frame generates enough data points on which to conduct statistical analysis, 2) a 12 year time frame seems a reasonable enough time to capture both stock and fundamental variable behaviour, and 3) a 12 year time frame was reasonable given the time constraints to complete this study.

4.6 SAMPLE ERROR

As highlighted by Zikmund (2003), common errors in research include random sampling error and systematic error. The data collected was extensive in breadth, hence administrative errors (example, data processing error, data entry error) could have an influence on the degree of research error. However, attempts were made to control systematic error such as restricting the sample to prescribed characteristics as described in 4.5.

4.7 DATA COLLECTION

Data collected for this study included both historical stock price and financial data. Historical monthly stock price information and annual fundamental variable information was sourced from McGregor BFA. Historical market returns on the Johannesburg Stock Exchange and ten year South African bond yields were sourced from Inet- Bridge.

The above-mentioned data sources used in this study represent secondary data. Saunders and Lewis (2012) defined secondary data as that data which was originally collected for some other purpose and is currently used for a research project. The primary advantage of using secondary data in this study was: 1) the data required had already been collected in the above-mentioned data bases and made it a feasible option given the time constraints of this study and 2) the databases (namely McGregor BFA and I-Net Bridge) are valid public sources and have been the source of data for other South African studies on the JSE (Hoffman, 2012; Friedrich, 2010; Auret and Cline, 2011; Strugnell, Gilbert and Kruger, 2011).

4.8 DATA ANALYSIS

The data in this study was collected and categorised in three stages to enable analysis.

Stage 1

The first stage used relative price momentum as the core indicator. This indicator was calculated as follows using monthly stock price data:

$$MOM_t = \frac{(Price_t - Price_{t-j})}{Price_{t-j}} * 100$$

Source: Friedrich,2010

Where:

$Price_t$ = Price of the security at time t

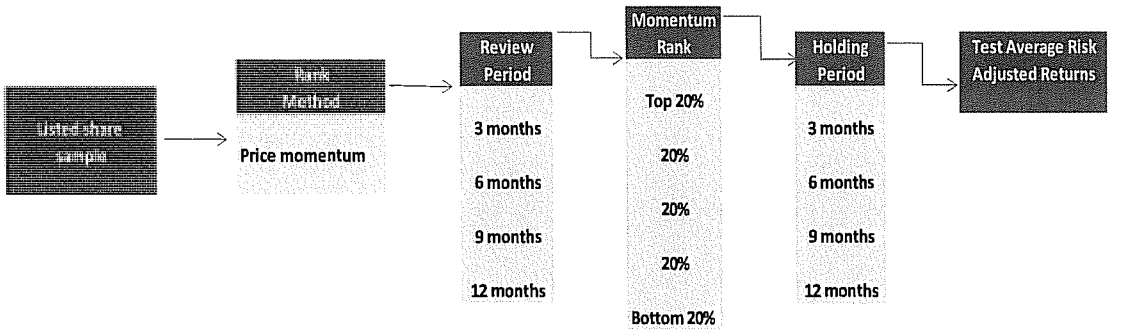
$Price_{t-j}$ = Price of the security j periods ago

Similar to the strategy by Jegadeesh and Titman (1993), the author constructed relative price momentum portfolios using stock price data for the past 3, 6, 9 and 12 months respectively. The sampled stocks were ranked based on their past stock returns (3, 6, 9, and 12 months) in five equally weighted portfolios. The top quintile portfolio represented the 'winner' stocks and the bottom quintile portfolio represented the 'loser' stocks. The use of quintiles was common in other studies on momentum (Fraser and Page, 2000; Leivo and Patari, 2011) and is a useful measure because of its reduced susceptibility to outliers making it robust (Koenker and Hallock, 2001).

The top (winner) and bottom (loser) quintiles were held over the respective holding periods. Independent t-tests had been run to obtain the mean, p-value and standard deviation per quintile. First the author tested for significance in the difference between the means of quintiles 1 and 5. Secondly, the author tested for significance in the difference between the means of quintiles 1 and 5 relative to the market returns (capital gain only). Thirdly, using the Sharpe ratio, the author tested for significance in the difference between the risk adjusted means of quintiles 1 and 5 and the market return (capital gain only). All significantly positive differences were further tested for strength of the phenomenon using effect size (Cohen, 1992).

Portfolios were rebalanced subsequent to the holding period following the same above-mentioned process. Detailed below is diagrammatic representation similar to that used by Snyman (2011) and adapted for this study:

Figure 4.1: Diagrammatic representation of data collection: Stage 1



Stage 2

In the second stage, stocks were ranked based on 'momentum' in the selected fundamental variables, namely EBITDA, OPCF and ROE. Momentum in the respective fundamentals was calculated using annual reported data assuming a calendar year end.

Time constraints did not permit testing of all the fundamental variables in this study, and choosing a limited number of variables was equally challenging. Various fundamental variables and the inter-relationships between them have been found to have predictive power (Lev and Thiagarajan, 1993; Abarbanell and Bushee, 1997; Piotroski, 2000; Mohanram, 2005; Hancock and Seng, 2012).

For this paper, the author had selected to use the basic principle of stock valuation since in this study the objective was to predict future stock returns. This principle suggested that the future value of a stock is based on its ability to generate cash flows now and in the future. In order to generate such cash flows, the author assumes that a company needs to be profitable, liquid and growing. With these three elements in mind, the author had limited the choice of variables as follows:

Table 4.1: Selection of Fundamental variables

Core Element	Variable	Reason for variable
Liquidity **Liquid stocks minimise the risk of bankruptcy and delisting which negatively affects the future cash flow generating ability of the company and ultimately its**	Operating cash flow (OPCF)	Operating cash flow was chosen because it is less prone to manipulation and is a good indicator for overall financial well-being (Bonenkamp, Homburg and Kempf (2011).

stock value. Furthermore, liquidity suggests resources for further growth thereby increasing potential future cash flows.		
Growth **A company showing signs of growth suggests effective and efficient management which could lead to positive future cash flow generation.**	Return on equity (ROE) (calculated as profit divided by equity)	ROE was chosen because it is a composite measure of the investment decision (asset turnover), operating decision (net margin) and the financing decision (leverage). Decisions which are all vital for company growth.
Profitability **Profitability is a popular financial metric used to assess a company's ability to generate earnings over and above the running costs. Thus, profitability suggests positive cash flow potential.**	Earnings before interest, tax, depreciation & amortisation (EBITDA)	EBITDA was chosen because it is free of capital investment and re-investment decisions (incorporated in the ROE measure) and represents a robust reflector of profitability. Furthermore, EBITDA excludes any extraordinary/abnormal items making it a more stable indicator of profitability.

Thus, this paper tested for predictive power in the 'momentum' of the following fundamental variables: operating cash flow, ROE and EBITDA.

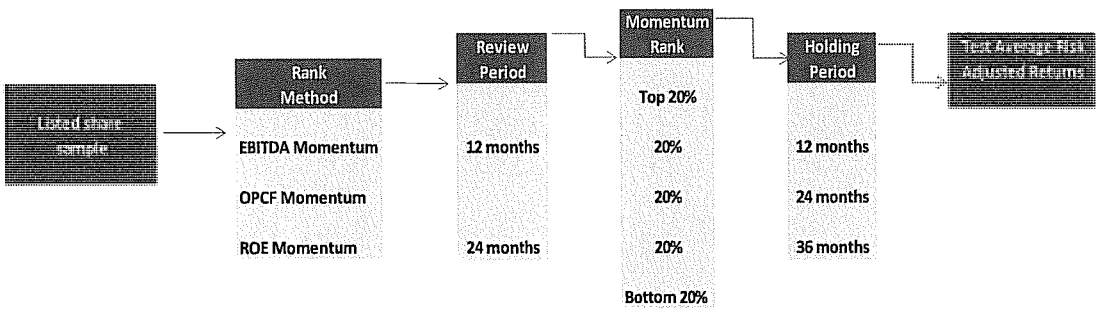
Similar to the study by Hoffman (2012), stocks with a minimum 24 month listing period was included. This restriction was aimed at providing at least 24 months of historic financial data for comparison and time to observe systematic behaviour / trend in the chosen fundamentals. During the review period, each of the selected fundamental variables was tested for relative momentum over 12 and 24 months respectively. Thereafter, each respective portfolio of EBITDA, OPCF and ROE momentum was ranked into quintiles, with the top quintile representing the 'winner' stocks and the bottom quintile representing the 'loser' stocks.

The top (winner) and bottom (loser) quintiles were held over the respective holding periods. Independent t-tests had been run to obtain the mean, p-value and standard deviation per quintile. First the author tested for significance in the difference between the means of quintiles 1

and 5. Secondly, the author tested for significance in the difference between the means of quintiles 1 and 5 relative to the market returns (capital gain only). Thirdly, using the Sharpe ratio, the author tested for significance in the difference between the risk adjusted means for quintiles 1 and 5 and the market return (capital gain only). All significantly positive differences were further tested for strength of the phenomenon using effect size (Cohen, 1992).

Long holding periods are characteristic of portfolios using fundamental variables as stock price predictors (Abarbanell and Bushee, 1997; Elleuch, 2009), hence our holding periods of 12, 24 and 36 months in this stage. Portfolios were rebalanced subsequent to the holding period following the same above-mentioned process. Detailed below is diagrammatic representation similar to that used by Snyman (2011) and adapted for this study:

Figure 4.2: Diagrammatic representation of data collection: Stage 2



Stage 3

In the third stage the author evaluated combination strategies of both fundamental and stock price momentum. Similar to a study by Leivo and Patari (2011), the combination portfolio was set up by further dividing the respective fundamental momentum portfolios (created in stage 2) based on 6 and 12 month relative price momentum. Unlike the study by Leivo and Patari (2011), which only uses 6 month relative price momentum, the author also tested the combination using 12 month relative price momentum. In sum, the author combined 12 month fundamental momentum per fundamental variable with 6 month price momentum, and 24 month fundamental momentum per variable with 12 month price momentum.

Stocks which ranked as winners in both price and fundamental momentum made up the "win win" portfolio. Whilst stocks that lost on both price and fundamental momentum made up the "lose lose" portfolio. These combinations were held for 12, 24 and 36 month holding periods consistent with stage 2.

Independent t-tests had been run to obtain the mean, p-value and standard deviation per quintile. First the author tested for significance in the difference between the means of portfolio

'win win' and portfolio "lose lose". Secondly, the author tested for significance in the difference between the means for portfolios "win win" and "lose lose" relative to the market returns (capital gain only). Thirdly, using the Sharpe ratio, the author tested for significance in the difference between the risk adjusted means for portfolios "win win" and "lose lose" and the market return (capital gain only). All significantly positive differences were further tested for strength of the phenomenon using effect size (Cohen, 1992).

Portfolios were rebalanced subsequent to the holding period following the same above-mentioned process. Detailed below is diagrammatic representation similar to that used by Snyman (2011) and adapted for this study:

Figure 4.3: Diagrammatic representation of data collection: Stage 3 Combination 1

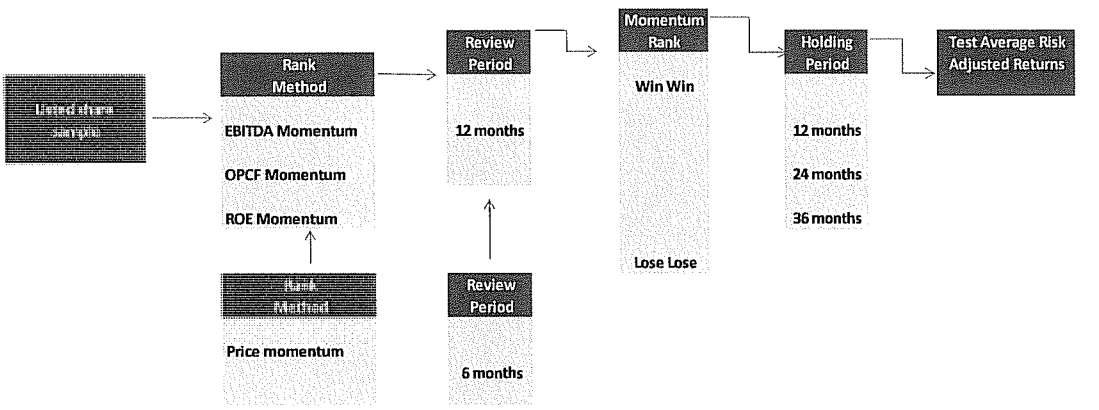
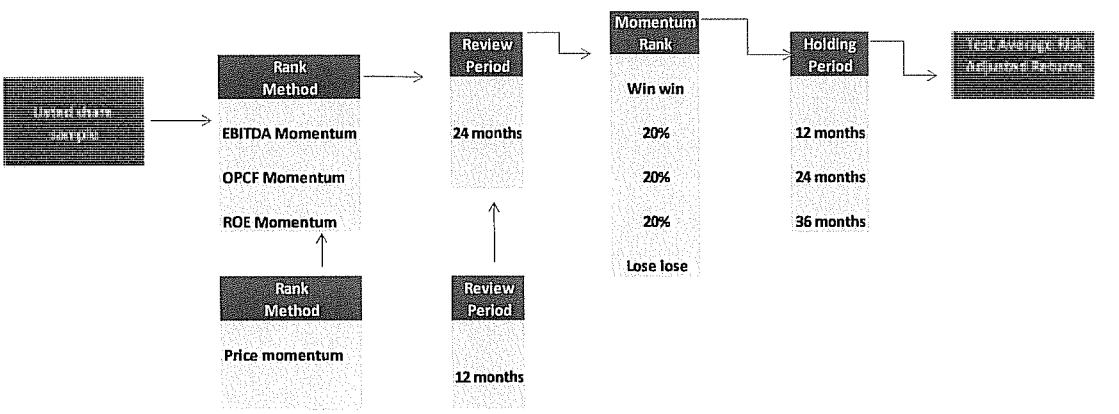


Figure 4.4: Diagrammatic representation of data collection: Stage 3 Combination 2



The statistical analysis for the above-mentioned stages was performed using the Statistica data analysis software (StatSoft, Inc. (2011). STATISTICA (data analysis software system), version 10. www.statsoft.com).This programme was used because of its ability to deal with large sample sizes, its ease of use and its compatibility with Microsoft Excel.

4.9 DATA MANAGEMENT

The data collected for this study was extensive in breadth and as such backup procedures were critical. The data was maintained both electronically with multiple backups in different locations (local and external hard drives). The motivation for this precautionary measure was to not compromise the integrity nor lose any of the data used in this study.

4.10 RESEARCH LIMITATIONS

Due to the nature of this study, including time constraints, various limitations have been identified. These include:

- A limited sample is taken from the JSE, excluding resource, commodity and financial company stocks.
- The data may be influenced by other explanatory variables and transaction costs which were beyond the scope of this study.
- The data may be influenced by economic conditions at the time which falls outside this study.
- Results may have been impacted by other plausible alternative causal factors, like behavioural finance theory which falls outside this study.

5. RESULTS

5.1 INTRODUCTION

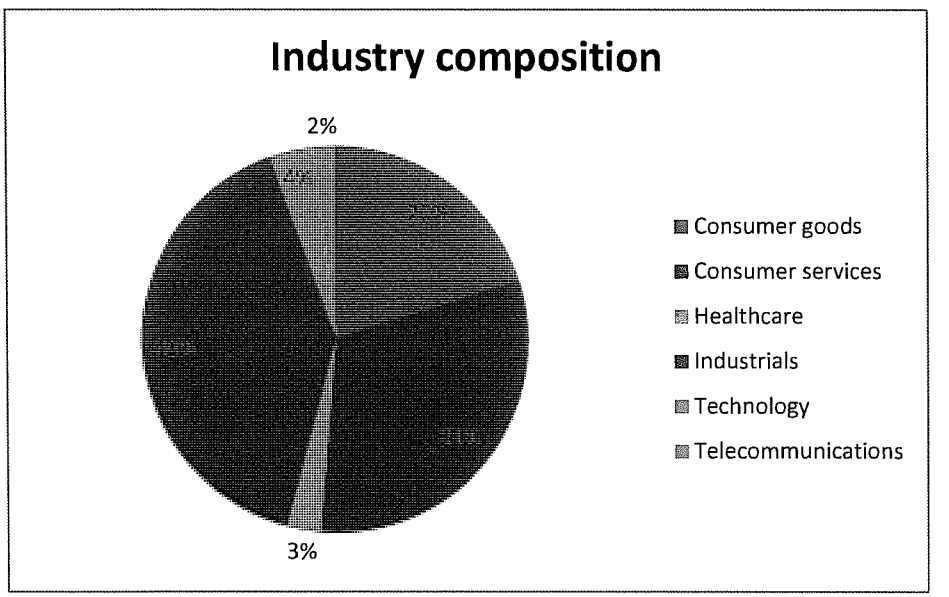
The results below are presented according the three stated hypotheses, examining the following issues:

- establish whether momentum separates winner and loser stocks
- whether returns from fundamental momentum stocks justifies it as a viable investment strategy
- whether momentum in a combination strategy outweighs pure momentum strategies in price and fundamentals

5.2 DESCRIPTIVE STATISTICS

A final data set of 109 stocks for the period 1999 – 2010 was used in this statistic analysis. The data had been "cleaned" to remove resource and commodity stocks, financial services stocks and stocks with less than two years historic listing data. Adjustments for outliers were carried out as appropriate. As can be seen in Figure 5.1, the sample included an array of industries.

Figure 5.1: Industry composition of the sample stocks



5.3 RESEARCH RESULTS FOR HYPOTHESIS 1

H_0: Average returns in portfolio 1(Price momentum) = Average market returns

H_1: Average returns in portfolio 1(Price momentum) > Average market returns

To test hypothesis 1, an independent –samples t-test was conducted to compare mean returns in quintile 1 (loser portfolio) to quintile 5 (winner portfolio) using pure price momentum as the investment strategy. The t-tests were adjusted for unequal variances in cases where the variances were significantly different.

Table 5.1 shows the mean returns per quintile using a 3 month review period and holding periods of 3 months, 6 months, 9 months and 12 months respectively. In this stage, stocks were ranked into quintiles based on their historic 3 month price momentum. Appendix 1 shows the quintile composition indicating that quintile 1 represented the loser stocks (negative momentum) and quintile 5 represented the winner stocks (upward momentum).

In the table, the higher mean of the two has been highlighted in green for each comparison. There were 34 significant differences in the expected direction between the means of quintiles 1 and 5 out of 48 comparisons tested at an alpha level of 0.05. Even though quintile 5 produced negative returns in some periods, it still performed better than quintile 1.

Table 5.2 shows the mean returns per quintile using a 6 month review period and holding periods of 3 months, 6 months, 9 months and 12 months respectively. In this stage, stocks were ranked into quintiles based on their historic 6 month price momentum. Appendix 2 shows the quintile composition indicating that quintile 1 represented the loser stocks (negative momentum) and quintile 5 represented the winner stocks (upward momentum).

There were 40 significant differences in the expected direction between the means of quintiles 1 and 5 out of 48 observations tested at an alpha level of 0.05. Quintile 5 performed even better during this review period, with only 3 negative returns out of 48 observations. Each of 3 negative returns was still lower than that of quintile 1 and significantly different.

Table 5.3 shows the mean returns per quintile using a 9 month review period and holding periods of 3 months, 6 months, 9 months and 12 months respectively. In this stage, stocks were ranked into quintiles based on their historic 9 month price momentum. Appendix 3 shows the

quintile composition indicating that quintile 1 represented the loser stocks (negative momentum) and quintile 5 represented the winner stocks (upward momentum).

There were 17 significant differences in the expected direction between the means of quintiles 1 and 5 out of 48 observations tested at an alpha level of 0.05. Quintile 5 continued to perform better than quintile 1 over the 12 year sample period even though the significant differences were much fewer in this review period.

Table 5.4 shows the mean returns per quintile using a 12 month review period and holding periods of 3 months, 6 months, 9 months and 12 months respectively. In this stage, stocks were ranked into quintiles based on their historic 12 month momentum. Appendix 4 shows the quintile composition indicating that quintile 1 represented the loser stocks (negative momentum) and quintile 5 represented the winner stocks (upward momentum).

There were 10 significant differences in the expected direction between the means of quintiles 1 and 5 out of 48 observations tested at an alpha level of 0.05. Quintile 5 reported more negative mean returns in this period than in any of the others.

Table 5.1: Statistical Significance in Stage 1 using a 3 month review period

Period	Review period	Hold months	Mean Q1	Mean Q5	t-value	df	p	Std.Dev. Q1	Std.Dev. Q5	Sig Q1 vs Q5 (α= 0.05)
1999	3	3	-0.0333	0.1431	-1.605	34.8	0.1174	0.4397	0.2689	
		6	-0.2960	0.1364	-3.975	42.0	0.0003	0.3644	0.3570	*
		9	-0.2966	0.5005	-6.074	42.0	0.0000	0.4098	0.4593	*
		12	-0.3292	0.4760	-5.560	42.0	0.0000	0.4275	0.5279	*
2000	3	3	-0.1603	-0.0871	-0.805	42.0	0.4256	0.3476	0.2477	
		6	0.8353	-0.0278	0.940	21.3	0.3577	4.2896	0.3833	
		9	0.2632	0.0499	0.431	23.3	0.6705	2.2618	0.5275	
		12	-0.2197	0.0563	-1.837	42.0	0.0734	0.4094	0.5738	*
2001	3	3	0.0618	0.1551	-1.015	42.0	0.3161	0.3009	0.3092	
		6	-0.0065	0.3438	-2.340	42.0	0.0241	0.4274	0.5571	*
		9	0.0232	0.5461	-3.309	42.0	0.0019	0.4748	0.5691	*
		12	0.0484	0.3789	-1.817	42.0	0.0764	0.6844	0.5096	*
2002	3	3	0.1044	0.0660	0.545	42.0	0.5890	0.2480	0.2194	
		6	-0.0449	0.2477	-2.743	42.0	0.0089	0.2887	0.4087	*
		9	0.3094	0.4950	-0.951	42.0	0.3471	0.7488	0.5269	
		12	0.0312	0.4080	-2.230	42.0	0.0311	0.4500	0.6524	*
2003	3	3	-0.0305	0.0913	-1.086	42.0	0.2837	0.4281	0.3055	
		6	-0.0122	0.3341	-2.390	42.0	0.0214	0.4417	0.5164	*
		9	0.1535	0.7797	-3.219	42.0	0.0025	0.5444	0.7322	*
		12	0.1966	0.9602	-3.172	42.0	0.0028	0.6500	0.9231	*
2004	3	3	-0.0178	0.0922	-2.506	32.0	0.0175	0.0966	0.1819	*
		6	0.0473	0.3903	-3.671	42.0	0.0007	0.2495	0.3604	*
		9	0.3481	0.9957	-3.017	42.0	0.0043	0.6231	0.7910	*
		12	0.4535	1.1540	-2.342	34.7	0.0251	0.7297	1.1982	*
2005	3	3	0.0325	0.0789	-0.797	42.0	0.4298	0.1489	0.2282	
		6	0.2022	0.3295	-0.856	31.9	0.3982	0.3256	0.6168	
		9	0.2373	0.8329	-1.769	22.7	0.0903	0.3091	1.5488	*
		12	0.3846	1.2265	-1.923	22.9	0.0670	0.4319	2.0076	*
2006	3	3	-0.0258	-0.0329	0.111	41.0	0.9122	0.2119	0.2056	
		6	-0.0470	0.0964	-1.821	41.0	0.0759	0.2903	0.2232	*
		9	0.0537	0.3325	-2.053	41.0	0.0465	0.4677	0.4226	*
		12	0.1324	0.5084	-2.254	41.0	0.0296	0.4402	0.6319	*
2007	3	3	-0.0370	0.1030	-1.724	41.0	0.0922	0.2596	0.2721	*
		6	-0.1209	0.2135	-3.055	41.0	0.0039	0.3393	0.3764	*
		9	-0.2594	0.2013	-3.436	41.0	0.0014	0.3595	0.5040	*
		12	-0.3998	-0.0166	-2.783	32.9	0.0088	0.3090	0.5629	*
2008	3	3	-0.1174	-0.1130	-0.090	42.0	0.9290	0.1560	0.1702	
		6	-0.2455	-0.0486	-2.216	42.0	0.0322	0.3437	0.2360	*
		9	-0.3397	-0.0734	-2.673	42.0	0.0107	0.3837	0.2669	*
		12	-0.4217	-0.1179	-2.967	42.0	0.0049	0.3851	0.2869	*
2009	3	3	0.0786	0.1620	-1.604	42.0	0.1162	0.1767	0.1680	
		6	0.2302	0.6605	-1.345	24.2	0.1910	0.4003	1.4459	
		9	0.1527	0.7311	-1.795	25.2	0.0847	0.4585	1.4406	*
		12	0.2429	0.7107	-1.935	31.7	0.0620	0.5261	1.0046	*
2010	3	3	-0.0556	0.0492	-2.589	33.2	0.0142	0.0936	0.1652	*
		6	-0.0461	0.2450	-4.216	42.0	0.0001	0.1765	0.2716	*
		9	0.0061	0.4117	-3.968	27.6	0.0005	0.1784	0.4449	*
		12	-0.1196	0.3614	-4.405	42.0	0.0001	0.2965	0.4176	*

Table 5.2: Statistical Significance in Stage 1 using a 6 month review period

Period	Review period	Hold months	Mean Q1	Mean Q5	t-value	df	p	Std.Dev. Q1	Std.Dev. Q5	Sig Q1 vs Q5 (α= 0.05)
1999	6	3	-0.2328	-0.0779	-1.842	42.0	0.0726	0.2644	0.2925	*
		6	-0.2188	1.1551	-1.460	21.3	0.1588	0.3643	4.3981	
		9	-0.2641	1.4714	-1.486	21.2	0.1521	0.3517	5.4679	
		12	-0.3728	0.9346	-1.815	21.5	0.0835	0.3509	3.3601	*
2000	6	3	-0.0068	0.2660	-2.177	42.0	0.0352	0.3880	0.4415	*
		6	-0.1276	0.2839	-2.893	42.0	0.0060	0.4807	0.4627	*
		9	-0.1001	0.3283	-2.637	42.0	0.0117	0.5132	0.5631	*
		12	0.0172	0.4490	-2.110	42.0	0.0409	0.6362	0.7190	*
2001	6	3	-0.0534	0.1553	-2.123	32.5	0.0414	0.4046	0.2208	*
		6	-0.0667	0.3486	-3.521	35.1	0.0012	0.4699	0.2918	*
		9	-0.0799	0.3004	-2.364	34.1	0.0239	0.6490	0.3847	*
		12	-0.0085	0.4604	-2.405	42.0	0.0206	0.6856	0.6053	*
2002	6	3	-0.1464	0.2003	-3.500	42.0	0.0011	0.3103	0.3458	*
		6	0.1132	0.3715	-1.176	34.0	0.2477	0.8873	0.5232	
		9	-0.0485	0.3377	-2.125	42.0	0.0395	0.5413	0.6583	*
		12	-0.0316	0.3569	-2.117	42.0	0.0402	0.5866	0.6298	*
2003	6	3	0.0033	0.2403	-3.683	42.0	0.0007	0.2519	0.1663	*
		6	0.0841	0.6152	-4.921	42.0	0.0000	0.4077	0.3000	*
		9	0.1194	0.7979	-4.187	42.0	0.0001	0.4214	0.6324	*
		12	0.1313	0.7631	-4.510	42.0	0.0001	0.4601	0.4692	*
2004	6	3	0.0647	0.3095	-2.580	42.0	0.0135	0.3055	0.3239	*
		6	0.1464	0.9624	-5.382	30.9	0.0000	0.3186	0.6358	*
		9	0.2410	1.1674	-2.540	25.2	0.0176	0.5183	1.6306	*
		12	0.4008	1.3196	-2.325	25.5	0.0283	0.5780	1.7608	*
2005	6	3	0.1362	0.7270	-1.231	26.4	0.2291	0.7684	2.1159	
		6	0.2813	0.6252	-1.046	42.0	0.3014	1.1787	0.9942	
		9	-0.0866	1.0085	-3.471	27.0	0.0018	0.5288	1.3822	*
		12	-0.0724	1.0281	-2.892	26.1	0.0076	0.5915	1.6843	*
2006	6	3	-0.0597	0.1172	-1.878	40.0	0.0677	0.2815	0.3246	*
		6	-0.0188	0.2803	-2.604	40.0	0.0129	0.4174	0.3249	*
		9	0.0903	0.3928	-1.725	40.0	0.0922	0.5596	0.5745	*
		12	0.0326	0.4769	-2.216	40.0	0.0325	0.6221	0.6724	*
2007	6	3	-0.1091	0.0999	-3.261	39.0	0.0023	0.2400	0.1687	*
		6	-0.2754	0.0821	-3.370	39.0	0.0017	0.3467	0.3317	*
		9	-0.3964	-0.0383	-3.275	39.0	0.0022	0.3126	0.3776	*
		12	-0.4556	-0.1240	-3.021	39.0	0.0044	0.3245	0.3712	*
2008	6	3	-0.1427	0.1255	-3.517	38.0	0.0011	0.2809	0.1933	*
		6	-0.2771	0.0895	-3.944	38.0	0.0003	0.3078	0.2793	*
		9	-0.3801	0.0347	-4.252	38.0	0.0001	0.2988	0.3180	*
		12	-0.2863	0.0551	-2.634	38.0	0.0121	0.3836	0.4344	*
2009	6	3	0.1234	0.4398	-1.223	24.1	0.2331	0.3110	1.1706	
		6	-0.0018	0.5352	-2.059	25.9	0.0497	0.3892	1.1570	*
		9	0.0324	0.5275	-2.634	32.8	0.0128	0.4205	0.7695	*
		12	0.0272	0.4146	-2.789	41.0	0.0080	0.4077	0.4963	*
2010	6	3	0.0278	0.1859	-3.566	41.0	0.0009	0.1631	0.1260	*
		6	0.1184	0.3283	-3.184	41.0	0.0028	0.2480	0.1807	*
		9	-0.0055	0.1743	-1.655	41.0	0.1055	0.2819	0.4145	
		12	0.0562	0.1975	-1.298	33.9	0.2030	0.2541	0.4394	

Table 5.3: Statistical Significance in Stage 1 using a 9 month review period

Period	Review period	Hold months	Mean Q1	Mean Q5	t-value	df	p	Std.Dev. Q1	Std.Dev. Q5	Sig Q1 vs Q5 (α= 0.05)
1999	9	3	0.9278	0.3087	0.655	21.3	0.5197	4.4202	0.3737	
		6	1.1486	0.2759	0.742	21.4	0.4660	5.4892	0.5264	
		9	0.5688	0.1484	0.583	22.6	0.5655	3.3169	0.6516	
		12	0.6715	1.1206	-0.387	42.0	0.7007	3.0456	4.5112	
2000	9	3	-0.1971	-0.0269	-2.201	42.0	0.0333	0.2421	0.2701	*
		6	-0.1595	0.0179	-1.427	42.0	0.1610	0.4105	0.4140	
		9	-0.0530	0.1538	-1.258	42.0	0.2153	0.5694	0.5195	
		12	0.0019	0.2220	-0.929	42.0	0.3583	0.7319	0.8365	
2001	9	3	0.1526	0.1502	0.025	27.6	0.9799	0.4212	0.1693	
		6	0.1388	0.1049	0.242	28.9	0.8105	0.6015	0.2653	
		9	0.3061	0.2197	0.458	24.6	0.6509	0.8489	0.2484	
		12	0.2435	0.2612	-0.074	27.5	0.9415	1.0408	0.4144	
2002	9	3	0.1983	0.3487	-0.863	24.1	0.2331	0.3475	0.7395	
		6	0.0582	0.2626	-1.520	25.9	0.0497	0.5236	0.3518	*
		9	0.2340	0.2978	-0.337	32.8	0.0128	0.7475	0.4808	*
		12	0.3602	0.3957	-0.179	41.0	0.0080	0.7461	0.5508	*
2003	9	3	0.1317	0.3594	-1.684	24.1	0.2331	0.2819	0.5679	
		6	0.2439	0.3502	-0.816	25.9	0.0497	0.3597	0.4938	*
		9	0.2206	0.3548	-1.018	32.8	0.0128	0.3822	0.4861	*
		12	0.2985	0.6640	-1.888	41.0	0.0080	0.4673	0.7783	*
2004	9	3	0.1061	0.4358	-3.676	34.2	0.0008	0.2152	0.3614	*
		6	0.2538	0.3629	-0.742	42.0	0.4624	0.5792	0.3756	
		9	0.3245	0.4223	-0.558	35.7	0.5803	0.6929	0.4423	
		12	0.4834	0.8027	-1.024	35.1	0.3126	1.2420	0.7711	
2005	9	3	0.0390	0.2924	-1.123	33.8	0.2695	0.5329	0.9151	
		6	-0.0018	0.3794	-1.558	34.7	0.1284	0.5977	0.9799	
		9	0.0143	0.3343	-1.138	42.0	0.2616	0.7360	1.0941	
		12	0.0392	0.2549	-0.761	42.0	0.4511	0.7623	1.0899	
2006	9	3	-0.0722	0.1114	-2.025	24.1	0.2331	0.3487	0.1460	
		6	-0.0080	0.2298	-1.709	25.9	0.0497	0.5274	0.2449	*
		9	-0.1659	0.2914	-2.626	32.8	0.0128	0.6373	0.3585	*
		12	-0.0640	0.3442	-1.827	41.0	0.0080	0.7930	0.5614	*
2007	9	3	-0.2018	-0.0650	-1.383	36.0	0.1751	0.2773	0.3171	
		6	-0.3504	-0.1798	-1.674	36.0	0.1027	0.3161	0.3058	
		9	-0.3846	-0.2421	-1.455	36.0	0.1544	0.2831	0.3086	
		12	-0.4204	-0.2800	-1.320	36.0	0.1951	0.3187	0.3272	
2008	9	3	-0.1323	-0.0220	-1.448	24.1	0.2331	0.1839	0.2830	
		6	-0.1793	-0.0969	-0.861	25.9	0.0497	0.2553	0.3338	*
		9	-0.1446	-0.1067	-0.293	32.8	0.0128	0.3850	0.4117	*
		12	0.3083	0.0279	0.687	41.0	0.0080	1.7982	0.4804	*
2009	9	3	-0.1263	0.0612	-3.005	24.1	0.2331	0.2437	0.1300	
		6	-0.1297	0.1647	-4.127	25.9	0.0497	0.2642	0.1764	*
		9	-0.1465	0.1655	-3.956	32.8	0.0128	0.2565	0.2463	*
		12	-0.0547	0.2785	-2.767	41.0	0.0080	0.3567	0.4068	*
2010	9	3	0.1106	0.0754	0.853	40.0	0.3990	0.1311	0.1358	
		6	-0.0629	-0.0990	0.334	40.0	0.7404	0.2900	0.3969	
		9	-0.0514	-0.0667	0.129	40.0	0.8982	0.3443	0.4185	
		12	-0.0884	-0.0229	-0.501	40.0	0.6189	0.3781	0.4596	

Table 5.4: Statistical Significance in Stage 1 using a 12 month review period

Period	Review period	Hold months	Mean Q1	Mean Q5	t-value	df	p	Std.Dev. Q1	Std.Dev. Q5	Sig Q1 vs Q5 (α= 0.05)
1999	12	3	0.0507	0.0426	0.068	28.6	0.9464	0.5134	0.2227	
		6	-0.1091	-0.0314	-0.639	33.4	0.5274	0.4955	0.2831	
		9	0.6545	-0.0068	1.038	22.0	0.3107	2.9540	0.4593	
		12	0.1915	-0.1079	0.852	24.8	0.4024	1.5782	0.4741	
2000	12	3	0.0807	-0.0433	0.962	30.9	0.3434	0.5404	0.2705	
		6	0.2551	0.0560	1.088	29.4	0.2853	0.7803	0.3576	
		9	0.3537	-0.0408	1.559	29.2	0.1299	1.0820	0.4881	
		12	0.4646	0.1124	1.284	33.8	0.2078	1.1110	0.6487	
2001	12	3	0.0157	-0.0522	0.867	24.1	0.2331	0.3056	0.2033	
		6	0.0733	0.0696	0.031	25.9	0.0497	0.4989	0.2652	*
		9	0.1115	0.1262	-0.087	32.8	0.0128	0.6703	0.4227	*
		12	0.2790	0.3009	-0.105	41.0	0.0080	0.8281	0.5258	*
2002	12	3	-0.1028	-0.0158	-0.848	29.3	0.4031	0.4382	0.1990	
		6	-0.0036	-0.0394	0.311	34.2	0.7581	0.4638	0.2764	
		9	0.0340	0.1035	-0.489	35.8	0.6277	0.5607	0.3606	
		12	0.3361	0.3296	0.030	42.0	0.9760	0.8136	0.5932	
2003	12	3	0.0582	-0.0091	1.611	24.1	0.2331	0.1356	0.1418	
		6	0.0485	0.0362	0.173	25.9	0.0497	0.1654	0.2908	*
		9	0.1310	0.2327	-1.083	32.8	0.0128	0.2951	0.3272	*
		12	0.3377	0.5025	-0.909	41.0	0.0080	0.5927	0.6098	*
2004	12	3	0.1524	-0.0431	1.674	23.6	0.1073	0.5314	0.1329	
		6	0.2531	-0.0073	1.878	25.5	0.0718	0.6174	0.2041	*
		9	0.4692	0.2164	0.947	24.2	0.3530	1.2066	0.3344	
		12	0.6310	0.3060	0.828	22.8	0.4165	1.8039	0.3738	
2005	12	3	0.0353	0.1202	-0.742	24.1	0.2331	0.4364	0.2981	
		6	0.0934	0.0248	0.458	25.9	0.0497	0.5374	0.4359	*
		9	0.1480	0.0644	0.447	32.8	0.0128	0.7085	0.4941	*
		12	0.2412	0.2146	0.109	41.0	0.0080	0.9590	0.6137	*
2006	12	3	0.1820	0.0675	0.479	17.2	0.6381	0.9241	0.2853	
		6	0.1388	0.1659	-0.095	16.4	0.9253	1.0570	0.3673	
		9	0.2121	0.1709	0.129	17.7	0.8986	1.1621	0.4972	
		12	0.4008	0.1958	0.530	18.0	0.6025	1.4761	0.5293	
2007	12	3	-0.1355	-0.1053	-0.600	33.0	0.5526	0.1586	0.1369	
		6	-0.1857	-0.1488	-0.655	33.0	0.5168	0.1676	0.1602	
		9	-0.2684	-0.1979	-0.745	18.7	0.4653	0.3205	0.1833	
		12	-0.2938	-0.3517	0.574	33.0	0.5701	0.3145	0.2769	
2008	12	3	-0.0867	-0.0442	-0.818	32.0	0.4194	0.1802	0.1234	
		6	-0.0428	-0.0604	0.196	32.0	0.8458	0.2767	0.2437	
		9	0.5482	0.0291	1.008	13.5	0.3311	1.9090	0.3078	
		12	0.5593	0.0005	1.081	13.5	0.2984	1.9136	0.3285	
2009	12	3	-0.0131	0.0541	-0.790	17.4	0.4403	0.3113	0.1305	
		6	0.0074	0.0373	-0.298	19.7	0.7690	0.3542	0.1921	
		9	0.1018	0.1569	-0.405	19.2	0.6903	0.4852	0.2523	
		12	0.2593	0.2476	0.062	17.1	0.9513	0.6912	0.2791	
2010	12	3	-0.0949	-0.1107	0.208	33.1	0.8368	0.1584	0.3044	
		6	-0.0523	-0.0839	0.323	36.0	0.7485	0.2697	0.3159	
		9	-0.0782	-0.0699	-0.076	36.0	0.9397	0.3164	0.3460	
		12	-0.1269	0.0010	-1.018	36.0	0.3152	0.3525	0.4019	

Further, we tested for the difference between the means and risk adjusted means of both quintile 1 (loser portfolio) and quintile 5 (winner portfolio) respectively relative to market returns. Risk adjusted returns in this case was calculated using the Sharpe ratio. The average 10 year South African government bond rate was used as a proxy for the risk free rate.

Table 5.5 shows the difference between each quintile's mean return relative to the market and each quintile's risk adjusted return relative to the market for the 3 month review period only.

From 48 observations for quintile 5 using a 3 month review period, 41 had beaten the market (indicated by green shading or a '+' sign in the Q5 vs Market rate of return columns), 20 of which were significant positive differences at an alpha level of 0.05, and 8 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, quintile 5 had still beaten the market 31 times, of which 20 were significant positive differences tested at an alpha level of 0.05, and 13 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.6 shows the difference between each quintile's mean return relative to the market and each quintile's risk adjusted return relative to the market for the 6 month review period only.

From 48 observations for quintile 5 using a 6 month review period, 43 had beaten the market, 26 of which were significant positive differences tested at an alpha level of 0.05, and 13 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, quintile 5 had still beaten the market 42 times, of which 27 were significant positive differences tested at an alpha level of 0.05, and 18 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.7 shows the difference between each quintile's mean return relative to the market and each quintile's risk adjusted return relative to the market for the 9 month review period only.

From 48 observations for quintile 5 using a 9 month review period, 31 had beaten the market, 11 of which were significant differences tested at an alpha level of 0.05, and 4 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, quintile 5 had still beaten the market 26 times, of which 21 were significant positive differences tested at an alpha level of 0.05, and 12 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.8 shows the difference between each quintiles mean return relative to the market and each quintiles risk adjusted return relative to the market for the 12 month review period only.

From 48 observations for quintile 5 using a 12 month review period, 22 had beaten the market, 7 of which were significant positive differences at an alpha level of 0.05, and none of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, quintile 5 had still beaten the market 13 times, of which 7 were significant positive differences at an alpha level of 0.05, and 4 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Over the respective holding periods, namely, 3 months, 6 months, 9 months and 12 months, quintile 1 also reported instances of beating the market however these were outweighed by the success of quintile 5.

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Table 5.5: Portfolio Performance in Stage 1 using a 3 month review period

			Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Review period	Hold months	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return
1999	3	3	-0.1585	0.0179	-0.5327	-0.1355	-	+	-	-					weak	-	strong	moderate
		6	-0.4057	0.0266	-1.3237	-0.1380	-	+	-	-					strong	-	strong	weak
		9	-0.6957	0.1015	-1.4733	0.3780	-	+	-	+				*	strong	weak	strong	strong
		12	-0.6292	0.1760	-1.4008	0.3339	-	+	-	+				*	strong	weak	strong	moderate
2000	3	3	-0.1352	-0.0620	-0.8366	-0.8886	-	-	-	-					weak	weak	strong	strong
		6	0.7862	-0.0769	0.1141	-0.4740	+	-	+	-					-	weak	-	strong
		9	0.2118	-0.0015	0.0064	-0.2080	+	-	+	-					-	-	-	weak
		12	-0.2632	0.0128	-0.8943	-0.1695	-	+	-	-					moderate	-	strong	weak
2001	3	3	-0.0599	0.0334	-0.2896	0.0168	-	+	-	+					-	-	strong	-
		6	0.0064	0.3568	-0.2536	0.4373	+	+	-	+		*		*	-	moderate	moderate	moderate
		9	-0.2672	0.2557	-0.4639	0.4837	-	+	-	+		*		*	moderate	weak	strong	strong
		12	-0.3109	0.0196	-0.4474	0.1710	-	+	-	+					weak	-	moderate	weak
2002	3	3	0.1368	0.0984	0.0173	-0.1599	+	+	+	-	*	*			moderate	weak	-	moderate
		6	0.0957	0.3884	-0.3742	0.4930	+	+	-	+		*		*	weak	strong	strong	strong
		9	0.4672	0.6528	0.4359	0.9054	+	+	+	+	*	*	*	*	moderate	strong	moderate	strong
		12	0.3340	0.7108	0.1532	0.7773	+	+	+	+	*	*		*	moderate	strong	weak	strong
2003	3	3	-0.1180	0.0037	-0.3685	-0.0827	-	+	-	-					weak	-	strong	weak
		6	-0.1744	0.1718	-0.3908	0.3128	-	+	-	+				*	weak	weak	strong	moderate
		9	-0.1990	0.4272	-0.2310	0.5930	-	+	-	+		*		*	weak	moderate	weak	strong
		12	-0.1957	0.5679	-0.2245	0.5531	-	+	-	+		*		*	weak	moderate	weak	moderate
2004	3	3	0.0368	0.1468	-1.0955	0.0485	+	+	-	+	*	*			weak	strong	strong	weak
		6	-0.0526	0.2904	-0.2767	0.7296	-	+	-	+		*		*	weak	strong	strong	strong
		9	0.1644	0.8120	0.2346	0.9645	+	+	+	+		*	*	*	weak	strong	weak	strong
		12	0.2097	0.9102	0.2624	0.6492	+	+	+	+		*		*	weak	moderate	weak	moderate
2005	3	3	-0.0318	0.0145	-0.3685	-0.0598	-	+	-	-					weak	-	strong	weak
		6	-0.0668	0.0606	0.1145	0.1399	-	+	+	+					weak	-	weak	weak
		9	-0.1235	0.4722	0.1599	0.1277	-	+	+	+			*		weak	weak	moderate	-
		12	-0.1458	0.6961	0.1865	0.0432	-	+	+	+			*		weak	weak	weak	-
2006	3	3	-0.0694	-0.0764	-0.5276	-0.5766	-	-	-	-					weak	weak	strong	strong
		6	-0.1464	-0.0030	-0.5387	-0.0282	-	-	-	-					moderate	-	strong	-
		9	-0.1705	0.1083	-0.2784	0.3756	-	+	-	+				*	weak	weak	moderate	strong
		12	-0.2074	0.1686	-0.2162	0.3413	-	+	-	+				*	weak	weak	weak	moderate
2007	3	3	-0.0762	0.0637	-0.4809	0.0537	-	+	-	+					weak	weak	strong	-
		6	-0.2196	0.1148	-0.6900	0.2566	-	+	-	+				*	moderate	weak	strong	moderate
		9	-0.3214	0.1393	-1.0057	0.1790	-	+	-	+					strong	weak	strong	weak
		12	-0.4849	-0.1017	-1.6435	-0.2600	-	-	-	-					strong	-	strong	weak
2008	3	3	-0.1453	-0.1409	-1.4158	-1.2740	-	-	-	-					strong	strong	strong	strong
		6	-0.0512	0.1458	-0.7925	-0.4083	-	+	-	-		*			-	moderate	strong	strong
		9	-0.0667	0.1996	-0.8451	-0.3367	-	+	-	-		*			-	moderate	strong	strong
		12	-0.1099	0.1939	-1.0113	-0.4052	-	+	-	-		*			weak	moderate	strong	strong
2009	3	3	-0.0041	0.0793	-0.1359	0.3577	-	+	-	+		*		*	-	weak	moderate	strong
		6	0.0069	0.4372	0.1316	0.1726	+	+	+	+					-	weak	weak	-
		9	-0.2059	0.3725	-0.2196	0.0872	-	+	-	+					weak	weak	weak	-
		12	-0.1687	0.2990	-0.1194	0.2070	-	+	-	+					weak	weak	weak	weak
2010	3	3	0.0310	0.1358	-1.4581	-0.1547	+	+	-	-		*			weak	strong	strong	strong
		6	-0.0707	0.2204	-0.7693	0.5635	-	+	-	+		*		*	weak	strong	strong	strong
		9	-0.1112	0.2944	-0.5561	0.6183	-	+	-	+		*		*	moderate	moderate	strong	strong
		12	-0.2398	0.2411	-0.8117	0.5405	-	+	-	+		*		*	strong	moderate	strong	strong

Table 5.6: Portfolio Performance in Stage 1 using a 6 month review period

			Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Review period	Hold months	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return
1999	6	3	-0.2191	-0.0642	-1.4226	-0.7553	-	-	-	-					strong	weak	strong	strong
		6	-0.4623	0.9117	-1.2353	-0.0132	-	+	-	-					strong	weak	strong	-
		9	-0.4195	1.3160	-1.3038	0.0882	-	+	-	+					strong	weak	strong	-
		12	-0.4992	0.8082	-1.5867	0.1102	-	+	-	+					strong	weak	strong	-
2000	6	3	-0.0829	0.1898	-0.4310	0.2298	-	+	-	+		*		*	weak	weak	strong	moderate
		6	-0.2061	0.2054	-0.6126	0.2560	-	+	-	+		*		*	weak	weak	strong	moderate
		9	-0.1705	0.2579	-0.5092	0.2905	-	+	-	+		*		*	weak	weak	strong	moderate
		12	-0.1835	0.2483	-0.3653	0.2543	-	+	-	+					weak	weak	moderate	weak
2001	6	3	0.0667	0.2754	-0.2650	0.3593	+	+	-	+		*		*	-	strong	moderate	strong
		6	-0.2171	0.1982	-0.5097	0.6942	-	+	-	+		*		*	weak	moderate	strong	strong
		9	-0.2917	0.0886	-0.5005	0.2896	-	+	-	+				*	weak	weak	moderate	moderate
		12	-0.1810	0.2879	-0.3419	0.4104	-	+	-	+		*		*	weak	weak	weak	moderate
2002	6	3	-0.0345	0.3121	-0.6796	0.4041	-	+	-	+		*		*	-	strong	strong	strong
		6	0.2427	0.5010	0.1470	0.6529	+	+	+	+		*		*	weak	strong	-	strong
		9	0.2310	0.6171	0.0139	0.6477	+	+	+	+	*	*		*	weak	strong	-	strong
		12	0.1847	0.5732	0.0024	0.6339	+	+	+	+		*		*	weak	strong	-	strong
2003	6	3	-0.0654	0.1717	-0.4037	0.8491	-	+	-	+		*		*	weak	strong	strong	strong
		6	-0.1595	0.3716	-0.2487	1.5198	-	+	-	+		*		*	weak	strong	moderate	strong
		9	-0.1608	0.5177	-0.2025	0.8444	-	+	-	+		*		*	weak	strong	weak	strong
		12	-0.0790	0.5528	-0.1169	1.2278	-	+	-	+		*		*	-	strong	weak	strong
2004	6	3	-0.0988	0.1461	-0.2446	0.5161	-	+	-	+		*		*	weak	weak	strong	strong
		6	-0.1057	0.7103	-0.0582	1.1286	-	+	-	+		*		*	weak	strong	-	strong
		9	-0.0746	0.8518	-0.0069	0.3507	-	+	-	+		*			-	moderate	-	weak
		12	0.0006	0.9193	0.1544	0.3036	+	+	+	+		*			-	moderate	weak	-
2005	6	3	-0.0561	0.5348	-0.1150	0.1151	-	+	-	+					-	weak	-	-
		6	0.0028	0.3467	-0.1040	0.2744	+	+	-	+					-	weak	-	weak
		9	-0.5244	0.5706	-0.7416	0.2382	-	+	-	+		*			strong	weak	strong	-
		12	-0.5728	0.5277	-0.7491	0.0656	-	+	-	+					strong	weak	strong	-
2006	6	3	-0.1132	0.0636	-0.5653	0.0476	-	+	-	+					weak	-	strong	-
		6	-0.1920	0.1072	-0.4103	0.4428	-	+	-	+				*	weak	weak	strong	strong
		9	-0.1936	0.1089	-0.2626	0.2634	-	+	-	+				*	weak	-	weak	weak
		12	-0.3017	0.1426	-0.4077	0.2586	-	+	-	+				*	weak	weak	moderate	weak
2007	6	3	-0.1663	0.0427	-0.8528	0.0502	-	+	-	+					moderate	weak	strong	weak
		6	-0.2973	0.0602	-1.0497	-0.0183	-	+	-	-					strong	-	strong	-
		9	-0.4405	-0.0824	-1.5782	-0.3661	-	-	-	-					strong	weak	strong	strong
		12	-0.5289	-0.1973	-1.7461	-0.6423	-	-	-	-					strong	moderate	strong	strong
2008	6	3	0.0736	0.3417	-0.6056	0.4091	+	+	-	+		*		*	weak	strong	strong	strong
		6	0.0157	0.3823	-0.8817	0.3110	+	+	-	+		*		*	-	strong	strong	strong
		9	-0.0497	0.3652	-1.2232	0.1753	-	+	-	+		*		*	-	strong	strong	moderate
		12	-0.0113	0.3301	-0.6930	0.2059	-	+	-	+		*		*	-	moderate	strong	weak
2009	6	3	-0.0063	0.3100	-0.0165	0.1706	-	+	-	+					-	weak	-	-
		6	-0.2566	0.2805	-0.4891	0.1306	-	+	-	+					moderate	weak	strong	-
		9	-0.2714	0.2238	-0.4396	0.2654	-	+	-	+					moderate	weak	strong	weak
		12	-0.1637	0.2237	-0.3435	0.4643	-	+	-	+		*		*	weak	weak	strong	strong
2010	6	3	-0.0939	0.0641	-0.4513	0.7064	-	+	-	+		*		*	moderate	moderate	strong	strong
		6	-0.1048	0.1051	-0.0767	1.1395	-	+	-	+		*		*	weak	moderate	weak	strong
		9	-0.2319	-0.0521	-0.5448	-0.0092	-	-	-	-					strong	-	strong	-
		12	-0.1573	-0.0160	-0.3256	0.0433	-	-	-	+					moderate	-	strong	-

Table 5.7: Portfolio Performance in Stage 1 using a 9 month review period

			Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Review period	Hold months	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return
1999	9	3	0.6671	0.0480	-0.0820	0.1959	+	+	-	+				*	-	-	-	moderate
		6	0.9772	0.1045	0.0130	0.0940	+	+	+	+					-	-	-	-
		9	0.4268	0.0064	-0.0119	-0.1248	+	+	-	-					-	-	-	-
		12	0.4425	0.8916	-0.0530	-0.0106	+	+	-	-					-	-	-	-
2000	9	3	-0.1993	-0.0290	-1.3422	-0.5733	-	-	-	-					strong	-	strong	strong
		6	-0.1541	0.0233	-0.6808	-0.2465	-	+	-	-					weak	-	strong	moderate
		9	-0.1687	0.0380	-0.4176	-0.0486	-	+	-	-					weak	-	moderate	-
		12	0.0202	0.2403	-0.1359	0.1465	+	+	-	+					-	weak	-	-
2001	9	3	-0.1548	-0.1572	-0.1867	-0.0216	-	-	-	-					weak	strong	weak	-
		6	-0.2384	-0.2723	-0.3293	-0.3965	-	-	-	-					weak	strong	moderate	strong
		9	-0.0264	-0.1128	-0.1008	0.1117	-	-	-	+				*	-	weak	-	weak
		12	0.0601	0.0778	-0.0521	0.1891	+	+	-	+				*	-	-	-	weak
2002	9	3	0.2182	0.3685	0.3142	0.3615	+	+	+	+	*	*	*	*	moderate	weak	strong	weak
		6	0.2468	0.4512	0.1217	0.6699	+	+	+	+	*	*		*	weak	strong	weak	strong
		9	0.3516	0.4154	0.3074	0.5454	+	+	+	+	*	*	*	*	weak	strong	weak	strong
		12	0.4172	0.4527	0.4178	0.6101	+	+	+	+	*	*	*	*	moderate	strong	moderate	strong
2003	9	3	-0.0320	0.1956	0.0032	0.3200	-	+	+	+				*	-	weak	-	moderate
		6	0.0459	0.1522	0.2404	0.3366	+	+	+	+			*	*	-	weak	moderate	moderate
		9	0.0881	0.2223	0.2128	0.4151	+	+	+	+		*	*	*	weak	weak	moderate	strong
		12	-0.0191	0.3463	0.1311	0.4214	-	+	+	+		*		*	-	weak	weak	moderate
2004	9	3	0.0299	0.3596	0.0460	0.9088	+	+	+	+		*		*	-	strong	weak	strong
		6	0.1230	0.2322	0.1747	0.6310	+	+	+	+		*		*	weak	moderate	weak	strong
		9	0.1209	0.2187	0.1534	0.5768	+	+	+	+		*		*	-	weak	weak	strong
		12	0.0485	0.3678	-0.1077	0.5062	+	+	-	+		*		*	-	weak	-	moderate
2005	9	3	-0.0334	0.2201	-0.1387	0.1660	-	+	-	+					-	weak	weak	-
		6	-0.2077	0.1735	-0.3305	0.1071	-	+	-	+					weak	-	moderate	-
		9	-0.2442	0.0759	-0.3396	-0.0206	-	+	-	-					weak	-	weak	-
		12	-0.2867	-0.0710	-0.3749	-0.1623	-	-	-	-					weak	-	weak	-
2006	9	3	-0.1857	-0.0021	-0.5386	0.1287	-	-	-	+				*	moderate	-	strong	strong
		6	-0.2267	0.0112	-0.3769	0.4117	-	+	-	+				*	weak	-	moderate	strong
		9	-0.4324	0.0249	-0.6463	0.3338	-	+	-	+				*	moderate	-	strong	strong
		12	-0.4030	0.0052	-0.5175	0.1359	-	+	-	+					moderate	-	moderate	weak
2007	9	3	-0.1684	-0.0316	-0.9830	-0.4238	-	-	-	-					moderate	-	strong	strong
		6	-0.3380	-0.1674	-1.3616	-0.8499	-	-	-	-					strong	moderate	strong	strong
		9	-0.3998	-0.2572	-1.6885	-1.0881	-	-	-	-					strong	strong	strong	strong
		12	-0.2160	-0.0756	-1.3934	-0.9229	-	-	-	-					moderate	weak	strong	strong
2008	9	3	-0.0347	0.0756	-1.0601	-0.2653	-	+	-	-					-	weak	strong	strong
		6	-0.0336	0.0487	-0.8776	-0.3904	-	+	-	-					-	-	strong	strong
		9	-0.0697	-0.0317	-0.5188	-0.3882	-	-	-	-					-	-	strong	strong
		12	0.2632	-0.0172	0.0790	-0.1642	+	-	+	-					-	-	-	weak
2009	9	3	-0.2370	-0.0494	-1.0003	-0.3361	-	-	-	-					strong	weak	strong	strong
		6	-0.2837	0.0107	-0.9862	0.2684	-	+	-	+				*	strong	-	strong	strong
		9	-0.2007	0.1113	-0.9755	0.2531	-	+	-	+		*		*	moderate	weak	strong	strong
		12	-0.2372	0.0960	-0.5818	0.2864	-	+	-	+				*	moderate	weak	strong	moderate
2010	9	3	0.0202	-0.0150	0.1238	-0.1427	+	-	+	-			*		-	-	strong	strong
		6	-0.1562	-0.1923	-0.6053	-0.5584	-	-	-	-					moderate	weak	strong	strong
		9	-0.1332	-0.1485	-0.4800	-0.4460	-	-	-	-					weak	weak	strong	strong
		12	-0.0958	-0.0303	-0.4667	-0.2428	-	-	-	-					weak	-	strong	moderate

Table 5.8: Portfolio Performance in Stage 1 using a 12 month review period

			Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Review period	Hold months	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return
1999	12	3	0.1215	0.1134	-0.0923	-0.3415	+	+	-	-		*			weak	moderate	-	strong
		6	-0.0149	0.0627	-0.4022	-0.5001	-	+	-	-					-	weak	strong	strong
		9	0.6797	0.0184	0.2011	-0.2833	+	+	+	-					weak	-	-	moderate
		12	0.2145	-0.0848	0.0601	-0.4850	+	-	+	-					-	-	-	strong
2000	12	3	0.0882	-0.0358	-0.0596	-0.5850	+	-	-	-					-	-	-	strong
		6	0.1417	-0.0574	0.0667	-0.2775	+	-	+	-					-	-	-	moderate
		9	0.3741	-0.0204	0.2451	-0.2897	+	-	+	-					weak	-	weak	moderate
		12	0.1838	-0.1684	0.0398	-0.2746	+	-	+	-					-	weak	-	weak
2001	12	3	-0.0378	-0.1056	-0.3889	-0.8912	-	-	-	-					-	moderate	strong	strong
		6	0.0541	0.0503	-0.0991	-0.1836	+	+	-	-					-	-	-	moderate
		9	0.2063	0.2210	0.0993	0.1365	+	+	+	+		*			weak	moderate	-	weak
		12	0.3917	0.4137	0.3224	0.4846	+	+	+	+	*	*	*	*	weak	moderate	weak	strong
2002	12	3	0.0693	0.1564	-0.2689	-0.3618	+	+	-	-		*			-	moderate	moderate	strong
		6	0.0961	0.0603	-0.1025	-0.3689	+	+	-	-					weak	weak	weak	strong
		9	0.0719	0.1414	-0.0608	0.0772	+	+	-	+		*			-	weak	-	weak
		12	0.2164	0.2099	0.1851	0.2873	+	+	+	+				*	weak	weak	weak	weak
2003	12	3	0.0288	-0.0385	-0.2470	-0.7126	+	-	-	-					weak	weak	strong	strong
		6	0.0753	0.0630	-0.2273	-0.1602	+	+	-	-	*				weak	weak	strong	moderate
		9	-0.0013	0.1004	0.0060	0.3033	-	+	+	+				*	-	weak	-	strong
		12	0.1192	0.2840	0.2034	0.4618	+	+	+	+		*		*	weak	weak	weak	moderate
2004	12	3	0.1017	-0.0938	0.0971	-0.9306	+	-	+	-					-	moderate	-	strong
		6	0.1348	-0.1257	0.1687	-0.5258	+	-	+	-					weak	moderate	weak	strong
		9	0.1359	-0.1170	-0.0076	0.0859	+	-	-	+					-	weak	-	weak
		12	0.2012	-0.1238	-0.1219	0.1863	+	-	-	+				*	-	weak	-	weak
2005	12	3	-0.0894	-0.0044	-0.2065	0.0405	-	-	-	+					weak	-	weak	-
		6	-0.0802	-0.1488	-0.1372	-0.2861	-	-	-	-					-	weak	weak	moderate
		9	-0.0885	-0.1720	-0.1368	-0.2626	-	-	-	-					-	weak	-	moderate
		12	-0.1356	-0.1622	-0.2056	-0.1526	-	-	-	-					-	weak	weak	weak
2006	12	3	0.0876	-0.0269	0.0216	-0.1203	+	-	+	-					-	-	-	weak
		6	0.0015	0.0286	-0.0782	0.1067	+	+	-	+					weak	-	-	weak
		9	0.0097	-0.0316	-0.0871	-0.0159	+	-	-	-					weak	-	-	-
		12	0.2386	0.0336	0.0560	0.0592	+	+	+	+					-	-	-	-
2007	12	3	-0.1572	-0.1270	-1.4303	-1.4323	-	-	-	-					strong	strong	strong	strong
		6	-0.2360	-0.1991	-1.7164	-1.5625	-	-	-	-					strong	strong	strong	strong
		9	-0.0915	-0.0211	-0.9468	-1.4030	-	-	-	-					weak	-	strong	strong
		12	-0.0366	-0.0944	-0.9596	-1.3338	-	-	-	-					-	weak	strong	strong
2008	12	3	-0.0335	0.0091	-0.8904	-0.9808	-	+	-	-					-	-	strong	strong
		6	-0.0679	-0.0855	-0.4894	-0.6246	-	-	-	-					weak	weak	strong	strong
		9	0.3900	-0.1291	0.0837	-0.3449	+	-	+	-					weak	weak	-	strong
		12	0.2730	-0.2858	-0.0397	-0.5512	+	-	-	-					-	strong	-	strong
2009	12	3	-0.0522	0.0150	-0.3698	-0.3132	-	+	-	-					-	-	strong	strong
		6	0.0583	0.0882	-0.1806	-0.2206	+	+	-	-		*			-	weak	moderate	strong
		9	0.0371	0.0923	-0.0339	0.2132	+	+	-	+				*	-	weak	-	strong
		12	0.0984	0.0867	0.0901	0.4190	+	+	+	+				*	-	weak	-	strong
2010	12	3	-0.0975	-0.1133	-1.1618	-0.6577	-	-	-	-					moderate	weak	strong	strong
		6	-0.0444	-0.0760	-0.5098	-0.5341	-	-	-	-					-	weak	strong	strong
		9	-0.0021	0.0063	-0.4435	-0.3748	-	+	-	-					-	-	strong	strong
		12	-0.1227	0.0051	-0.5988	-0.2066	-	+	-	-					weak	-	strong	moderate

Figure 5.2 and figure 5.3 is a graphical representation of the results obtained with respect to quintile 1 (loser portfolio) and quintile 5 (winner portfolio) respectively over the different holding periods.

Figure 5.2: Portfolio Performance of quintile 1 using a pure price momentum investment strategy

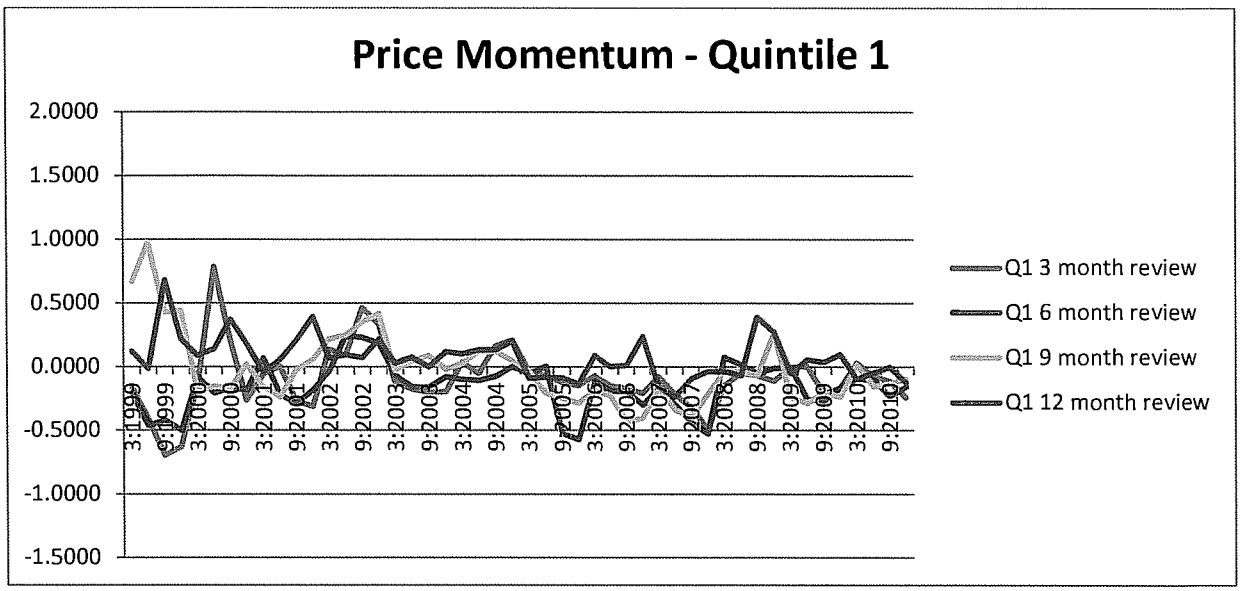
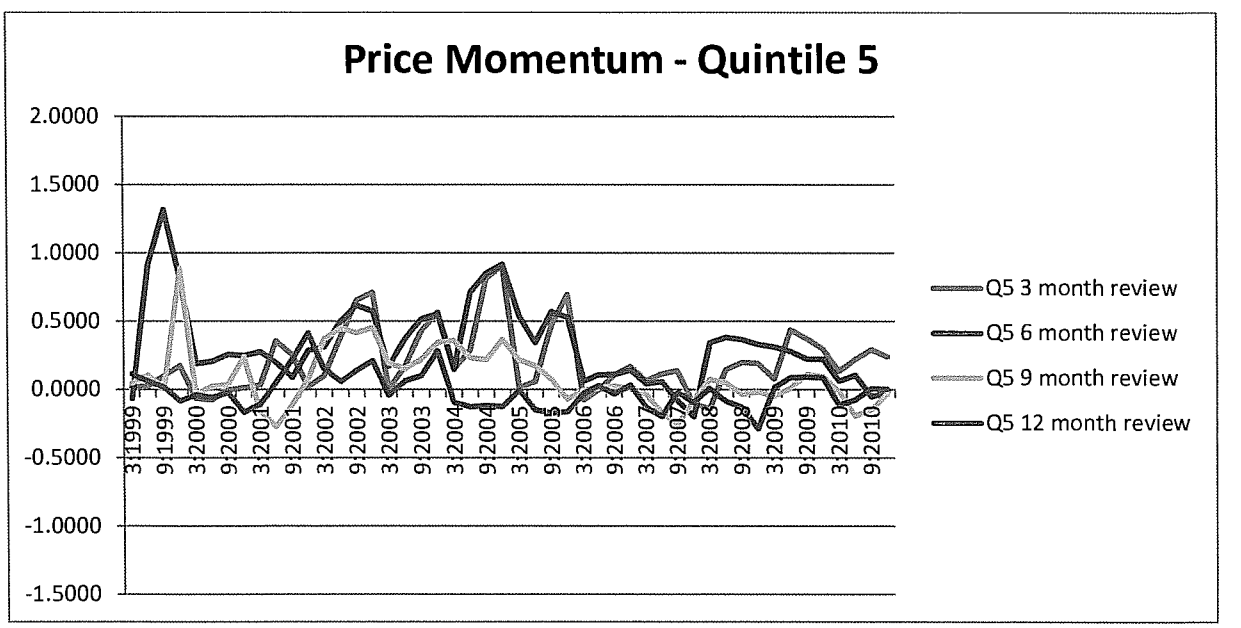


Figure 5.3: Portfolio Performance of quintile 5 using a pure price momentum investment strategy



The results for quintile 1 show a poor record of beating the market over the 12 year period compared to quintile 5. Furthermore, quintile 5 seems to perform much better with the 6 month review period performing better than the other review periods over the 12 years.

The null hypothesis was rejected.

5.4 RESEARCH RESULTS FOR HYPOTHESIS 2

H_O: Average returns in portfolio 2 (ROE momentum) = Average market returns

H_1: Average returns in portfolio 2 (ROE momentum) > Average market returns

H_O: Average returns in portfolio 3 (OPCF momentum) = Average market returns

H_1: Average returns in portfolio 3 (OPCF momentum) > Average market returns

H_O: Average returns in portfolio 4 (EBITDA momentum) = Average market returns

H_1: Average returns in portfolio 4 (EBITDA momentum) > Average market returns

To test hypothesis 2, an independent –samples t-test was conducted to compare mean returns in quintile 1 (loser portfolio) to quintile 5 (winner portfolio) using fundamental momentum as the investment strategy. Unlike hypothesis 1 which calculates returns based on price momentum, this test uses momentum in the three fundamental variables, namely ROE, OPCF and EBITDA respectively. The holding periods are also longer in this test and run over 12, 24 and 36 months respectively. The t-tests were adjusted for unequal variances in cases where the variances were significantly different. The nil values are as a result of insufficient information at the time of this paper.

Table 5.9 shows the mean returns per quintile using a 12 and 24 month review period with holding periods of 12 months, 24 months, and 36 months respectively. In this stage, stocks were ranked into quintiles based on their historic ROE momentum. Appendix 5 shows the quintile composition indicating that quintile 1 represented the loser stocks (negative momentum) and quintile 5 represented the winner stocks (upward momentum).

There were 5 significant differences between the means of quintiles 1 and 5 out of 63 observations at an alpha level of 0.05. Whilst negative returns were found in both quintile 1 and 5, quintile 5 still performed better than quintile 1.

Table 5.10 shows the mean returns per quintile using a 12 and 24 month review period with holding periods of 12 months, 24 months, and 36 months respectively. In this stage, stocks were ranked into quintiles based on their historic OPCF momentum. Appendix 6 shows the quintile composition indicating that quintile 1 represented the loser stocks (negative momentum) and quintile 5 represented the winner stocks (upward momentum).

There was 1 significant difference between the means of quintiles 1 and 5 out of 63 observations at an alpha level of 0.05. There was a slight increase in the number of negative returns earned in quintile 5, most of which relate to the 24 month review period.

Table 5.11 shows the mean returns per quintile using a 12 and 24 month review period with holding periods of 12 months, 24 months, and 36 months respectively. In this stage, stocks were ranked into quintiles based on their historic EBITDA momentum. Appendix 7 shows the quintile composition indicating that quintile 1 represented the loser stocks (negative momentum) and quintile 5 represented the winner stocks (upward momentum).

There was 1 significant difference between the means of quintiles 1 and 5 out of 63 observations at an alpha level of 0.05. Similarly in this test, the number of negative returns for quintile 5 increased, most of which relate to the 24 month review period.

Table 5.9: Statistical significance for ROE momentum in Stage 2 using a 12 and 24 month review period

Period	Fundamental variable	Review period	Hold months	Mean Q1	Mean Q5	Std.Dev. Q1	Std.Dev. Q5	t-value	df	p	Significance Q1 vs Q5 (α = 0.05)
1999	ROE	12 months	12	-0.1755	0.2220	0.4331	1.5579	-1.1530	24.2269	0.2601	
			24	-0.1470	0.0597	0.9513	0.6761	-0.8307	42.0000	0.4108	
			36	0.0925	0.3318	1.3423	0.8843	-0.6982	42.0000	0.4889	
1999	ROE	24 months	12	-0.0626	0.4240	0.7867	0.8729	-1.9425	42.0000	0.0588	
			24	0.0020	0.6997	0.8396	1.2366	-2.1896	42.0000	0.0342	*
			36	0.5057	0.8211	1.4810	1.5860	-0.6817	42.0000	0.4992	
2000	ROE	12 months	12	0.3449	0.4256	0.7823	0.9031	-0.3168	42.0000	0.7530	
			24	0.8439	0.9646	1.1263	1.1990	-0.3440	42.0000	0.7326	
			36	1.2426	1.6314	1.7751	1.5760	-0.7681	42.0000	0.4467	
2000	ROE	24 months	12	0.3042	0.2807	0.6676	0.4309	0.1385	42.0000	0.8905	
			24	0.4476	0.7232	0.8093	0.8363	-1.1106	42.0000	0.2731	
			36	1.0082	1.6248	1.6867	1.9134	-1.1340	42.0000	0.2632	
2001	ROE	12 months	12	0.4293	0.2803	1.0633	0.6815	0.5535	35.7601	0.5834	
			24	0.9066	0.5558	1.8260	0.6322	0.8516	25.9627	0.4022	
			36	2.2039	1.0888	3.2363	1.1226	1.5268	25.9815	0.1389	
2001	ROE	24 months	12	0.4856	0.2231	0.6809	0.5053	1.4524	42.0000	0.1538	
			24	0.9608	0.9814	1.2236	1.2053	-0.0564	42.0000	0.9553	
			36	1.8794	1.5359	2.1733	1.5712	0.6007	42.0000	0.5513	
2002	ROE	12 months	12	0.3551	0.3586	0.6180	0.6446	-0.0181	42.0000	0.9857	
			24	0.9265	1.1821	1.3074	1.4177	-0.6218	42.0000	0.5374	
			36	1.5783	1.8286	1.8415	2.1499	-0.4148	42.0000	0.6804	
2002	ROE	24 months	12	0.6311	0.4961	0.8808	0.6699	0.5721	42.0000	0.5703	
			24	1.2083	0.8448	1.2293	0.9951	1.0681	41.0000	0.2917	
			36	1.9849	1.4319	2.5834	1.5083	0.8521	31.9143	0.4005	
2003	ROE	12 months	12	0.5883	0.5816	1.0246	0.6756	0.0259	42.0000	0.9795	
			24	0.8281	0.8035	1.2674	0.8992	0.0733	41.0000	0.9419	
			36	0.9768	1.5307	1.6235	2.1204	-0.9645	41.0000	0.3404	
2003	ROE	24 months	12	0.3666	0.6080	0.7082	1.7694	-0.5939	27.5598	0.5574	
			24	0.6663	0.3775	1.1306	0.6417	1.0183	31.6728	0.3163	
			36	0.9406	0.6164	2.0173	1.1621	0.6382	31.9566	0.5279	
2004	ROE	12 months	12	0.6231	0.5188	1.8716	0.4701	0.2535	23.6391	0.8021	
			24	0.3515	0.7517	1.2977	0.7991	-1.1893	31.0221	0.2433	
			36	1.0823	0.8708	2.4972	1.4951	0.3289	30.4731	0.7445	
2004	ROE	24 months	12	0.3065	0.1791	0.8651	0.6448	0.5492	41.0000	0.5858	
			24	0.6102	0.5642	2.2742	1.1850	0.0827	29.8035	0.9346	
			36	-0.1263	0.1931	1.0201	1.1244	-0.9741	41.0000	0.3357	
2005	ROE	12 months	12	0.2406	0.2016	0.8725	0.4911	0.1824	33.0911	0.8564	
			24	0.7754	0.1886	2.1422	0.7531	1.2119	26.1125	0.2364	
			36	0.3225	-0.2808	1.3466	0.5547	1.9431	27.9276	0.0621	
2005	ROE	24 months	12	0.6089	-0.0815	1.2336	0.6281	2.0982	22.6222	0.0473	*
			24	0.2563	-0.4128	1.3695	0.4279	1.9393	18.5361	0.0678	
			36	-0.2370	-0.3215	0.5534	0.5381	0.4673	35.0000	0.6432	
2006	ROE	12 months	12	0.5166	0.3051	1.3594	0.4043	0.6207	18.1973	0.5425	
			24	0.1352	-0.0756	1.4131	0.4052	0.5964	18.0427	0.5583	
			36	-0.4802	0.0398	0.4989	0.5898	-2.8581	36.0000	0.0070	*
2006	ROE	24 months	12	-0.3373	-0.2151	0.3334	0.3494	-1.0320	33.0000	0.3096	
			24	0.1709	-0.1000	2.0342	0.4559	0.4900	13.8753	0.6318	
			36	-0.0796	0.1600	1.0214	0.7748	-0.7891	33.0000	0.4357	
2007	ROE	12 months	12	-0.3490	-0.2182	0.3103	0.3330	-1.2530	37.0000	0.2181	
			24	0.0646	-0.1832	1.8566	0.4537	0.5379	17.4825	0.5974	
			36	-0.2022	0.0423	0.8730	0.6801	-0.9841	37.0000	0.3315	
2007	ROE	24 months	12	0.4429	0.2067	2.2207	0.4056	0.3498	10.3510	0.7335	
			24	0.0535	0.4307	0.9529	0.7522	-1.2292	30.0000	0.2286	
			36	0.2315	0.3505	1.3074	0.9226	-0.2999	30.0000	0.7663	
2008	ROE	12 months	12	-0.2015	0.5309	0.6011	1.4746	-2.1422	28.3334	0.0409	*
			24	0.0497	0.4973	0.9899	0.7412	-1.6687	40.0000	0.1030	
			36	-0.0779	0.4470	1.0149	0.9738	-1.7101	40.0000	0.0950	
2008	ROE	24 months	12	0.2809	0.1001	0.7528	0.3901	0.7170	11.2588	0.4880	
			24	0.2207	0.1829	1.2281	0.8178	0.1033	30.0000	0.9184	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2009	ROE	12 months	12	0.1203	0.2470	0.3752	0.4824	-0.9353	39.0000	0.3554	
			24	-0.0817	0.4514	0.5487	0.8910	-2.3188	33.5064	0.0266	*
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2009	ROE	24 months	12	-0.1545	0.0774	0.4721	0.5429	-1.3025	33.0000	0.2017	
			24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2010	ROE	12 months	12	-0.2234	-0.0054	0.4490	0.3049	-1.7959	38.0000	0.0805	
			24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table 5.10: Statistical significance for OPCF momentum in Stage 2 using a 12 and 24 month review period

Period	Fundamental variable	Review period	Hold months	Mean Q1	Mean Q5	Std.Dev. Q1	Std.Dev. Q5	t-value	df	p	Significance Q1 vs Q5 (α = 0.05)
1999	OPCF	12 months	12	-0.1121	-0.0303	0.5564	0.4602	-0.5318	42.0000	0.5977	
			24	0.1402	0.0138	1.3026	0.8201	0.3853	35.3880	0.7023	
			36	0.4247	0.1413	1.4131	0.8744	0.7998	35.0234	0.4292	
1999	OPCF	24 months	12	0.1492	-0.0070	0.5004	0.6193	0.9200	42.0000	0.3628	
			24	0.5243	0.1959	1.1020	0.7523	1.1542	42.0000	0.2550	
			36	1.1037	0.5600	1.6792	1.2954	1.2025	42.0000	0.2359	
2000	OPCF	12 months	12	0.3750	0.1822	0.7899	0.5972	0.9131	42.0000	0.3664	
			24	0.9828	0.4752	1.7877	0.9514	1.1756	32.0119	0.2484	
			36	1.1201	0.8224	1.4995	0.9531	0.7730	33.6364	0.4449	
2000	OPCF	24 months	12	0.3852	0.1541	0.7128	0.4068	1.3207	33.3678	0.1956	
			24	1.1766	0.5525	1.7584	0.6760	1.5538	27.0739	0.1318	
			36	2.0874	1.7172	2.7676	1.9826	0.5060	41.0000	0.6155	
2001	OPCF	12 months	12	0.4614	0.3235	1.0562	0.7107	0.5081	42.0000	0.6140	
			24	0.4968	0.5446	0.6316	1.0803	-0.1792	33.8550	0.8588	
			36	1.5897	1.4255	2.1489	2.1576	0.2529	42.0000	0.8016	
2001	OPCF	24 months	12	0.3965	0.3731	0.6469	0.5889	0.1255	42.0000	0.9007	
			24	1.2683	1.5495	1.6306	1.9038	-0.5262	42.0000	0.6016	
			36	1.8849	2.2085	2.4481	1.7412	-0.4973	41.0000	0.6216	
2002	OPCF	12 months	12	0.3541	0.3619	0.4705	0.6007	-0.0478	42.0000	0.9621	
			24	1.3414	1.4456	1.5847	2.0268	-0.1900	42.0000	0.8502	
			36	1.9634	1.7359	2.2788	1.7181	0.3683	41.0000	0.7146	
2002	OPCF	24 months	12	0.5438	0.4960	0.9230	0.8306	0.1808	42.0000	0.8574	
			24	1.1457	0.9578	1.4080	1.0652	0.4993	42.0000	0.6202	
			36	1.9324	1.2924	2.4165	1.2190	1.1090	31.0375	0.2760	
2003	OPCF	12 months	12	0.4814	0.8265	1.0052	0.6894	-1.3278	42.0000	0.1914	
			24	0.7903	1.2348	1.5890	1.0290	-1.0939	41.0000	0.2804	
			36	1.1282	1.9389	2.2915	1.6735	-1.3293	41.0000	0.1911	
2003	OPCF	24 months	12	0.1157	0.3031	0.4982	0.3471	-1.4478	42.0000	0.1551	
			24	0.3163	0.4981	0.9325	0.7793	-0.7018	42.0000	0.4867	
			36	0.6718	0.3657	1.9393	1.0138	0.6562	31.6795	0.5165	
2004	OPCF	12 months	12	0.1613	0.7944	0.6822	1.7334	-1.5941	27.3524	0.1224	
			24	0.2823	0.9259	0.9430	1.1558	-1.9774	40.0000	0.0549	
			36	0.4789	1.4946	1.5002	2.3543	-1.6672	40.0000	0.1033	
2004	OPCF	24 months	12	0.1829	0.1961	0.9578	0.3937	-0.0584	26.3202	0.9539	
			24	0.5676	0.4056	2.2759	0.6550	0.3140	23.1492	0.7563	
			36	-0.0200	-0.0518	1.0727	0.5451	0.1219	29.3748	0.9038	
2005	OPCF	12 months	12	0.3938	0.3283	0.8942	0.4438	0.3078	30.7555	0.7603	
			24	0.7178	0.8251	2.1812	1.3028	-0.1981	34.2923	0.8442	
			36	0.1274	0.1428	1.1253	1.1340	-0.0452	42.0000	0.9642	
2005	OPCF	24 months	12	0.2002	0.3854	0.4673	0.9284	-0.7966	28.0467	0.4324	
			24	-0.1738	-0.0231	0.4772	0.8881	-0.6684	29.1259	0.5091	
			36	-0.0650	-0.0507	0.6436	0.5510	-0.0757	38.0000	0.9401	
2006	OPCF	12 months	12	0.2033	0.4889	1.1198	0.7150	-0.9782	38.0000	0.3341	
			24	-0.0046	0.0170	1.1275	0.8887	-0.0681	38.0000	0.9461	
			36	-0.2217	-0.0230	0.6697	0.6731	-0.9161	37.0000	0.3656	
2006	OPCF	24 months	12	-0.3190	-0.3657	0.2101	0.3165	0.5094	35.0000	0.6137	
			24	0.0801	-0.2999	1.8781	0.4680	0.7909	16.4251	0.4403	
			36	-0.0895	-0.2325	0.7485	0.6125	0.6392	35.0000	0.5269	
2007	OPCF	12 months	12	-0.3537	-0.2760	0.2630	0.3117	-0.8942	42.0000	0.3763	
			24	-0.0257	-0.1197	1.6160	0.4952	0.2611	24.9089	0.7962	
			36	-0.1526	0.1430	0.7198	0.8141	-1.2759	42.0000	0.2090	
2007	OPCF	24 months	12	-0.0349	0.5583	0.4726	1.5065	-1.7136	24.2689	0.0994	
			24	0.1676	0.5257	0.6945	0.7445	-1.5680	38.0000	0.1252	
			36	0.2247	0.4470	1.1026	0.9887	-0.6722	38.0000	0.5056	
2008	OPCF	12 months	12	-0.0494	0.3957	0.5908	1.5221	-1.2704	27.6958	0.2145	
			24	0.1817	0.4242	1.0036	0.7103	-0.9106	40.0000	0.3679	
			36	0.0972	0.3104	1.0820	1.0844	-0.6371	40.0000	0.5277	
2008	OPCF	24 months	12	0.1708	0.2791	0.5001	0.4048	-0.7059	33.0000	0.4852	
			24	-0.0279	0.2349	0.6288	0.8045	-1.0291	33.0000	0.3109	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2009	OPCF	12 months	12	0.2057	0.3008	0.5172	0.3395	-0.6989	39.0000	0.4888	
			24	-0.0197	0.5531	0.6157	0.8390	-2.4818	39.0000	0.0175	*
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2009	OPCF	24 months	12	0.0657	0.1318	0.2808	0.5252	-0.4841	32.7993	0.6315	
			24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2010	OPCF	12 months	12	-0.1849	-0.1292	0.3421	0.3491	-0.5211	40.0000	0.6051	
			24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Table 5.11: Statistical significance for EBITDA momentum in Stage 2 using a 12 and 24 month review period

Period	Fundamental variable	Review period	Hold months	Mean Q1	Mean Q5	Std.Dev. Q1	Std.Dev. Q5	t-value	df	p	Significance Q1 vs Q5 (α = 0.05)
1999	EBITDA	12 months	12	0.2050	-0.0975	1.5517	0.6360	0.8460	27.8625	0.4048	
			24	-0.0183	0.1373	0.9513	1.3150	-0.4496	42.0000	0.6553	
			36	0.3717	0.2188	1.2986	1.2164	0.4030	42.0000	0.6890	
1999	EBITDA	24 months	12	0.0973	0.0614	0.9888	0.6998	0.1391	42.0000	0.8900	
			24	0.4831	0.0871	1.3176	0.7502	1.2252	33.3204	0.2291	
			36	0.7314	0.4451	1.6813	1.1197	0.6647	42.0000	0.5099	
2000	EBITDA	12 months	12	0.2814	-0.0541	0.9000	0.4574	1.5588	31.1693	0.1291	
			24	0.9615	0.3985	1.9533	1.1520	1.1646	34.0318	0.2523	
			36	0.4710	0.8758	1.0216	1.7076	-0.9482	34.5941	0.3496	
2000	EBITDA	24 months	12	0.2906	0.3854	0.6909	0.8255	-0.4131	42.0000	0.6817	
			24	0.4135	0.7838	1.0283	0.8628	-1.2942	42.0000	0.2027	
			36	0.9053	1.7468	1.7351	2.0096	-1.4866	42.0000	0.1446	
2001	EBITDA	12 months	12	0.5587	0.2519	1.0882	0.7602	1.0841	42.0000	0.2845	
			24	0.6611	0.3723	1.4790	1.1769	0.7165	42.0000	0.4776	
			36	1.7284	0.9519	2.8392	1.9353	1.0600	42.0000	0.2952	
2001	EBITDA	24 months	12	0.1178	0.2709	0.3690	0.6547	-0.9555	33.1192	0.3462	
			24	0.7905	0.9146	1.3567	1.3099	-0.3088	42.0000	0.7590	
			36	1.2232	1.5098	1.8001	2.0608	-0.4912	42.0000	0.6259	
2002	EBITDA	12 months	12	0.2621	0.1483	0.6394	0.4422	0.6867	42.0000	0.4961	
			24	0.8634	0.5942	1.3087	0.8283	0.8152	35.4986	0.4204	
			36	1.4203	1.2298	1.8729	1.2869	0.3932	42.0000	0.6961	
2002	EBITDA	24 months	12	0.4963	0.5778	0.8163	0.7002	-0.3557	42.0000	0.7238	
			24	0.7335	1.3263	0.7880	1.2726	-1.8265	33.0952	0.0768	
			36	1.1003	2.2377	1.9068	2.0917	-1.8648	41.0000	0.0694	
2003	EBITDA	12 months	12	0.6906	0.4241	1.0725	0.5463	1.0385	31.2090	0.3070	
			24	1.0453	0.7321	1.4452	0.7640	0.8822	30.0562	0.3847	
			36	1.0738	1.4266	1.7779	1.8704	-0.6333	41.0000	0.5300	
2003	EBITDA	24 months	12	0.5779	0.3567	1.8842	0.5647	0.5273	24.7422	0.6027	
			24	0.4167	0.5092	1.2000	0.6096	-0.3150	29.6771	0.7550	
			36	0.5044	0.7647	1.8662	1.0370	-0.5589	31.2755	0.5802	
2004	EBITDA	12 months	12	0.6278	0.2977	1.8806	0.4945	0.7965	23.8898	0.4336	
			24	0.4055	0.3832	1.3672	0.6338	0.0667	26.2438	0.9473	
			36	1.0522	0.5101	2.5911	1.0918	0.8681	25.0387	0.3936	
2004	EBITDA	24 months	12	0.3267	0.2789	0.8730	0.3680	0.2318	26.6294	0.8185	
			24	0.7800	0.4217	2.3985	0.7122	0.6576	23.3503	0.5173	
			36	0.0799	-0.0090	1.3864	0.5673	0.2728	26.2652	0.7871	
2005	EBITDA	12 months	12	0.3507	0.2425	0.8669	0.3744	0.5378	28.5720	0.5949	
			24	0.6065	0.6050	2.0369	1.0529	0.0031	31.4751	0.9976	
			36	0.1500	0.1137	1.1589	1.0671	0.1082	42.0000	0.9144	
2005	EBITDA	24 months	12	0.2133	0.0089	1.0520	0.5156	0.7508	23.8612	0.4601	
			24	-0.1446	-0.3782	0.9897	0.4486	0.9232	22.9091	0.3655	
			36	-0.3688	-0.2326	0.6274	0.5974	-0.6934	37.0000	0.4924	
2006	EBITDA	12 months	12	-0.1249	0.6443	0.4732	1.0943	-2.9581	30.0825	0.0060	*
			24	-0.2534	0.0942	0.5004	1.2194	-1.2116	29.3216	0.2353	
			36	-0.3097	-0.2740	0.5378	0.5570	-0.1997	36.0000	0.8428	
2006	EBITDA	24 months	12	-0.2605	-0.3485	0.3803	0.3661	0.6925	34.0000	0.4933	
			24	-0.4479	-0.0166	0.5071	1.6160	-1.1652	26.9592	0.2541	
			36	-0.4192	-0.0967	0.6504	0.7572	-1.3134	34.0000	0.1978	
2007	EBITDA	12 months	12	-0.3814	-0.3632	0.3512	0.2183	-0.1876	25.2641	0.8527	
			24	-0.0536	-0.2835	1.8587	0.3919	0.5013	17.1026	0.6225	
			36	-0.2695	-0.0977	0.7789	0.6094	-0.7731	37.0000	0.4443	
2007	EBITDA	24 months	12	-0.2931	0.0257	0.4503	0.5417	-1.6108	29.0000	0.1181	
			24	-0.0407	0.0803	0.7316	0.8027	-0.4032	29.0000	0.6898	
			36	-0.2744	-0.1669	1.0561	0.6422	-0.3521	29.0000	0.7273	
2008	EBITDA	12 months	12	-0.1905	0.5088	0.6124	1.4786	-2.0346	28.5486	0.0513	
			24	0.1132	0.4828	1.0141	0.7160	-1.3745	40.0000	0.1769	
			36	-0.0373	0.5038	1.1411	1.0208	-1.6224	40.0000	0.1126	
2008	EBITDA	24 months	12	0.4192	0.0806	0.8384	0.3898	1.0999	8.1270	0.3029	
			24	0.3631	0.0416	1.6036	0.6160	0.5525	7.7639	0.5962	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2009	EBITDA	12 months	12	0.1560	0.2895	0.3925	0.4932	-0.9480	39.0000	0.3490	
			24	0.0920	0.5114	0.5028	0.8655	-1.9274	34.4781	0.0622	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2009	EBITDA	24 months	12	0.0371	-0.0035	0.6132	0.2365	0.2288	14.1386	0.8223	
			24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
2010	EBITDA	12 months	12	-0.1899	0.0626	0.4247	0.5404	-1.6715	40.0000	0.1024	
			24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
			36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

Further, we looked at each of three fundamental variables and tested for the difference between the means and risk adjusted means of both quintile 1 (loser portfolio) and quintile 5 (winner portfolio) respectively, relative to market returns. Risk adjusted returns in this case was calculated using the Sharpe ratio. The average 10 year South African government bond rate was used as a proxy for the risk free rate.

Table 5.12 shows the difference between each quintile's mean return relative to the market and each quintile's risk adjusted return relative to the market for the 12 and 24 month review period using ROE momentum.

From 63 observations (comparisons with missing data not included) for quintile 5 using a 12 and 24 month review period, 40 had beaten the market, 16 of which were significant positive differences at an alpha level of 0.05, and 4 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, quintile 5 had still beaten the market 29 times, of which 12 were significant positive differences at an alpha level of 0.05, and 5 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.13 shows the difference between each quintiles mean return relative to the market and each quintiles risk adjusted return relative to the market for the 12 and 24 month review period using OPCF momentum.

From 63 observations for quintile 5 using a 12 and 24 month review period, 38 had beaten the market, 18 of which were significant positive differences at an alpha level of 0.05, and 2 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, quintile 5 had still beaten the market 32 times, of which 15 were significant positive differences at an alpha level of 0.05, and 2 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.14 shows the difference between each quintiles mean return relative to the market and each quintiles risk adjusted return relative to the market for the 12 and 24 month review period using EBITDA momentum.

From 63 observations for quintile 5 using a 12 and 24 month review period, 31 had beaten the market, 12 of which were significant positive differences at an alpha level of 0.05, and 1 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After

adjusting returns for risk using the Sharpe ratio, quintile 5 had still beaten the market 26 times, of which 8 were significant positive differences at an alpha level of 0.05, and 1 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Over the respective holding periods, namely, 12 and 24 months, quintile 1 also reported instances of beating the market however these were outweighed by the success of quintile 5. Based on the statistically significant differences, it appears that ROE momentum performs better than the OPCF and EBITDA momentum respectively.

Table 5.12: Portfolio Performance for ROE momentum in Stage 2 using a 12 and 24 month review period

				Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Fundamental	Review period	Hold months	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return
			12	-0.1525	0.2450	-0.6893	0.0802	-	+	-	+					weak		strong	
1999	ROE	12 months	24	-0.3982	-0.1915	-0.5326	-0.3414	-	-	-	-					weak	weak	moderate	moderate
			36	-0.0176	0.2217	-0.1273	0.1344	-	+	-	+						weak		
			12	-0.3434	0.1433	-0.4981	0.0808	-	+	-	+					weak		moderate	
1999	ROE	24 months	24	-0.1343	0.5634	-0.2613	0.3431	-	+	-	+		*				weak	weak	weak
			36	0.2334	0.5488	0.0012	0.1820	+	+	+	+						weak		
			12	0.0641	0.1448	0.0215	0.0705	+	+	+	+								
2000	ROE	12 months	24	0.7076	0.8282	0.5181	0.5790	+	+	+	+	*	*	*	*	moderate	moderate	weak	weak
			36	0.9704	1.3591	0.3711	0.6990	+	+	+	+	*	*		*	moderate	strong	weak	weak
			12	0.4170	0.3935	0.4106	0.5197	+	+	+	+	*	*	*	*	moderate	strong	moderate	strong
2000	ROE	24 months	24	0.4543	0.7298	0.4401	0.7556	+	+	+	+	*	*	*	*	moderate	strong	moderate	strong
			36	0.7977	1.4144	0.3317	0.5898	+	+	+	+	*	*			weak	moderate		weak
			12	0.5421	0.3931	0.4174	0.3694	+	+	+	+	*	*	*	*	moderate	moderate	weak	moderate
2001	ROE	12 months	24	0.9132	0.5624	0.4501	0.7327	+	+	+	+	*	*		*	moderate	strong	weak	strong
			36	1.9934	0.8784	0.4416	0.6760	+	+	+	+	*	*		*	moderate	moderate		moderate
			12	0.3660	0.1035	0.4641	0.1474	+	+	+	+	*		*		moderate	weak	moderate	weak
2001	ROE	24 months	24	0.5965	0.6171	0.3491	0.3770	+	+	+	+	*	*			weak	moderate	weak	weak
			36	0.9288	0.5853	-0.1245	-0.0264	+	+	-	-	*	*			weak	weak		
			12	0.2355	0.2389	0.3123	0.2998	+	+	+	+	*	*	*	*	weak	weak	moderate	weak
2002	ROE	12 months	24	0.5622	0.8178	0.2771	0.4076	+	+	+	+	*	*			weak	moderate	weak	weak
			36	0.6276	0.8780	-0.1391	-0.1391	+	+	-	-		*			weak	weak		
			12	0.4126	0.2776	0.3986	0.3913	+	+	+	+	*	*	*	*	weak	weak	weak	moderate
2002	ROE	24 months	24	0.4661	0.1026	0.1743	0.0247	+	+	+	+	*				weak			
			36	0.5863	0.0333	-0.6613	-0.5023	+	+	-	-					weak		weak	weak
			12	0.3698	0.3630	0.2702	0.5127	+	+	+	+		*		*	weak	moderate	weak	moderate
2003	ROE	12 months	24	0.0859	0.0613	-0.1532	0.0605	+	+	-	+								
			36	-0.4219	0.1320	-0.8463	-0.7145	-	+	-	-					weak		moderate	weak
			12	-0.0631	0.1782	-0.0190	-0.1290	-	+	-	-								
2003	ROE	24 months	24	-0.3022	-0.5910	-0.4467	-0.4992	-	-	-	-					weak	strong	weak	moderate
			36	-0.3473	-0.6715	-0.8599	-0.8238	-	-	-	-						moderate	weak	moderate
			12	0.1934	0.0891	-0.1373	0.5129	+	+	-	+				*				strong
2004	ROE	12 months	24	-0.6171	-0.2169	-0.7565	-0.1235	-	-	-	-					weak	weak	moderate	
			36	-0.2057	-0.4171	-0.8854	-0.7571	-	-	-	-						weak	weak	moderate
			12	-0.0703	-0.1977	-0.1115	-0.2185	-	-	-	-						weak		weak
2004	ROE	24 months	24	0.0100	-0.0360	-0.3661	-0.1698	+	-	-	-								
			36	-0.3149	0.0045	-0.3923	-0.0893	-	+	-	-					weak		weak	
			12	-0.1362	-0.1751	-0.1893	-0.1230	-	-	-	-						weak	weak	weak
2005	ROE	12 months	24	0.1752	-0.4116	-0.2746	-0.4530	+	-	-	-						moderate		moderate
			36	0.1340	-0.4694	-0.0096	-0.8417	+	-	-	-						strong		strong
			12	0.4467	-0.2438	0.2677	-0.4172	+	-	+	-					weak	weak	weak	moderate
2005	ROE	24 months	24	0.3930	-0.2761	0.2627	-1.0238	+	-	+	-					weak	moderate		strong
			36	-0.3475	-0.4319	-0.6925	-0.8659	-	-	-	-					moderate	strong	strong	strong
			12	0.3544	0.1429	0.1600	0.3980	+	+	+	+				*	weak	weak		strong
2006	ROE	12 months	24	0.2719	0.0611	0.1731	-0.2566	+	+	+	-								moderate
			36	-0.5906	-0.0706	-1.2434	-0.1871	-	-	-	-					strong		strong	weak
			12	-0.0800	0.0422	-1.0212	-0.6128	-	+	-	-					weak		strong	strong
2006	ROE	24 months	24	0.2155	-0.0554	0.0852	-0.3682	+	-	+	-								strong
			36	-0.1888	0.0509	-0.2727	-0.0154	-	+	-	-							weak	
			12	-0.0918	0.0390	-1.1542	-0.6651	-	+	-	-					weak		strong	strong
2007	ROE	12 months	24	0.1092	-0.1386	0.0318	-0.5536	+	-	+	-						weak		strong
			36	-0.3113	-0.0668	-0.4409	-0.1754	-	-	-	-					weak		moderate	weak
			12	0.1566	-0.0796	-0.1262	0.0074	+	-	-	+								
2007	ROE	24 months	24	-0.4398	-0.0626	-0.5280	-0.0358	-	-	-	-					weak		moderate	
			36	-0.2556	-0.1366	-0.3761	-0.2007	-	-	-	-							weak	weak
			12	-0.4878	0.2447	-0.7671	0.0144	-	+	-	+					strong		strong	
2008	ROE	12 months	24	-0.4435	0.0041	-0.5305	0.0609	-	+	-	+					weak		moderate	
			36	-0.5650	-0.0400	-0.6489	-0.1167	-	-	-	-					moderate		moderate	
			12	0.1200	-0.0608	0.0983	-0.1241	+	-	+	-								weak
2008	ROE	24 months	24	0.0646	0.0268	-0.0462	-0.0372	+	+	-	-								
			36	0.0000	0.0000	0.0000	0.0000	-	-										
			12	-0.0406	0.0861	-0.0688	0.1733	-	+	-	+								weak
2009	ROE	12 months	24	-0.2378	0.2953	-0.4613	0.2543	-	+	-	+					weak	weak	strong	weak
			36	0.0000	0.0000	0.0000		-	-										
			12	-0.1504	0.0816	-0.5046	-0.0110	-	+	-	-					weak		strong	
2009	ROE	24 months	24	0.0000	0.0000	0.0000	0.0000	-	-										
			36	0.0000	0.0000	0.0000	0.0000	-	-										
			12	-0.2192	-0.0013	-0.6841	-0.2946	-	-	-	-					weak		strong	strong
2010	ROE	12 months	24	0.0000	0.0000	0.0000	0.0000	-	-										
			36	0.0000	0.0000	0.0000	0.0000	-	-										

Table 5.13: Portfolio Performance for OPCF momentum in Stage 2 using a 12 and 24 month review period

				Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Fundamental	Review period	Hold months	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return
			12	-0.0891	-0.0072	-0.4174	-0.3317	-	-	-	-							moderate	moderate
1999	OPCF	12 months	24	-0.1110	-0.2374	-0.2362	-0.3816	-	-	-	-						weak		weak
			36	0.3146	0.0312	0.1086	-0.0806	+	+	+	-					weak			
			12	-0.1316	-0.2878	-0.1992	-0.4671	-	-	-	-					weak	weak	weak	moderate
1999	OPCF	24 months	24	0.3879	0.0596	0.2424	-0.0180	+	+	+	-					weak		weak	
			36	0.8314	0.2877	0.3250	0.0823	+	+	+	+	*				weak	weak		
			12	0.0942	-0.0986	0.0568	-0.1572	+	-	+	-								weak
2000	OPCF	12 months	24	0.8465	0.3389	0.3537	0.2509	+	+	+	+	*				weak	weak		weak
			36	0.8478	0.5501	0.4076	0.4850	+	+	+	+	*	*		*	moderate	moderate	weak	moderate
			12	0.4980	0.2669	0.5053	0.2325	+	+	+	+	*	*	*	*	moderate	moderate	moderate	moderate
2000	OPCF	24 months	24	1.1832	0.5591	0.6207	0.6808	+	+	+	+	*	*		*	moderate	strong	weak	strong
			36	1.8769	1.5068	0.5099	0.6084	+	+	+	+	*	*			moderate	moderate		weak
			12	0.5742	0.4362	0.4498	0.4196	+	+	+	+	*	*	*	*	moderate	moderate	weak	moderate
2001	OPCF	12 months	24	0.5034	0.5512	0.6399	0.4211	+	+	+	+	*	*	*	*	moderate	moderate	strong	weak
			36	1.3793	1.2151	0.4857	0.4068	+	+	+	+	*	*			moderate	moderate	weak	
			12	0.2769	0.2535	0.3571	0.3642	+	+	+	+	*	*	*	*	weak	weak	moderate	moderate
2001	OPCF	24 months	24	0.9041	1.1852	0.3596	0.4035	+	+	+	+	*	*			moderate	moderate	weak	weak
			36	0.9343	1.2579	-0.2149	0.2696	+	+	-	+	*	*			weak	moderate		
			12	0.2344	0.2422	0.4456	0.3360	+	+	+	+	*	*	*	*	weak	weak	strong	moderate
2002	OPCF	12 months	24	0.9771	1.0813	0.4268	0.3056	+	+	+	+	*	*			moderate	moderate	weak	
			36	1.0128	0.7853	-0.1258	0.0110	+	+	-	+	*	*			weak	weak		
			12	0.3253	0.2774	0.2758	0.2731	+	+	+	+					weak	weak	weak	weak
2002	OPCF	24 months	24	0.4035	0.2156	0.0135	0.0804	+	+	+	+					weak	weak		
			36	0.5337	-0.1062	-0.6321	-0.4041	+	-	-	-					weak		weak	weak
			12	0.2629	0.6080	0.1733	0.8533	+	+	+	+		*		*	weak	strong		strong
2003	OPCF	12 months	24	0.0481	0.4926	-0.2962	0.3784	+	+	-	+		*		*		weak		weak
			36	-0.2704	0.5402	-0.9413	-0.2879	-	+	-	-						weak	weak	
			12	-0.3141	-0.1267	-0.3496	0.2254	-	-	-	+				*	moderate	weak	moderate	moderate
2003	OPCF	24 months	24	-0.6523	-0.4704	-0.7113	-0.4273	-	-	-	-					moderate	moderate	moderate	moderate
			36	-0.6161	-0.9222	-0.9813	-1.0033	-	-	-	-					weak	strong	moderate	strong
			12	-0.2685	0.3646	-0.3043	-0.0152	-	+	-	-					weak	weak	weak	
2004	OPCF	12 months	24	-0.6862	-0.0426	-0.7502	-0.2335	-	-	-	-					moderate		moderate	weak
			36	-0.8090	0.2067	-1.0201	-0.6859	-	+	-	-					moderate		moderate	weak
			12	-0.1939	-0.1807	-0.2662	-0.0745	-	-	-	-					weak	weak	weak	
2004	OPCF	24 months	24	-0.0326	-0.1946	-0.3850	-0.0997	-	-	-	-						weak		
			36	-0.2085	-0.2404	-0.2832	-0.4332	-	-	-	-						weak	weak	moderate
			12	0.0170	-0.0485	-0.0225	0.1894	+	-	-	+				*				weak
2005	OPCF	12 months	24	0.1176	0.2249	-0.3068	-0.0266	+	+	-	-								
			36	-0.0612	-0.0458	-0.1478	-0.1345	-	-	-	-								
			12	0.0380	0.2231	0.0980	0.1682	+	+	+	+						weak	weak	
2005	OPCF	24 months	24	-0.0371	0.1136	-0.4032	0.0163	-	+	-	+							strong	
			36	-0.1755	-0.1611	-0.3436	-0.3567	-	-	-	-					weak	weak	moderate	moderate
			12	0.0411	0.3266	-0.0509	0.4115	+	+	-	+		*		*		weak		moderate
2006	OPCF	12 months	24	0.1321	0.1537	0.0583	0.0616	+	+	+	+								
			36	-0.3321	-0.1334	-0.5684	-0.2709	-	-	-	-					weak		strong	weak
			12	-0.0618	-0.1085	-1.6847	-1.1793	-	-	-	-					weak	weak	strong	strong
2006	OPCF	24 months	24	0.1247	-0.2553	0.0403	-0.7848	+	-	+	-						moderate		strong
			36	-0.1986	-0.3416	-0.3455	-0.6314	-	-	-	-					weak	moderate	weak	strong
			12	-0.0965	-0.0187	-1.4256	-0.9133	-	-	-	-					weak		strong	strong
2007	OPCF	12 months	24	0.0189	-0.0751	-0.0259	-0.3754	+	-	-	-								moderate
			36	-0.2617	0.0339	-0.4426	-0.0408	-	+	-	-					weak		moderate	
			12	-0.3211	0.2720	-0.5452	0.0262	-	+	-	+					moderate		strong	
2007	OPCF	24 months	24	-0.3257	0.0324	-0.3768	0.0964	-	+	-	+					weak		moderate	
			36	-0.2623	-0.0401	-0.3615	-0.1223	-	-	-	-					weak		weak	
			12	-0.3357	0.1094	-0.5181	-0.0838	-	+	-	-					moderate		strong	
2008	OPCF	12 months	24	-0.3116	-0.0690	-0.3986	-0.0179	-	-	-	-					weak		weak	
			36	-0.3699	-0.1767	-0.4770	-0.2804	-	-	-	-					weak		weak	weak
			12	0.0099	0.1182	0.0091	0.3168	+	+	+	+				*		weak		moderate
2008	OPCF	24 months	24	-0.1840	0.0788	-0.3368	0.0294	-	+	-	+					weak		moderate	
			36	0.0000	0.0000	0.0000	0.0000	-	-										
			12	0.0448	0.1398	0.0711	0.4724	+	+	+	+		*		*		weak		strong
2009	OPCF	12 months	24	-0.1758	0.3970	-0.3274	0.4009	-	+	-	+		*		*	weak	weak	moderate	weak
			36	0.0000	0.0000	0.0000	0.0000	-	-										
			12	0.0699	0.1359	-0.0669	0.0919	+	+	-	+					weak	weak	weak	
2009	OPCF	24 months	24	0.0000	0.0000	0.0000	0.0000	-	-										
			36	0.0000	0.0000	0.0000	0.0000	-	-										
			12	-0.1808	-0.1251	-0.7868	-0.6114	-	-	-	-					moderate	weak	strong	strong
2010	OPCF	12 months	24	0.0000	0.0000	0.0000	0.0000	-	-										
			36	0.0000	0.0000	0.0000		-	-										

Table 5.14: Portfolio Performance for EBITDA momentum in Stage 2 using a 12 and 24 month review period

				Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Fundamental	Review period	Hold months	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return
			12	0.2280	-0.0744	0.0695	-0.3393	+	-	+	-								moderate
1999	EBITDA	12 months	24	-0.2695	-0.1139	-0.3973	-0.2386	-	-	-	-					weak		weak	
			36	0.2616	0.1087	0.0871	-0.0253	+	+	+	-					weak			
			12	-0.1834	-0.2194	-0.2919	-0.3479	-	-	-	-						weak	weak	weak
1999	EBITDA	24 months	24	0.3468	-0.0492	0.1492	-0.1627	+	-	+	-					weak			weak
			36	0.4591	0.1728	0.1029	0.0354	+	+	+	+					weak			
			12	0.0006	-0.3349	-0.0885	-0.6360	+	-	-	-						moderate		strong
2000	EBITDA	12 months	24	0.8252	0.2622	0.3012	0.1168	+	+	+	+	*				weak	weak		
			36	0.1988	0.6036	0.0903	0.1817	+	+	+	+						weak		
			12	0.4034	0.4982	0.3808	0.4520	+	+	+	+	*	*	*	*	moderate	moderate	moderate	moderate
2000	EBITDA	24 months	24	0.4201	0.7905	0.3146	0.8029	+	+	+	+	*	*		*	weak	strong	weak	strong
			36	0.6949	1.5364	0.2573	0.6122	+	+	+	+	*	*			weak	moderate		weak
			12	0.6715	0.3647	0.5293	0.3055	+	+	+	+	*	*	*	*	moderate	weak	weak	weak
2001	EBITDA	12 months	24	0.6677	0.3790	0.3882	0.2408	+	+	+	+	*				weak	weak	weak	weak
			36	1.5180	0.7415	0.3653	0.2330	+	+	+	+	*	*			moderate	weak		
			12	-0.0019	0.1512	-0.0394	0.1594	-	+	-	+						weak		weak
2001	EBITDA	24 months	24	0.4262	0.5503	0.1536	0.2669	+	+	+	+		*			weak	weak		weak
			36	0.2726	0.5591	-0.3177	-0.2587	+	+	-	-						weak		
			12	0.1425	0.0287	0.1524	0.0164	+	+	+	+					weak		weak	
2002	EBITDA	12 months	24	0.4991	0.2299	0.2283	0.2470	+	+	+	+	*				weak	weak		weak
			36	0.4696	0.2791	-0.2371	-0.0602	+	+	-	-					weak	weak		
			12	0.2778	0.3593	0.2822	0.4817	+	+	+	+		*		*	weak	moderate	weak	moderate
2002	EBITDA	24 months	24	-0.0087	0.5841	0.0850	0.2358	-	+	+	+		*				weak		
			36	-0.2983	0.8390	-0.8636	-0.3672	-	+	-	-		*				weak	weak	
			12	0.4721	0.2056	0.3437	0.3975	+	+	+	+	*	*		*	weak	weak	weak	moderate
2003	EBITDA	12 months	24	0.3031	-0.0101	-0.0754	0.1092	+	-	-	+					weak			
			36	-0.3248	0.0280	-0.8397	-0.6787	-	+	-	-							weak	weak
			12	0.1481	-0.0730	-0.1633	0.0679	+	-	-	+								
2003	EBITDA	24 months	24	-0.5518	-0.4593	-0.6849	-0.2584	-	-	-	-					weak	moderate	moderate	weak
			36	-0.7836	-0.5232	-1.0590	-0.6248	-	-	-	-					weak	moderate	moderate	moderate
			12	0.1981	-0.1321	-0.1362	0.0191	+	-	-	+								
2004	EBITDA	12 months	24	-0.5630	-0.5853	-0.7277	-0.4844	-	-	-	-					weak	weak		
			36	-0.2358	-0.7778	-0.9116	-0.8914	-	-	-	-						moderate	moderate	strong
			12	-0.0501	-0.0979	-0.0908	0.1719	-	-	-	+				*		weak		weak
2004	EBITDA	24 months	24	0.1798	-0.1785	-0.3074	-0.1173	+	-	-	-						weak		
			36	-0.1087	-0.1976	-0.1898	-0.3482	-	-	-	-						weak		moderate
			12	-0.0261	-0.1343	-0.0611	0.0650	-	-	-	+						weak		
2005	EBITDA	12 months	24	0.0063	0.0048	-0.3407	-0.0995	+	+	-	-								
			36	-0.0386	-0.0749	-0.1295	-0.1584	-	-	-	-								
			12	0.0510	-0.1534	-0.0342	-0.2975	+	-	-	-						weak		moderate
2005	EBITDA	24 months	24	-0.0079	-0.2415	-0.0941	-0.8932	-	-	-	-						moderate		strong
			36	-0.4792	-0.3431	-0.8337	-0.6422	-	-	-	-					moderate	moderate	strong	strong
			12	-0.2871	0.4820	-0.5922	0.3547	-	+	-	+		*			moderate	weak	strong	weak
2006	EBITDA	12 months	24	-0.1167	0.2309	-0.5372	0.1453	-	+	-	+					weak		strong	
			36	-0.4201	-0.3844	-0.8444	-0.7550	-	-	-	-					moderate	moderate	strong	strong
			12	-0.0033	-0.0913	-0.6618	-0.9377	-	-	-	-						weak	strong	strong
2006	EBITDA	24 months	24	-0.4033	0.0280	-1.0128	-0.0203	-	+	-	-					moderate		strong	
			36	-0.5284	-0.2059	-0.8881	-0.3523	-	-	-	-					strong	weak	strong	weak
			12	-0.1242	-0.1060	-1.0821	-1.8140	-	-	-	-					weak	weak	strong	strong
2007	EBITDA	12 months	24	-0.0090	-0.2389	-0.0317	-0.9040	-	-	-	-						moderate		strong
			36	-0.3786	-0.2069	-0.5673	-0.4129	-	-	-	-					weak	weak	moderate	moderate
			12	-0.5794	-0.2606	-1.1315	-0.4004	-	-	-	-					strong	weak	strong	moderate
2007	EBITDA	24 months	24	-0.5340	-0.4130	-0.6673	-0.5012	-	-	-	-					moderate	moderate	strong	moderate
			36	-0.7614	-0.6540	-0.8286	-0.8815	-	-	-	-					moderate	strong	moderate	strong
			12	-0.4767	0.2225	-0.7402	-0.0013	-	+	-	-					moderate		strong	
2008	EBITDA	12 months	24	-0.3801	-0.0104	-0.4671	0.0600	-	-	-	+					weak		weak	
			36	-0.5244	0.0168	-0.5954	-0.0781	-	+	-	-					weak		moderate	
			12	0.2583	-0.0803	0.2368	-0.1741	+	-	+	-					weak	weak	weak	weak
2008	EBITDA	24 months	24	0.2070	-0.1145	0.0169	-0.2277	+	-	+	-								weak
			36	0.0000	0.0000	0.0000	0.0000												
			12	-0.0049	0.1285	0.0181	0.2521	-	+	+	+				*		weak		moderate
2009	EBITDA	12 months	24	-0.0641	0.3553	-0.1437	0.3357	-	+	-	+		*		*		weak	weak	weak
			36	0.0000	0.0000	0.0000													
			12	0.0412	0.0006	-0.0751	-0.3731	+	+	-	-								strong
2009	EBITDA	24 months	24	0.0000	0.0000	0.0000	0.0000												
			36	0.0000	0.0000	0.0000	0.0000												
2010	EBITDA	12 months	12	-0.1857	0.0667	-0.6447	-0.0386	-	+	-	-					weak		strong	
			24	0.0000	0.0000	0.0000	0.0000												
			36	0.0000	0.0000	0.0000	0.0000												

Figure 5.4 shows the above market returns for quintile 1 using ROE, OPCF, and EBITDA momentum respectively over a 12 month review period. In this graph, the pattern indicates ROE momentum to be a better strategy.

Figure 5.5 shows the above market returns for quintile 1 using ROE, OPCF, and EBITDA momentum respectively over a 24 month review period. Despite ROE momentum not matching the returns generated by OPCF momentum during 1999 – 2001, ROE momentum continued to outperform the other strategies for the rest of the period.

Figure 5.6 shows the above market returns for quintile 5 using ROE, OPCF, and EBITDA momentum respectively over a 12 month review period. In this portfolio the pattern shows OPCF momentum performed much better over the 12 year period relative to the other fundamentals.

Figure 5.7 shows the above market returns for quintile 5 using ROE, OPCF, and EBITDA momentum respectively over a 24 month review period.

Whilst the results show OPCF and ROE momentum being the better strategy in some of the periods, the pattern indicates that the strategy of fundamental momentum worked up until 2003, after which beating the market became negligible. Based on this observation, the null hypothesis could not be rejected.

Figure 5.4: Portfolio Performance of quintile 1 using a fundamental momentum investment strategy over a 12 month review period

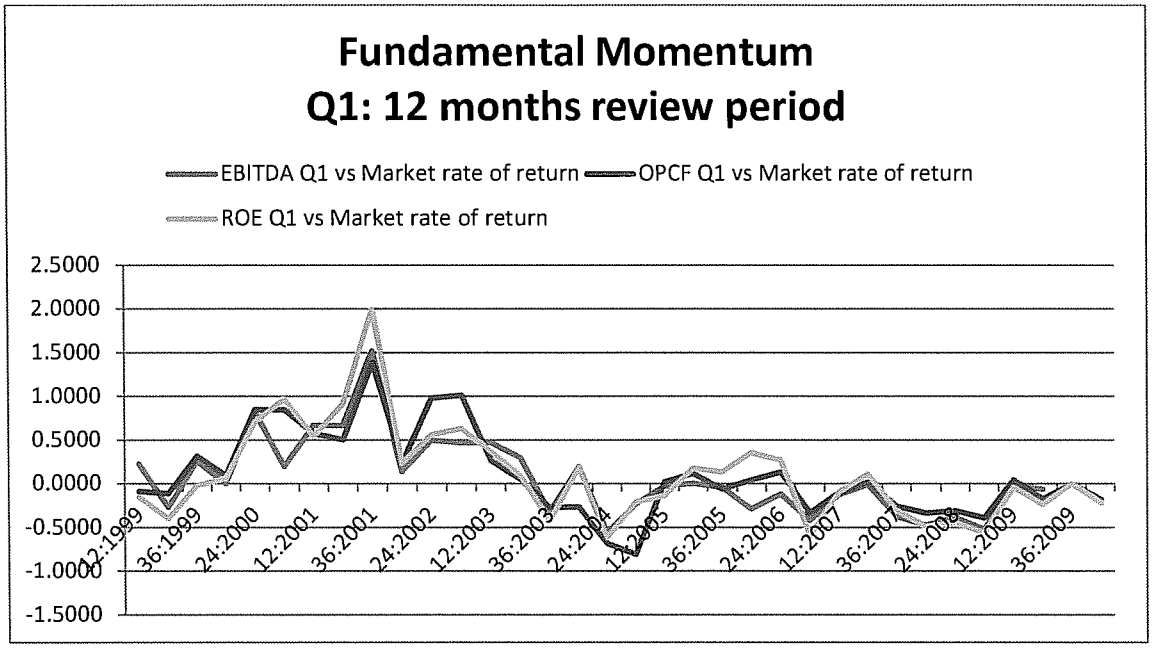


Figure 5.5: Portfolio Performance of quintile 1 using a fundamental momentum investment strategy over a 24 month review period

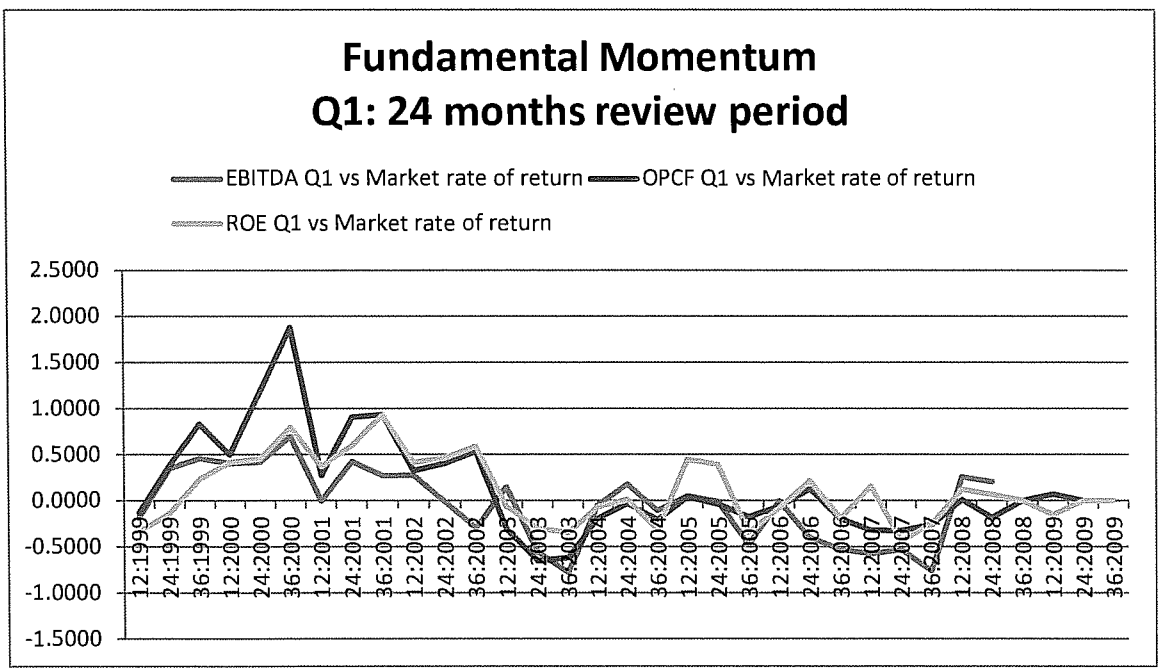


Figure 5.6: Portfolio Performance of quintile 5 using a fundamental momentum investment strategy over a 12 month review period

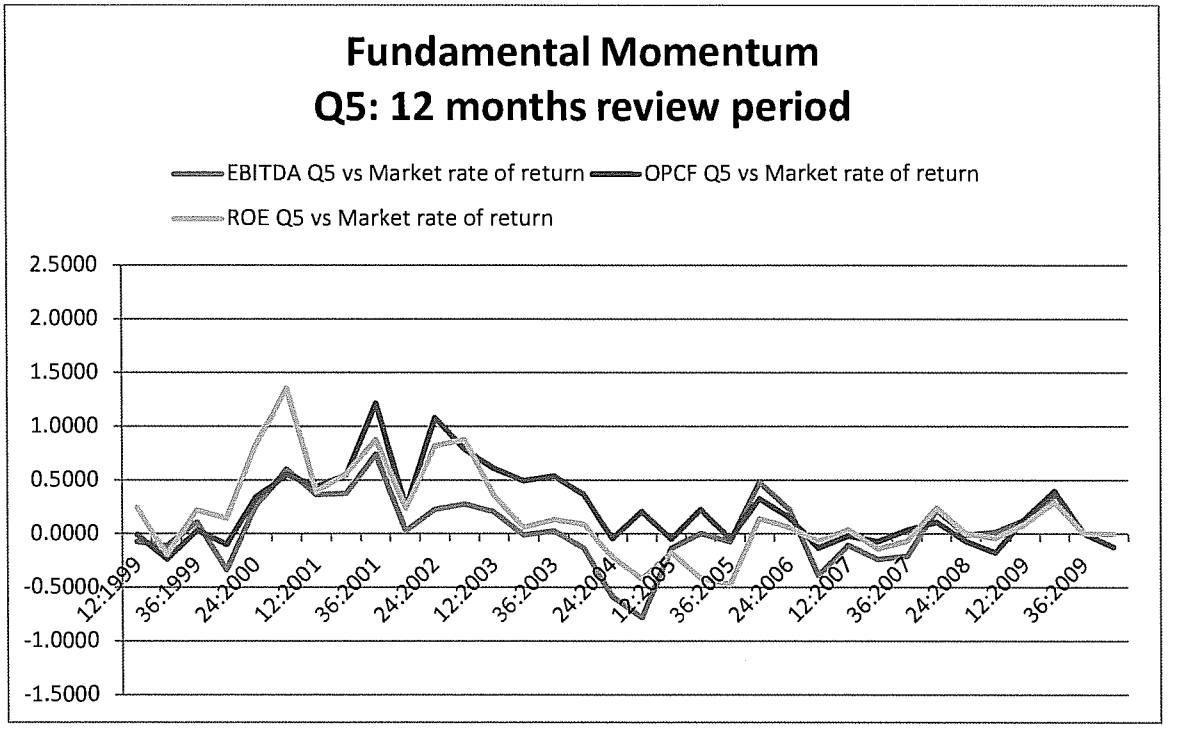
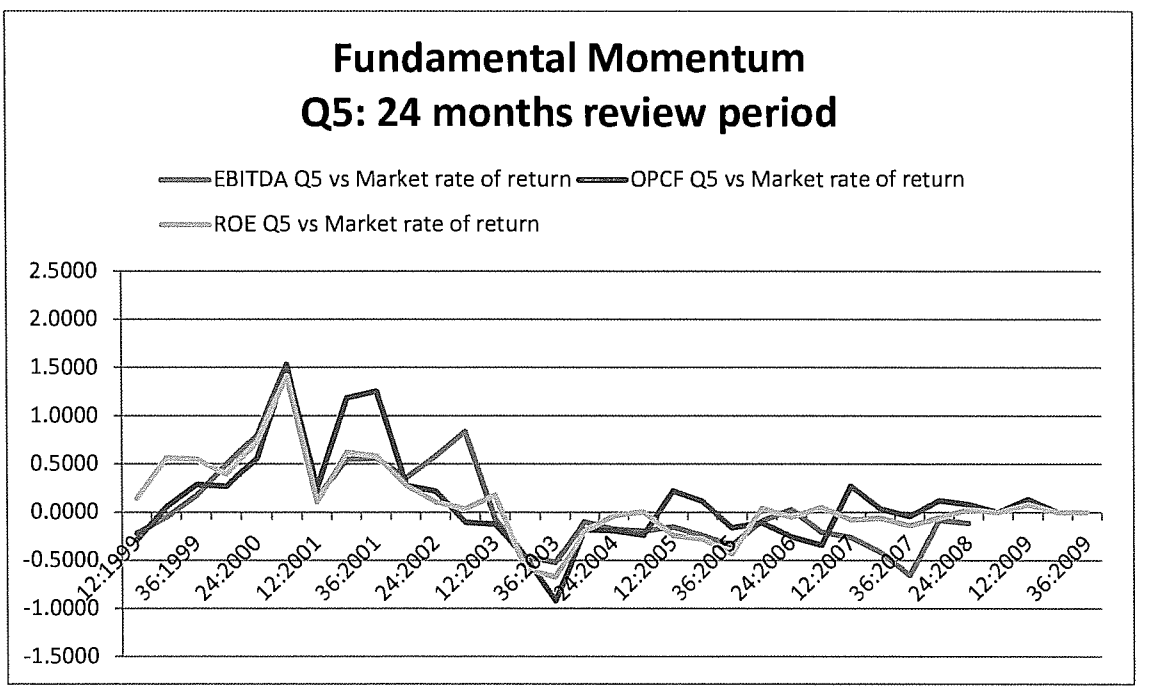


Figure 5.7: Portfolio Performance of quintile 5 using a fundamental momentum investment strategy over a 24 month review period



5.5 RESEARCH RESULTS FOR HYPOTHESIS 3

H_0: Average returns in portfolio 5 (ROE and price momentum) = Average market returns

H_1: Average returns in portfolio 5 (ROE and price momentum) > Average market returns

H_0: Average returns in portfolio 6 (OPCF and price momentum) = Average market returns

H_1: Average returns in portfolio 6 (OPCF and price momentum) > Average market returns

H_0: Average returns in portfolio 7 (EBITDA and price momentum) = Average market returns

H_1: Average returns in portfolio 7 (EBITDA and price momentum) > Average market returns

To test hypothesis 3, an independent –samples t-test was conducted to compare mean returns in the "lose lose" portfolio to the "win win" portfolio using combinations of fundamental and price momentum. These combinations were:

- 12 month ROE momentum with 6 month price momentum
- 12 month OPCF momentum with 6 month price momentum
- 12 month EBITDA momentum with 6 month price momentum
- 24 month ROE momentum with 12 month price momentum
- 24 month OPCF momentum with 12 month price momentum
- 24 month EBITDA momentum with 12 month price momentum

The t-tests were adjusted for when the variances were significantly different. The results end in 2010 after the first 12 month holding period due to insufficient information available at the time.

Table 5.15 shows the mean returns per portfolio using a 12 month ROE momentum and 6 month price momentum review period. Each portfolio was held over a 12, 24 and 36 month period. There were 4 significant differences between the means of the "lose lose" and "win win" portfolios out of 33 observations tested at an alpha level of 0.05.

Table 5.16 shows the mean returns per portfolio using a 12 month OPCF momentum and 6 month price momentum review period. Each portfolio was held over a 12, 24 and 36 month period. There were 4 significant differences between the means of the "lose lose" and "win win" portfolios out of 33 observations tested at an alpha level of 0.05.

Table 5.17 shows the mean returns per portfolio using a 12 month EBITDA momentum and 6 month price momentum review period. Each portfolio was held over a 12, 24 and 36 month period. There were 8 significant differences between the means of the "lose lose" and "win win" portfolios out of 33 observations tested at an alpha level of 0.05.

Table 5.18 shows the mean returns per portfolio using a 24 month ROE momentum and 12 month price momentum review period. Each portfolio was held over a 12, 24 and 36 month period. There were 2 significant differences between the means of the "lose lose" and "win win" portfolios out of 30 observations tested at an alpha level of 0.05.

Table 5.19 shows the mean returns per portfolio using a 24 month OPCF momentum and 12 month price momentum review period. Each portfolio was held over a 12, 24 and 36 month period. There were 5 significant differences between the means of the "lose lose" and "win win" portfolios out of 30 observations tested at an alpha level of 0.05.

Table 5.20 shows the mean returns per portfolio using a 24 month EBITDA momentum and 12 month price momentum review period. Each portfolio was held over a 12, 24 and 36 month period. There were 6 significant differences between the means of the "lose lose" and "win win" portfolios out of 30 observations tested at an alpha level of 0.05.

Table 5.15: Statistical significance for 12 month ROE momentum combined with 6 month price momentum in Stage 3 using a 12, 24 and 36 month review period

Period	Fundamental variable	Review period	Hold months	Mean loselose	Mean winwin	t-value	df	p	Std.Dev. loselose	Std.Dev. winwin	Sig loselose vs winwin (α = 0.05)
1999	ROE 12	12: 6 months	12	-0.14993	0.215555	-0.80763	15.86199	0.215625	0.445784	1.784868	
	ROE 12	12: 6 months	24	0.127777	-0.02072	0.795766	47.07421	0.215081	0.855642	0.471711	
	ROE 12	12: 6 months	36	0.431631	0.220547	0.899322	44.79232	0.186646	1.032257	0.627969	
2000	ROE 12	12: 6 months	12	0.117333	0.424531	-1.49039	53	0.071024	0.564399	0.325201	
	ROE 12	12: 6 months	24	0.402315	0.887966	-1.2921	53	0.100964	0.996962	0.883636	
	ROE 12	12: 6 months	36	0.711213	1.330669	-1.34773	53	0.091739	1.217273	1.094414	
2001	ROE 12	12: 6 months	12	0.243978	0.308815	-0.37517	57.95003	0.354452	0.808403	0.545956	
	ROE 12	12: 6 months	24	0.418681	0.628558	-1.21249	60	0.11504	0.767121	0.550561	
	ROE 12	12: 6 months	36	1.183701	1.583763	-0.85149	59	0.19897	2.022341	1.568285	
2002	ROE 12	12: 6 months	12	0.231816	0.313127	-0.58935	60	0.278921	0.606067	0.476278	
	ROE 12	12: 6 months	24	0.76375	1.132592	-1.09764	60	0.138373	1.250933	1.38568	
	ROE 12	12: 6 months	36	1.688617	1.655806	0.0598	60	0.476257	2.44064	1.857318	
2003	ROE 12	12: 6 months	12	0.575252	0.556164	0.08716	40.17804	0.46549	1.03754	0.593469	
	ROE 12	12: 6 months	24	1.185523	1.046628	0.32519	36.87533	0.373436	2.077684	1.022503	
	ROE 12	12: 6 months	36	1.34136	1.935974	-1.09521	63	0.138796	2.543571	1.835567	
2004	ROE 12	12: 6 months	12	0.499896	0.34269	0.488361	25.28516	0.314751	1.539466	0.413056	
	ROE 12	12: 6 months	24	0.478478	0.693302	-0.52211	26.33472	0.302978	1.883612	0.725343	
	ROE 12	12: 6 months	36	0.994336	0.692932	0.483303	27.61062	0.316346	2.818516	1.234279	
2005	ROE 12	12: 6 months	12	-0.0912	0.21034	-1.80044	22.47114	0.042616	0.661043	0.398126	*
	ROE 12	12: 6 months	24	0.129442	0.335928	-0.50078	19.88577	0.311012	1.680911	0.740162	
	ROE 12	12: 6 months	36	-0.16498	-0.05661	-0.33928	20.9397	0.368888	1.284727	0.658995	
2006	ROE 12	12: 6 months	12	0.1728	0.255521	-0.25805	21.20324	0.39943	1.339812	0.522853	
	ROE 12	12: 6 months	24	0.14411	-0.14821	0.89209	20.72396	0.191294	1.377799	0.496222	
	ROE 12	12: 6 months	36	-0.294	-0.00702	-1.41054	49	0.082348	0.782129	0.642824	
2007	ROE 12	12: 6 months	12	-0.20257	-0.28494	0.938061	48	0.176455	0.30058	0.313977	
	ROE 12	12: 6 months	24	0.17689	-0.17482	0.987719	23.81695	0.16661	1.617037	0.471519	
	ROE 12	12: 6 months	36	0.177512	0.063196	0.497112	48	0.31069	0.890295	0.736027	
2008	ROE 12	12: 6 months	12	-0.05604	0.201016	-2.83327	44.15254	0.00346	0.482817	0.218157	*
	ROE 12	12: 6 months	24	0.163937	0.576485	-1.81681	62	0.03704	0.736161	0.708316	*
	ROE 12	12: 6 months	36	0.066369	0.661988	-2.21411	62	0.015254	0.863345	0.876151	*
2009	ROE 12	12: 6 months	12	0.17503	0.19798	-0.17481	40	0.431058	0.420835	0.413015	
	ROE 12	12: 6 months	24	0.0521	0.33164	-1.29617	40	0.101173	0.627881	0.765064	
2010	ROE 12	12: 6 months	12	-0.03665	-0.01532	-0.22549	25.89997	0.411683	0.242546	0.303689	

Table 5.16: Statistical significance for 12 month OPCF momentum combined with 6 month price momentum in Stage 3 using a 12, 24 and 36 month review period

Period	Fundamental variable	Review period	Hold months	Mean loselose	Mean winwin	t-value	df	p	Std.Dev. loselose	Std.Dev. winwin	Sig loselose vs winwin (α = 0.05)
1999	OPCF 12	12: 6 months	12	-0.17344	-0.17084	-0.02582	56.05287	0.489748	0.464784	0.312296	
	OPCF 12	12: 6 months	24	0.105385	-0.00807	0.548706	58	0.292657	0.856635	0.71633	
	OPCF 12	12: 6 months	36	0.460991	0.142365	1.20833	58	0.115912	1.111736	0.884443	
2000	OPCF 12	12: 6 months	12	0.211687	0.330195	-0.54588	59	0.293605	0.752019	0.553368	
	OPCF 12	12: 6 months	24	0.590314	0.684498	-0.29471	59	0.384624	1.086193	0.908403	
	OPCF 12	12: 6 months	36	1.008921	1.153906	-0.34291	59	0.366442	1.422643	1.260959	
2001	OPCF 12	12: 6 months	12	0.371366	0.326852	0.257202	49.23512	0.399048	0.81204	0.465898	
	OPCF 12	12: 6 months	24	0.580112	0.769497	-0.85811	54	0.197314	0.686001	0.963572	
	OPCF 12	12: 6 months	36	1.382641	1.747048	-0.69787	53	0.244154	1.827985	2.042819	
2002	OPCF 12	12: 6 months	12	0.216066	0.34146	-0.90448	66	0.184515	0.597885	0.54407	
	OPCF 12	12: 6 months	24	0.832641	1.165715	-0.90164	66	0.185264	1.259787	1.747197	
	OPCF 12	12: 6 months	36	1.666754	1.459188	0.443332	53.63696	0.329655	2.344964	1.377207	
2003	OPCF 12	12: 6 months	12	0.546624	0.691668	-0.7838	55.73149	0.218238	0.933308	0.547191	
	OPCF 12	12: 6 months	24	1.107841	1.21282	-0.28779	47.40153	0.38738	1.915876	0.896231	
	OPCF 12	12: 6 months	36	1.156971	1.952715	-1.64244	55.32607	0.053086	2.386276	1.466954	
2004	OPCF 12	12: 6 months	12	0.560718	0.525933	0.101611	65	0.459689	1.489382	1.270083	
	OPCF 12	12: 6 months	24	0.515074	0.763271	-0.68233	27.23712	0.250397	1.706225	0.67198	
	OPCF 12	12: 6 months	36	0.933803	1.051945	-0.21325	33.12018	0.416219	2.4612	1.495037	
2005	OPCF 12	12: 6 months	12	-0.02513	0.344612	-1.98048	21.67081	0.030242	0.743767	0.379817	*
	OPCF 12	12: 6 months	24	-0.16993	0.564593	-2.23317	51	0.014977	1.387831	0.982823	*
	OPCF 12	12: 6 months	36	-0.47632	-0.01536	-2.32495	51	0.012046	0.739081	0.654041	*
2006	OPCF 12	12: 6 months	12	-0.05444	0.178179	-0.91559	27.43388	0.183931	1.070247	0.574626	
	OPCF 12	12: 6 months	24	-0.1639	-0.31942	0.625407	24.19346	0.26878	1.084781	0.437543	
	OPCF 12	12: 6 months	36	-0.29648	-0.16857	-0.69566	51	0.2449	0.732674	0.593571	
2007	OPCF 12	12: 6 months	12	-0.25975	-0.31016	0.561076	53	0.288555	0.355273	0.308396	
	OPCF 12	12: 6 months	24	-0.02648	-0.16344	0.482371	31.81097	0.316423	1.43904	0.423926	
	OPCF 12	12: 6 months	36	-0.08728	0.044704	-0.7425	53	0.230531	0.623282	0.694163	
2008	OPCF 12	12: 6 months	12	-0.02178	0.212968	-1.32503	49	0.095653	0.485626	0.258834	
	OPCF 12	12: 6 months	24	0.208406	0.588205	-1.24798	49	0.108985	0.785695	0.818005	
	OPCF 12	12: 6 months	36	0.171651	0.670762	-1.37916	49	0.087054	0.929932	0.997537	
2009	OPCF 12	12: 6 months	12	0.20721	0.30429	-0.68959	42	0.247123	0.526746	0.35953	
	OPCF 12	12: 6 months	24	-0.03957	0.46678	-2.35453	42	0.011649	0.688101	0.730513	*
2010	OPCF 12	12: 6 months	12	-0.08388	-0.01602	-0.58382	34.24658	0.281586	0.209695	0.518789	

Table 5.17: Statistical significance for 12 month EBITDA momentum combined with 6 month price momentum in Stage 3 using a 12, 24 and 36 month review period

Period	Fundamental variable	Review period	Hold months	Mean loselose	Mean winwin	t-value	df	p	Std.Dev. loselose	Std.Dev. winwin	Sig loselose vs winwin (α = 0.05)
1999	EBITDA 1	12: 6 months	12	-0.12882	-0.13755	0.081577	60	0.467628	0.428208	0.412287	
	EBITDA 1	12: 6 months	24	0.13885	0.100973	0.153831	60	0.43913	0.864106	1.039999	
	EBITDA 1	12: 6 months	36	0.442785	0.213414	0.858716	60	0.196958	1.098918	1.0019	
2000	EBITDA 1	12: 6 months	12	0.36931	0.382781	-0.06514	56	0.474147	0.85703	0.577006	
	EBITDA 1	12: 6 months	24	0.668768	0.793001	-0.43722	56	0.331815	1.129385	0.902222	
	EBITDA 1	12: 6 months	36	1.069582	1.438738	-0.90328	56	0.185124	1.441482	1.61829	
2001	EBITDA 1	12: 6 months	12	0.389484	0.315731	0.361904	36.86991	0.359745	0.904545	0.570736	
	EBITDA 1	12: 6 months	24	0.537337	0.756637	-0.95529	60	0.171633	0.739938	0.972318	
	EBITDA 1	12: 6 months	36	1.569065	1.722996	-0.29203	59	0.385644	2.263606	1.831714	
2002	EBITDA 1	12: 6 months	12	0.214695	0.315904	-0.78539	37.76713	0.218564	0.588007	0.402599	
	EBITDA 1	12: 6 months	24	0.739338	1.018286	-1.01259	73	0.1573	1.235475	1.079583	
	EBITDA 1	12: 6 months	36	1.333089	1.541815	-0.41441	36.12948	0.340511	2.328218	1.488139	
2003	EBITDA 1	12: 6 months	12	0.76824	0.554567	0.841159	26.54081	0.203887	1.161038	0.532994	
	EBITDA 1	12: 6 months	24	1.372372	1.079045	0.575798	24.15751	0.285039	2.305799	0.925585	
	EBITDA 1	12: 6 months	36	1.424765	1.877233	-0.69329	27.91222	0.246927	2.842903	1.676631	
2004	EBITDA 1	12: 6 months	12	0.607574	0.323816	0.856638	23.1837	0.200207	1.567799	0.377818	
	EBITDA 1	12: 6 months	24	0.673891	0.631582	0.100666	22.83467	0.460347	1.930098	0.604669	
	EBITDA 1	12: 6 months	36	1.255665	0.780366	0.740116	23.90134	0.233219	2.914827	1.145031	
2005	EBITDA 1	12: 6 months	12	-0.13156	0.29695	-2.57354	17.75894	0.009635	0.638171	0.366012	*
	EBITDA 1	12: 6 months	24	-0.45832	0.511497	-4.21014	73	0.000036	0.774584	0.827911	*
	EBITDA 1	12: 6 months	36	-0.47819	0.023565	-2.7366	73	0.003896	0.770373	0.615689	*
2006	EBITDA 1	12: 6 months	12	-0.36728	0.210225	-3.38033	65	0.000615	0.570865	0.548878	*
	EBITDA 1	12: 6 months	24	-0.36585	-0.26549	-0.62319	65	0.26767	0.69528	0.473074	
	EBITDA 1	12: 6 months	36	-0.49351	-0.15137	-1.77122	65	0.040607	0.697234	0.607781	*
2007	EBITDA 1	12: 6 months	12	-0.31013	-0.335	0.2624	56	0.396988	0.375676	0.293445	
	EBITDA 1	12: 6 months	24	0.00005	-0.20764	0.404192	14.46951	0.345991	1.973656	0.43154	
	EBITDA 1	12: 6 months	36	-0.2201	-0.02827	-0.92525	56	0.179404	0.778891	0.659674	
2008	EBITDA 1	12: 6 months	12	-0.20534	0.261881	-3.13864	45	0.001497	0.529452	0.326669	*
	EBITDA 1	12: 6 months	24	0.054345	0.604161	-2.12479	45	0.019566	0.868848	0.725582	*
	EBITDA 1	12: 6 months	36	-0.11057	0.681958	-2.7437	45	0.004347	0.947022	0.867789	*
2009	EBITDA 1	12: 6 months	12	0.18201	0.23699	-0.41319	42	0.340785	0.482526	0.39986	
	EBITDA 1	12: 6 months	24	0.11584	0.30757	-0.87755	42	0.192589	0.686571	0.740462	
2010	EBITDA 1	12: 6 months	12	-0.04635	0.112749	-1.24487	34.83757	0.110745	0.271037	0.512863	

Table 5.18: Statistical significance for 24 month ROE momentum combined with 12 month price momentum in Stage 3 using a 12, 24 and 36 month review period

Period	Fundamental variable	Review period	Hold months	Mean loselose	Mean winwin	t-value	df	p	Std.Dev. loselose	Std.Dev. winwin	Sig loselose vs winwin (α = 0.05)
1999	ROE 24	24: 12 months	12	0.114111	0.313146	-1.34551	50.37125	0.092244	0.747687	0.351714	
	ROE 24	24: 12 months	24	0.466145	0.655829	-0.63498	54	0.264062	1.073209	0.699445	
	ROE 24	24: 12 months	36	0.862228	0.963162	-0.23653	54	0.406957	1.520664	1.051913	
2000	ROE 24	24: 12 months	12	0.42333	0.32627	0.617325	62.73536	0.269627	0.892742	0.382227	
	ROE 24	24: 12 months	24	0.729097	0.804936	-0.27594	48.18925	0.391888	1.321148	0.839728	
	ROE 24	24: 12 months	36	1.737499	2.059987	-0.49343	63	0.311713	2.38377	2.286253	
2001	ROE 24	24: 12 months	12	0.348256	0.368056	-0.16566	63.27376	0.434476	0.591506	0.400359	
	ROE 24	24: 12 months	24	1.067319	1.226287	-0.54192	66.79609	0.294839	1.538848	0.910877	
	ROE 24	24: 12 months	36	1.560975	1.895536	-0.87415	67	0.192581	1.584391	1.369896	
2002	ROE 24	24: 12 months	12	0.48118	0.544523	-0.36673	56	0.357601	0.740863	0.572684	
	ROE 24	24: 12 months	24	0.76541	0.910482	-0.53782	55	0.296435	1.048837	0.984626	
	ROE 24	24: 12 months	36	1.254748	1.453627	-0.48996	55	0.313056	1.695388	1.369687	
2003	ROE 24	24: 12 months	12	0.660457	0.292954	1.116361	22.55533	0.13801	1.568926	0.22027	
	ROE 24	24: 12 months	24	0.772598	0.717402	0.137809	23.95873	0.445772	1.81642	0.613353	
	ROE 24	24: 12 months	36	0.837067	0.957876	-0.20842	28.62476	0.418191	2.504335	1.353993	
2004	ROE 24	24: 12 months	12	0.209291	0.224419	-0.08723	30.52352	0.46553	0.736888	0.503695	
	ROE 24	24: 12 months	24	0.470462	0.341803	0.35867	25.89143	0.361375	1.594352	0.785575	
	ROE 24	24: 12 months	36	-0.15455	-0.04914	-0.55664	67	0.289816	0.878398	0.656055	
2005	ROE 24	24: 12 months	12	0.343678	0.049999	0.88107	17.33536	0.195165	1.346813	0.424792	
	ROE 24	24: 12 months	24	0.228288	-0.23087	1.31457	17.42725	0.102846	1.409431	0.459414	
	ROE 24	24: 12 months	36	-0.36771	-0.02427	-1.76727	55	0.041365	0.694329	0.645628	*
2006	ROE 24	24: 12 months	12	-0.05834	-0.28988	2.26143	50	0.014057	0.23821	0.286484	*
	ROE 24	24: 12 months	24	0.409011	-0.10315	0.60719	8.09884	0.28018	2.522713	0.432855	
	ROE 24	24: 12 months	36	0.02162	0.092747	-0.26599	50	0.395672	1.014099	0.661562	
2007	ROE 24	24: 12 months	12	-0.10576	0.194623	-1.66562	20.00529	0.055687	0.701739	0.326705	
	ROE 24	24: 12 months	24	0.215014	0.457972	-0.91036	23.60383	0.185919	0.991143	0.634987	
	ROE 24	24: 12 months	36	0.133892	0.467857	-1.1024	45	0.138076	1.098352	0.937933	
2008	ROE 24	24: 12 months	12	0.26696	0.19439	0.4687	49	0.32068	0.467224	0.280944	
	ROE 24	24: 12 months	24	0.13763	0.55573	-1.55572	49	0.063106	0.71885	0.929875	
2009	ROE 24	24: 12 months	12	-0.13562	0.012172	-1.16385	42	0.125528	0.413322	0.340851	

Table 5.19: Statistical significance for 24 month OPCF momentum combined with 12 month price momentum in Stage 3 using a 12, 24 and 36 month review period

Period	Fundamental variable	Review period	Hold months	Mean loselose	Mean winwin	t-value	df	p	Std.Dev. loselose	Std.Dev. winwin	Sig loselose vs winwin (α = 0.05)
1999	OPCF 24	24: 12 months	12	0.142692	0.147497	-0.03365	50.7434	0.486643	0.627604	0.411081	
	OPCF 24	24: 12 months	24	0.483887	0.435647	0.194586	48.33632	0.423267	1.157966	0.632889	
	OPCF 24	24: 12 months	36	0.686822	0.869241	-0.50365	51	0.308337	1.440869	1.064733	
2000	OPCF 24	24: 12 months	12	0.497473	0.19696	2.077111	60.3927	0.021026	0.905434	0.264158	*
	OPCF 24	24: 12 months	24	0.817433	0.699496	0.521935	64.98538	0.301745	1.309443	0.539934	
	OPCF 24	24: 12 months	36	1.839617	1.947882	-0.18151	64	0.428272	2.35152	1.899705	
2001	OPCF 24	24: 12 months	12	0.254363	0.30334	-0.33203	61	0.370503	0.577723	0.537904	
	OPCF 24	24: 12 months	24	0.777399	0.929123	-0.55063	61	0.291951	1.122555	0.916762	
	OPCF 24	24: 12 months	36	1.186686	1.56455	-0.91103	61	0.182933	1.547272	1.649748	
2002	OPCF 24	24: 12 months	12	0.48607	0.545678	-0.30405	56	0.381107	0.739009	0.745324	
	OPCF 24	24: 12 months	24	0.816199	0.958837	-0.5495	55	0.292445	0.973993	0.9713	
	OPCF 24	24: 12 months	36	0.913658	1.408725	-1.43277	55	0.078792	1.35019	1.249649	
2003	OPCF 24	24: 12 months	12	0.781092	0.287297	1.203561	26.52931	0.119695	2.121108	0.229238	
	OPCF 24	24: 12 months	24	0.404866	0.601461	-0.53937	29.6941	0.296827	1.723166	0.660692	
	OPCF 24	24: 12 months	36	0.696872	0.693146	0.006847	33.39678	0.497289	2.485476	1.231507	
2004	OPCF 24	24: 12 months	12	0.165429	0.295007	-0.71737	21.09929	0.240507	0.756125	0.33405	
	OPCF 24	24: 12 months	24	0.53798	0.453128	0.194387	20.36716	0.423899	1.844038	0.71354	
	OPCF 24	24: 12 months	36	0.060769	0.017758	0.135569	22.2773	0.44669	1.309319	0.677428	
2005	OPCF 24	24: 12 months	12	0.080896	0.097354	-0.05734	18.40712	0.477445	1.141898	0.457923	
	OPCF 24	24: 12 months	24	-0.05827	-0.25848	0.67546	18.02356	0.25398	1.185773	0.436527	
	OPCF 24	24: 12 months	36	-0.43382	-0.08507	-2.01644	51	0.024518	0.613367	0.562665	*
2006	OPCF 24	24: 12 months	12	-0.00915	-0.3844	3.579394	50	0.000389	0.309616	0.32098	*
	OPCF 24	24: 12 months	24	0.322611	-0.26769	0.938911	11.30896	0.183699	2.162848	0.4668	
	OPCF 24	24: 12 months	36	0.077546	-0.16938	1.085798	50	0.141388	0.877889	0.628241	
2007	OPCF 24	24: 12 months	12	-0.21183	0.42637	-2.26529	39.81147	0.014504	0.647255	1.228291	*
	OPCF 24	24: 12 months	24	0.169055	0.435471	-0.80896	15.98847	0.215206	1.102498	0.691872	
	OPCF 24	24: 12 months	36	-0.05934	0.351165	-1.34158	43	0.093388	1.051117	0.879153	
2008	OPCF 24	24: 12 months	12	0.17462	0.18526	-0.10259	37.73763	0.459415	0.483527	0.242539	
	OPCF 24	24: 12 months	24	0.02245	0.48782	-2.14352	50	0.01848	0.588165	0.866722	*
2009	OPCF 24	24: 12 months	12	-0.16238	-0.0277	-1.49753	51	0.07021	0.355301	0.27872	

Table 5.20: Statistical significance for 24 month EBITDA momentum combined with 12 month price momentum in Stage 3 using a 12, 24 and 36 month review period

Period	Fundamental variable	Review period	Hold months	Mean loselose	Mean winwin	t-value	df	p	Std.Dev. loselose	Std.Dev. winwin	Sig loselose vs winwin (α = 0.05)
1999	EBITDA 2	24: 12 months	12	0.173395	0.133322	0.224367	42.04946	0.41178	0.902717	0.396443	
	EBITDA 2	24: 12 months	24	0.610446	0.487529	0.458681	50.82202	0.32421	1.248689	0.776154	
	EBITDA 2	24: 12 months	36	0.791246	0.879816	-0.26254	51.56098	0.396974	1.55852	0.99633	
2000	EBITDA 2	24: 12 months	12	0.43002	0.24817	1.09645	51.01205	0.139016	0.889788	0.413476	
	EBITDA 2	24: 12 months	24	0.657786	0.767061	-0.40231	60.18602	0.344442	1.343366	0.856234	
	EBITDA 2	24: 12 months	36	1.742638	1.74418	-0.00273	65	0.498916	2.562108	1.964994	
2001	EBITDA 2	24: 12 months	12	0.207775	0.330423	-0.93136	54	0.177907	0.542184	0.437722	
	EBITDA 2	24: 12 months	24	0.947289	1.169756	-0.54561	47.47639	0.293943	1.786127	1.210257	
	EBITDA 2	24: 12 months	36	1.217097	1.880558	-1.53976	46.93899	0.065167	1.248456	1.892661	
2002	EBITDA 2	24: 12 months	12	0.474868	0.550089	-0.40082	65	0.344932	0.888619	0.632556	
	EBITDA 2	24: 12 months	24	0.737015	1.05614	-1.14022	65	0.12919	1.149398	1.0548	
	EBITDA 2	24: 12 months	36	0.808726	1.792897	-2.29204	65	0.012576	1.645496	1.680582	*
2003	EBITDA 2	24: 12 months	12	1.021757	0.323245	1.169984	17.11729	0.12902	2.528617	0.239859	
	EBITDA 2	24: 12 months	24	0.74434	0.729251	0.029522	17.02056	0.488396	2.074857	0.613067	
	EBITDA 2	24: 12 months	36	0.848224	1.0625	-0.29467	19.08757	0.385715	2.866652	1.460656	
2004	EBITDA 2	24: 12 months	12	0.203337	0.224426	-0.12774	25.79532	0.449671	0.734745	0.413503	
	EBITDA 2	24: 12 months	24	0.666222	0.399885	0.705518	23.49603	0.243712	1.721136	0.703678	
	EBITDA 2	24: 12 months	36	0.089932	-0.00118	0.334086	25.11831	0.370544	1.222161	0.63863	
2005	EBITDA 2	24: 12 months	12	0.277927	0.142873	0.39679	18.41221	0.348042	1.415351	0.50535	
	EBITDA 2	24: 12 months	24	0.121093	-0.21688	1.00841	18.24208	0.163223	1.396938	0.468131	
	EBITDA 2	24: 12 months	36	-0.43643	-0.07898	-2.09629	71	0.019811	0.661883	0.601701	*
2006	EBITDA 2	24: 12 months	12	-0.06563	-0.35121	2.76087	63	0.003771	0.253581	0.276419	*
	EBITDA 2	24: 12 months	24	-0.41486	-0.20668	-1.22057	63	0.113399	0.540022	0.439471	
	EBITDA 2	24: 12 months	36	-0.22568	-0.02033	-0.81787	63	0.208258	0.739106	0.655163	
2007	EBITDA 2	24: 12 months	12	-0.55898	0.290105	-3.98792	17.63796	0.000447	0.422949	1.01412	*
	EBITDA 2	24: 12 months	24	-0.37158	0.386651	-2.67186	57	0.004909	0.798135	0.693082	*
	EBITDA 2	24: 12 months	36	-0.57875	0.398418	-2.67723	57	0.00484	0.709973	0.92698	*
2008	EBITDA 2	24: 12 months	12	0.3606	0.13294	1.47788	26.69193	0.075572	0.621089	0.249409	
	EBITDA 2	24: 12 months	24	0.06667	0.20955	-0.56146	31.06506	0.289257	0.937763	0.539519	
2009	EBITDA 2	24: 12 months	12	-0.08967	0.016149	-0.81091	33.00535	0.211613	0.597213	0.267987	

Further, we tested for the difference between the means and risk adjusted means of both portfolios relative to the market returns for each combination. Risk adjusted returns in this case was calculated using the Sharpe ratio. The average 10 year South African government bond rate was used as a proxy for the risk free rate.

Table 5.21 shows the difference between each portfolio's mean and risk adjusted mean return relative to the market based on stocks with a 12 month ROE momentum and a 6 month price momentum.

From 33 observations for the "win win" portfolio, 19 had beaten the market, 11 of which were significant positive differences at an alpha level of 0.05, and 3 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, the "win win" portfolio had still beaten the market 19 times, of which 11 were significant positive differences at an alpha level of 0.05, and 6 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.22 shows the difference between each portfolios mean and adjusted mean return relative to the market based on stocks with a 12 month OPCF momentum and a 6 month price momentum.

From 33 observations for the "win win" portfolio, 19 had beaten the market, 13 of which were significant positive differences at an alpha level of 0.05, and 3 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, the "win win" portfolio had still beaten the market 19 times, of which 10 were significant positive differences at an alpha level of 0.05, and 3 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.23 shows the difference between each portfolios mean and adjusted mean return relative to the market based on stocks with a 12 month EBITDA momentum and a 6 month price momentum.

From 33 observations for the "win win" portfolio, 19 had beaten the market, 11 of which were significant positive differences at an alpha level of 0.05, and 1 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, the "win win" portfolio had still beaten the market 20 times, of which 12 were

significant positive differences at an alpha level of 0.05, and 3 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.24 shows the difference between each portfolios mean and adjusted mean return relative to the market based on stocks with a 24 month ROE momentum and a 12 month price momentum.

From 30 observations for the "win win" portfolio, 15 had beaten the market, 9 of which were significant positive differences at an alpha level of 0.05, and 4 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, the "win win" portfolio still beaten the market 17 times, of which 10 were significant positive differences at an alpha level of 0.05, and 9 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.25 shows the difference between each portfolio's mean and adjusted mean return relative to the market based on stocks with a 24 month OPCF momentum and a 12 month price momentum.

From 30 observations for the "win win" portfolio, 14 had beaten the market, 8 of which were significant positive differences at an alpha level of 0.05, and 3 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, the "win win" portfolio had still beaten the market 14 times, of which 11 were significant positive differences at an alpha level of 0.05, and 5 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.26 shows the difference between each portfolios mean and adjusted mean return relative to the market based on stocks with a 24 month EBITDA momentum and a 12 month price momentum.

From 30 observations for the "win win" portfolio, 14 had beaten the market, 10 of which were significant positive differences at an alpha level of 0.05, and 2 of these showed strength of the phenomenon with an effect size greater than or equal to 0.8. After adjusting returns for risk using the Sharpe ratio, the "win win" portfolio had still beaten the market 13 times, of which 9 were significant positive differences at an alpha level of 0.05, and 5 of these showed strength of the phenomenon with an effect size greater than or equal to 0.08.

Table 5.21: Portfolio performance for 12 month ROE momentum combined with 6 month price momentum in Stage 3 using a 12, 24 and 36 month review period

				Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Fundamental variable	Review period	Hold months	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market rate of
1999	ROE 12	12: 6 months	12	-0.12684	0.238637	-0.61153	0.069349	-	+	-	+					weak		strong	
	ROE 12	12: 6 months	24	-0.12342	-0.27192	-0.2429	-0.55096	-	-	-	-						moderate	weak	strong
	ROE 12	12: 6 months	36	0.321543	0.110459	0.196079	0.057053	+	+	+	+	*				weak			
2000	ROE 12	12: 6 months	12	-0.16342	0.143774	-0.26489	0.691417	-	+	-	+				*	weak	weak	weak	strong
	ROE 12	12: 6 months	24	0.265999	0.75165	0.160005	0.747613	+	+	+	+	*	*		*	weak	strong		strong
	ROE 12	12: 6 months	36	0.438939	1.058395	0.229308	0.851632	+	+	+	+	*	*		*	weak	strong		moderate
2001	ROE 12	12: 6 months	12	0.356755	0.421592	0.284189	0.485347	+	+	+	+	*	*	*	*	weak	moderate	weak	strong
	ROE 12	12: 6 months	24	0.425304	0.635181	0.426238	0.972497	+	+	+	+	*	*	*	*	moderate	strong	moderate	strong
	ROE 12	12: 6 months	36	0.973268	1.37333	0.328539	0.739679	+	+	+	+	*	*		*	weak	strong		weak
2002	ROE 12	12: 6 months	12	0.112168	0.193479	0.117378	0.352691	+	+	+	+		*		*		weak		moderate
	ROE 12	12: 6 months	24	0.399456	0.768298	0.176006	0.389647	+	+	+	+	*	*			weak	moderate		weak
	ROE 12	12: 6 months	36	0.737974	0.705163	-0.29311	-0.10427	+	+	-	-		*			weak	weak		
2003	ROE 12	12: 6 months	12	0.356749	0.337661	0.251525	0.571066	+	+	+	+	*	*		*	weak	moderate	weak	strong
	ROE 12	12: 6 months	24	0.44333	0.304435	-0.21089	0.201556	+	+	-	+		*			weak	weak		
	ROE 12	12: 6 months	36	-0.05728	0.537334	-0.90278	-0.38758	-	+	-	-		*				weak	weak	weak
2004	ROE 12	12: 6 months	12	0.070115	-0.08709	-0.15424	0.216586	+	-	-	+				*		weak		moderate
	ROE 12	12: 6 months	24	-0.49004	-0.27521	-0.75503	-0.11797	-	-	-	-					weak	weak	weak	
	ROE 12	12: 6 months	36	-0.29359	-0.59499	-0.9625	-0.78899	-	-	-	-						weak	weak	moderate
2005	ROE 12	12: 6 months	12	-0.468	-0.16645	-0.63128	-0.04194	-	-	-	-					moderate	weak	strong	
	ROE 12	12: 6 months	24	-0.47075	-0.26427	-0.56948	-0.25146	-	-	-	-					weak	weak	weak	weak
	ROE 12	12: 6 months	36	-0.35356	-0.24519	-0.38046	-0.39819	-	-	-	-					weak	weak	weak	moderate
2006	ROE 12	12: 6 months	12	0.010539	0.09326	-0.09195	0.176123	+	+	-	+				*				weak
	ROE 12	12: 6 months	24	0.280814	-0.01151	0.180496	-0.33079	+	-	+	-					weak			moderate
	ROE 12	12: 6 months	36	-0.40442	-0.11745	-0.59503	-0.25362	-	-	-	-					moderate		moderate	weak
2007	ROE 12	12: 6 months	12	0.054654	-0.02771	-0.71264	-0.93359	+	-	-	-							strong	strong
	ROE 12	12: 6 months	24	0.22149	-0.13022	0.099423	-0.5133	+	-	+	-						weak		strong
	ROE 12	12: 6 months	36	0.068357	-0.04596	-0.00795	-0.14205	+	-	-	-								
2008	ROE 12	12: 6 months	12	-0.34231	-0.08525	-0.58363	0.233946	-	-	-	+				*	moderate	weak	strong	strong
	ROE 12	12: 6 months	24	-0.32933	0.083222	-0.38826	0.198303	-	+	-	+					weak		moderate	weak
	ROE 12	12: 6 months	36	-0.4207	0.174919	-0.51018	0.169975	-	+	-	+					weak		moderate	
2009	ROE 12	12: 6 months	12	0.014097	0.037047	0.051227	0.110811	+	+	+	+								weak
	ROE 12	12: 6 months	24	-0.10402	0.175522	-0.20965	0.165329	-	+	-	+						weak	weak	weak
2010	ROE 12	12: 6 months	12	-0.0325	-0.01117	-0.50021	-0.32842	-	-	-	-							strong	strong

Table 5.22: Portfolio performance for 12 month OPCF momentum combined with 6 month price momentum in Stage 3 using a 12, 24 and 36 month review period

				Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Fundamental variable	Review period	Hold months	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market rate of
1999	OPCF 12	12: 6 months	12	-0.15036	-0.14776	-0.63619	-0.94976	-	-	-	-					weak	weak	strong	strong
	OPCF 12	12: 6 months	24	-0.14581	-0.25927	-0.26905	-0.43093	-	-	-	-						weak	weak	moderate
	OPCF 12	12: 6 months	36	0.350903	0.032277	0.2006	-0.07981	+	+	+	-	*				weak			
2000	OPCF 12	12: 6 months	12	-0.06907	0.049438	-0.14338	0.12009	-	+	-	+								weak
	OPCF 12	12: 6 months	24	0.453998	0.548182	0.308743	0.499529	+	+	+	+	*	*	*	*	weak	moderate	weak	moderate
	OPCF 12	12: 6 months	36	0.736647	0.881632	0.366165	0.563007	+	+	+	+	*	*	*		moderate	moderate	weak	weak
2001	OPCF 12	12: 6 months	12	0.484143	0.439629	0.440295	0.588082	+	+	+	+	*	*	*	*	moderate	strong	moderate	strong
	OPCF 12	12: 6 months	24	0.586735	0.77612	0.71118	0.704767	+	+	+	+	*	*	*	*	strong	strong	strong	moderate
	OPCF 12	12: 6 months	36	1.172208	1.536615	0.494674	0.598905	+	+	+	+	*	*			moderate	moderate	weak	weak
2002	OPCF 12	12: 6 months	12	0.096418	0.221812	0.094279	0.345913	+	+	+	+		*		*		weak		moderate
	OPCF 12	12: 6 months	24	0.468347	0.801421	0.226893	0.252605	+	+	+	+	*	*			weak	weak		
	OPCF 12	12: 6 months	36	0.716111	0.508545	-0.27561	0.048026	+	+	-	+	*	*			weak	weak		
2003	OPCF 12	12: 6 months	12	0.328121	0.473165	0.273344	0.885479	+	+	+	+	*	*	*	*	weak	strong	weak	strong
	OPCF 12	12: 6 months	24	0.365648	0.470627	-0.20656	0.519958	+	+	-	+		*		*		moderate		moderate
	OPCF 12	12: 6 months	36	-0.24167	0.554075	-0.94736	-0.12211	-	+	-	-		*				weak	weak	
2004	OPCF 12	12: 6 months	12	0.130937	0.096152	-0.10413	-0.07529	+	+	-	-								
	OPCF 12	12: 6 months	24	-0.45344	-0.20524	-0.71139	0.053699	-	-	-	+					weak	weak	weak	
	OPCF 12	12: 6 months	36	-0.35412	-0.23598	-0.93985	-0.63588	-	-	-	-							weak	weak
2005	OPCF 12	12: 6 months	12	-0.40192	-0.03218	-0.51414	0.327722	-	-	-	+				*	moderate		moderate	strong
	OPCF 12	12: 6 months	24	-0.77013	-0.0356	-0.7787	-0.1049	-	-	-	-					moderate		moderate	
	OPCF 12	12: 6 months	36	-0.6649	-0.20394	-0.94336	-0.33671	-	-	-	-					strong	weak	strong	moderate
2006	OPCF 12	12: 6 months	12	-0.2167	0.015918	-0.28657	0.01104	-	+	-	+					weak		weak	
	OPCF 12	12: 6 months	24	-0.0272	-0.18272	-0.09161	-0.78479	-	-	-	-						weak		strong
	OPCF 12	12: 6 months	36	-0.40691	-0.27899	-0.63113	-0.53765	-	-	-	-					moderate	weak	strong	strong
2007	OPCF 12	12: 6 months	12	-0.00252	-0.05293	-0.72427	-1.03692	-	-	-	-							strong	strong
	OPCF 12	12: 6 months	24	0.01812	-0.11884	-0.03512	-0.54908	+	-	-	-						weak		strong
	OPCF 12	12: 6 months	36	-0.19643	-0.06445	-0.38942	-0.17067	-	-	-	-					weak		moderate	weak
2008	OPCF 12	12: 6 months	12	-0.30804	-0.07329	-0.51135	0.198369	-	-	-	+				*	moderate	weak	strong	moderate
	OPCF 12	12: 6 months	24	-0.28486	0.094942	-0.33828	0.119897	-	+	-	+					weak		weak	
	OPCF 12	12: 6 months	36	-0.31542	0.183693	-0.39531	0.098818	-	+	-	+					weak		weak	
2009	OPCF 12	12: 6 months	12	0.046277	0.143357	0.069661	0.446928	+	+	+	+		*		*		weak		strong
	OPCF 12	12: 6 months	24	-0.19569	0.310662	-0.33819	0.365526	-	+	-	+		*		*	weak	weak	weak	moderate
2010	OPCF 12	12: 6 months	12	-0.07974	-0.01187	-0.80447	-0.19188	-	-	-	-					weak		strong	weak

Table 5.23: Portfolio performance for 12 month EBITDA momentum combined with 6 month price momentum in Stage 3 using a 12, 24 and 36 month review period

				Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Fundamental variable	Review period	Hold months	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market rate of
1999	EBITDA 12 12: 6 months		12	-0.10574	-0.11447	-0.58828	-0.63308	-	-	-	-					weak	weak	strong	strong
	EBITDA 12 12: 6 months		24	-0.11234	-0.15022	-0.23016	-0.27014	-	-	-	-							weak	weak
	EBITDA 12 12: 6 months		36	0.332697	0.103326	0.187657	-0.01245	+	+	+	-					weak			
2000	EBITDA 12 12: 6 months		12	0.088553	0.102024	0.023703	0.194805	+	+	+	+								weak
	EBITDA 12 12: 6 months		24	0.532452	0.656685	0.361188	0.624147	+	+	+	+	*	*	*	*	weak	moderate	weak	moderate
	EBITDA 12 12: 6 months		36	0.797308	1.166464	0.399903	0.554579	+	+	+	+	*	*	*		moderate	moderate	weak	weak
2001	EBITDA 12 12: 6 months		12	0.502261	0.428508	0.426831	0.481289	+	+	+	+	*	*	*	*	moderate	moderate	weak	strong
	EBITDA 12 12: 6 months		24	0.54396	0.76326	0.602013	0.685261	+	+	+	+	*	*	*	*	moderate	moderate	strong	moderate
	EBITDA 12 12: 6 months		36	1.358632	1.512563	0.441336	0.679051	+	+	+	+	*	*		*	moderate	strong		weak
2002	EBITDA 12 12: 6 months		12	0.095047	0.196256	0.095541	0.44603	+	+	+	+		*		*		weak		strong
	EBITDA 12 12: 6 months		24	0.375044	0.653992	0.163006	0.497534	+	+	+	+		*		*	weak	moderate		weak
	EBITDA 12 12: 6 months		36	0.382446	0.591172	-0.41406	0.029104	+	+	-	+		*				weak		
2003	EBITDA 12 12: 6 months		12	0.549737	0.336064	0.367749	0.657657	+	+	+	+	*	*		*	weak	moderate	weak	strong
	EBITDA 12 12: 6 months		24	0.630179	0.336852	-0.18242	0.3354	+	+	-	+		*		*	weak	weak		weak
	EBITDA 12 12: 6 months		36	0.026125	0.478593	-0.92565	-0.32677	+	+	-	-		*				weak	weak	
2004	EBITDA 12 12: 6 months		12	0.177793	-0.10597	-0.09053	0.226916	+	-	-	+				*		weak		moderate
	EBITDA 12 12: 6 months		24	-0.29462	-0.33693	-0.65893	-0.0503	-	-	-	-						moderate	weak	
	EBITDA 12 12: 6 months		36	-0.03226	-0.50756	-0.8836	-0.67374	-	-	-	-						weak	weak	moderate
2005	EBITDA 12 12: 6 months		12	-0.50835	-0.07984	-0.70364	0.224075	-	-	-	+				*	moderate	weak	strong	moderate
	EBITDA 12 12: 6 months		24	-1.05851	-0.0887	-1.29234	-0.07636	-	-	-	-					strong		strong	
	EBITDA 12 12: 6 months		36	-0.66677	-0.16502	-0.91513	-0.28272	-	-	-	-					strong	weak	strong	weak
2006	EBITDA 12 12: 6 months		12	-0.52954	0.047964	-0.94331	0.077554	-	+	-	+					strong		strong	
	EBITDA 12 12: 6 months		24	-0.22915	-0.12879	-0.50998	-0.60158	-	-	-	-					weak	weak	moderate	strong
	EBITDA 12 12: 6 months		36	-0.60393	-0.26179	-0.94018	-0.49937	-	-	-	-					strong	weak	strong	strong
2007	EBITDA 12 12: 6 months		12	-0.0529	-0.07777	-0.80507	-1.18749	-	-	-	-						weak	strong	strong
	EBITDA 12 12: 6 months		24	0.04465	-0.16304	-8.4E-05	-0.64103	+	-	-	-						weak		strong
	EBITDA 12 12: 6 months		36	-0.32926	-0.13742	-0.50396	-0.28451	-	-	-	-					weak	weak	moderate	weak
2008	EBITDA 12 12: 6 months		12	-0.4916	-0.02438	-0.83941	0.247465	-	-	-	+				*	strong		strong	moderate
	EBITDA 12 12: 6 months		24	-0.43892	0.110898	-0.53043	0.21999	-	+	-	+					moderate		moderate	weak
	EBITDA 12 12: 6 months		36	-0.59764	0.194889	-0.69497	0.199319	-	+	-	+					moderate	weak	moderate	weak
2009	EBITDA 12 12: 6 months		12	0.021077	0.076057	0.038568	0.21731	+	+	+	+				*				moderate
	EBITDA 12 12: 6 months		24	-0.04028	0.151452	-0.11224	0.143503	-	+	-	+						weak		
2010	EBITDA 12 12: 6 months		12	-0.0422	0.116897	-0.48297	0.05693	-	+	-	+						weak	strong	

Table 5.24: Portfolio performance for 24 month ROE momentum combined with 12 month price momentum in Stage 3 using a 12, 24 and 36 month review period

				Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Fundamental variable	Review period	Hold months	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market rate of
1999	ROE 24	24: 12 month	12	-0.16665	0.032389	-0.27309	0.30144	-	+	-	+				*				strong
	ROE 24	24: 12 month	24	0.329829	0.519513	0.198429	0.648499	+	+	+	+	*	*		*	weak	moderate		strong
	ROE 24	24: 12 month	36	0.589954	0.690888	0.228545	0.547672	+	+	+	+	*	*		*	weak	moderate		moderate
2000	ROE 24	24: 12 month	12	0.536107	0.439047	0.468896	0.690606	+	+	+	+	*	*	*	*	moderate	strong	moderate	strong
	ROE 24	24: 12 month	24	0.73572	0.811559	0.485231	0.849933	+	+	+	+	*	*	*	*	moderate	strong	weak	strong
	ROE 24	24: 12 month	36	1.527066	1.849554	0.47914	0.649608	+	+	+	+	*	*			moderate	strong	weak	weak
2001	ROE 24	24: 12 month	12	0.228608	0.248408	0.320066	0.579458	+	+	+	+	*	*	*	*	weak	moderate	moderate	strong
	ROE 24	24: 12 month	24	0.703025	0.861993	0.272187	0.885508	+	+	+	+	*	*		*	weak	strong		strong
	ROE 24	24: 12 month	36	0.610332	0.944893	-0.01832	0.371882	+	+	-	+	*	*			weak	moderate		weak
2002	ROE 24	24: 12 month	12	0.262677	0.32602	0.31277	0.579396	+	+	+	+	*	*	*	*	weak	moderate	weak	strong
	ROE 24	24: 12 month	24	0.023217	0.168289	-0.09026	0.099589	+	+	-	+								
	ROE 24	24: 12 month	36	-0.14389	0.054987	-0.70579	-0.39584	-	+	-	-							weak	weak
2003	ROE 24	24: 12 month	12	0.230676	-0.13683	-0.05707	0.556508	+	-	-	+				*		moderate		strong
	ROE 24	24: 12 month	24	-0.19592	-0.25111	-0.58521	0.076623	-	-	-	+						weak	weak	
	ROE 24	24: 12 month	36	-0.45086	-0.33005	-0.98447	-0.63743	-	-	-	-						weak	weak	weak
2004	ROE 24	24: 12 month	12	-0.1675	-0.15237	-0.1973	-0.08417	-	-	-	-					weak	weak	weak	
	ROE 24	24: 12 month	24	-0.12973	-0.25839	-0.35392	-0.26414	-	-	-	-						weak	weak	weak
	ROE 24	24: 12 month	36	-0.34313	-0.23772	-0.45733	-0.38775	-	-	-	-					weak	weak	moderate	moderate
2005	ROE 24	24: 12 month	12	0.181417	-0.11226	0.034561	-0.22958	+	-	+	-						weak		moderate
	ROE 24	24: 12 month	24	0.364992	-0.09417	0.239238	-0.54818	+	-	+	-					weak	weak		strong
	ROE 24	24: 12 month	36	-0.47813	-0.13469	-0.76246	-0.2797	-	-	-	-					moderate	weak	strong	weak
2006	ROE 24	24: 12 month	12	0.198889	-0.03266	-0.36108	-1.06512	+	-	-	-	*				strong		strong	strong
	ROE 24	24: 12 month	24	0.453611	-0.05855	0.171753	-0.39755	+	-	+	-								strong
	ROE 24	24: 12 month	36	-0.08754	-0.01641	-0.17403	-0.10109	-	-	-	-								
2007	ROE 24	24: 12 month	12	-0.39203	-0.09164	-0.56171	0.041539	-	-	-	+					moderate	weak	strong	
	ROE 24	24: 12 month	24	-0.27825	-0.03529	-0.36374	0.091528	-	-	-	+					weak		weak	
	ROE 24	24: 12 month	36	-0.35318	-0.01921	-0.44376	-0.08028	-	-	-	-					weak		weak	
2008	ROE 24	24: 12 month	12	0.106027	0.033457	0.22692	0.225778	+	+	+	+			*	*	weak		weak	strong
	ROE 24	24: 12 month	24	-0.01849	0.399612	-0.08389	0.349345	-	+	-	+						weak		weak
2009	ROE 24	24: 12 month	12	-0.13147	0.01632	-0.53126	-0.21151	-	+	-	-					weak		strong	moderate

Table 5.25: Portfolio performance for 24 month OPCF momentum combined with 12 month price momentum in Stage 3 using a 12, 24 and 36 month review period

				Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Fundamental variable	Review period	Hold months	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market rate of
1999	OPCF 24	24: 12 month	12	-0.13806	-0.13326	-0.22608	-0.1856	-	-	-	-					weak	weak	weak	weak
	OPCF 24	24: 12 month	24	0.347571	0.299331	0.189249	0.383132	+	+	+	+		*		*	weak	weak		moderate
	OPCF 24	24: 12 month	36	0.414548	0.596967	0.134544	0.449588	+	+	+	+		*		*	weak	moderate		weak
2000	OPCF 24	24: 12 month	12	0.61025	0.309737	0.54579	0.459357	+	+	+	+	*	*	*	*	moderate	strong	moderate	strong
	OPCF 24	24: 12 month	24	0.824056	0.706119	0.55697	1.12289	+	+	+	+	*	*	*	*	moderate	strong	weak	strong
	OPCF 24	24: 12 month	36	1.629184	1.737449	0.532023	0.765595	+	+	+	+	*	*		*	moderate	strong	weak	weak
2001	OPCF 24	24: 12 month	12	0.134715	0.183692	0.168034	0.280382	+	+	+	+			*	*	weak	weak	weak	moderate
	OPCF 24	24: 12 month	24	0.413105	0.564829	0.249954	0.55334	+	+	+	+	*	*		*	weak	moderate	weak	moderate
	OPCF 24	24: 12 month	36	0.236043	0.613907	-0.23786	-0.05309	+	+	-	-		*				weak		
2002	OPCF 24	24: 12 month	12	0.267567	0.327175	0.32072	0.396127	+	+	+	+	*	*	*	*	weak	weak	weak	moderate
	OPCF 24	24: 12 month	24	0.074006	0.216644	0.011978	0.160922	+	+	+	+						weak		
	OPCF 24	24: 12 month	36	-0.48498	0.010085	-0.78128	-0.33544	-	+	-	-					weak		moderate	weak
2003	OPCF 24	24: 12 month	12	0.351311	-0.14248	-0.09722	0.493246	+	-	-	+				*		moderate		strong
	OPCF 24	24: 12 month	24	-0.56365	-0.36705	-0.77788	-0.17375	-	-	-	-					weak	moderate	weak	weak
	OPCF 24	24: 12 month	36	-0.59105	-0.59478	-1.03857	-0.7877	-	-	-	-					weak	weak	weak	moderate
2004	OPCF 24	24: 12 month	12	-0.21136	-0.08179	-0.25988	0.275749	-	-	-	+				*	weak	weak	weak	strong
	OPCF 24	24: 12 month	24	-0.06221	-0.14707	-0.35065	-0.0742	-	-	-	-						weak		
	OPCF 24	24: 12 month	36	-0.12781	-0.17082	-0.20443	-0.28271	-	-	-	-						weak		weak
2005	OPCF 24	24: 12 month	12	-0.08137	-0.06491	-0.16025	-0.1213	-	-	-	-								weak
	OPCF 24	24: 12 month	24	0.078434	-0.12178	0.016914	-0.64734	+	-	+	-						weak		strong
	OPCF 24	24: 12 month	36	-0.54425	-0.19549	-0.95633	-0.41273	-	-	-	-					strong	weak	strong	moderate
2006	OPCF 24	24: 12 month	12	0.248073	-0.12718	-0.05963	-1.21749	+	-	-	-	*				strong	weak		strong
	OPCF 24	24: 12 month	24	0.367211	-0.22309	0.152962	-0.71789	+	-	+	-						weak		strong
	OPCF 24	24: 12 month	36	-0.03161	-0.27854	-0.12039	-0.5179	-	-	-	-						weak		strong
2007	OPCF 24	24: 12 month	12	-0.4981	0.140109	-0.74877	-0.0104	-	+	-	-					moderate		strong	
	OPCF 24	24: 12 month	24	-0.32421	-0.05779	-0.41851	0.010925	-	-	-	+					weak		weak	
	OPCF 24	24: 12 month	36	-0.54641	-0.1359	-0.62565	-0.18582	-	-	-	-					moderate		moderate	weak
2008	OPCF 24	24: 12 month	12	0.013687	0.024327	0.022871	0.249369	+	+	+	+				*				strong
	OPCF 24	24: 12 month	24	-0.13367	0.331702	-0.26368	0.307823	-	+	-	+					weak	weak	weak	weak
2009	OPCF 24	24: 12 month	12	-0.15823	-0.02356	-0.69402	-0.40265	-	-	-	-					weak		strong	strong

Table 5.26: Portfolio performance for 24 month EBITDA momentum combined with 12 month price momentum in Stage 3 using a 12, 24 and 36 month review period

				Magnitude of difference				Direction of difference				Significance (α = 0.05)				Effect size			
Period	Fundamental variable	Review period	Hold months	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of	Risk adjusted Winwin vs Market rate of
1999	EBITDA 24 24: 12 month	12		-0.10736	-0.14743	-0.20873	-0.21784	-	-	-	-						weak	weak	moderate
	EBITDA 24 24: 12 month	24		0.47413	0.351213	0.266948	0.354096	+	+	+	+	*	*		*	weak	weak	weak	weak
	EBITDA 24 24: 12 month	36		0.518972	0.607542	0.170836	0.509762	+	+	+	+	*	*		*	weak	moderate		moderate
2000	EBITDA 24 24: 12 month	12		0.542797	0.360947	0.477597	0.458049	+	+	+	+	*	*	*	*	moderate	strong	moderate	strong
	EBITDA 24 24: 12 month	24		0.664409	0.773684	0.424231	0.789441	+	+	+	+	*	*	*	*	weak	strong	weak	strong
	EBITDA 24 24: 12 month	36		1.532205	1.533747	0.433147	0.6295	+	+	+	+	*	*		*	moderate	moderate		weak
2001	EBITDA 24 24: 12 month	12		0.088127	0.210775	0.100964	0.43381	+	+	+	+		*		*		weak		strong
	EBITDA 24 24: 12 month	24		0.582995	0.805462	0.116868	0.529636	+	+	+	+	*	*		*	weak	moderate		weak
	EBITDA 24 24: 12 month	36		0.266454	0.929915	-0.0429	-0.00132	+	+	-	-		*			weak	weak		
2002	EBITDA 24 24: 12 month	12		0.256365	0.331586	0.217329	0.512673	+	+	+	+		*		*	weak	moderate	weak	strong
	EBITDA 24 24: 12 month	24		-0.00518	0.313947	-0.172	0.181677	-	+	-	+		*				weak		
	EBITDA 24 24: 12 month	36		-0.58991	0.394257	-0.95584	-0.37947	-	+	-	-					weak	weak	moderate	weak
2003	EBITDA 24 24: 12 month	12		0.591976	-0.10654	-0.05564	0.602245	+	-	-	+				*	weak	weak		strong
	EBITDA 24 24: 12 month	24		-0.22417	-0.23926	-0.64658	0.096438	-	-	-	+						weak	weak	
	EBITDA 24 24: 12 month	36		-0.4397	-0.22543	-1.01893	-0.6133	-	-	-	-							weak	weak
2004	EBITDA 24 24: 12 month	12		-0.17346	-0.15237	-0.20488	-0.02032	-	-	-	-					weak	weak	weak	
	EBITDA 24 24: 12 month	24		0.066028	-0.20031	-0.25832	-0.14249	+	-	-	-						weak		weak
	EBITDA 24 24: 12 month	36		-0.09865	-0.18976	-0.1817	-0.31807	-	-	-	-						weak		weak
2005	EBITDA 24 24: 12 month	12		0.115666	-0.01939	-0.02143	-0.03507	+	-	-	-								
	EBITDA 24 24: 12 month	24		0.257797	-0.08017	0.163419	-0.50553	+	-	+	-								strong
	EBITDA 24 24: 12 month	36		-0.54686	-0.1894	-0.89826	-0.38299	-	-	-	-					strong	weak	strong	moderate
2006	EBITDA 24 24: 12 month	12		0.191597	-0.09399	-0.35236	-1.33515	+	-	-	-	*				moderate	weak	strong	strong
	EBITDA 24 24: 12 month	24		-0.37026	-0.16208	-0.88703	-0.62649	-	-	-	-					moderate	weak	strong	strong
	EBITDA 24 24: 12 month	36		-0.33483	-0.12949	-0.53276	-0.2736	-	-	-	-					weak		moderate	weak
2007	EBITDA 24 24: 12 month	12		-0.84524	0.003844	-1.81484	-0.08651	-	+	-	-					strong		strong	
	EBITDA 24 24: 12 month	24		-0.86484	-0.10661	-1.06738	-0.06039	-	-	-	-					strong		strong	
	EBITDA 24 24: 12 month	36		-1.06582	-0.08865	-1.42382	-0.15038	-	-	-	-					strong		strong	
2008	EBITDA 24 24: 12 month	12		0.199667	-0.02799	0.281603	0.028291	+	-	+	+			*		weak		weak	
	EBITDA 24 24: 12 month	24		-0.08945	0.053432	-0.17642	0.073416	-	+	-	+								
2009	EBITDA 24 24: 12 month	12		-0.08552	0.020297	-0.28947	-0.25531	-	+	-	-							weak	strong

Figure 5.8 and 5.9 show the results of the "lose lose" and "win win" portfolios using 12 month fundamental momentum combined with 6 month price momentum. As can be seen from the graph the "win win" portfolio performs slightly better than the "lose lose" portfolio. It also indicates a pattern of combination momentum working up until 2004.

Figure 5.10 and 5.11 show the results of the "lose lose" and "win win" portfolios using 24 month fundamental momentum combined with 12 month price momentum. Here we see the "lose lose" portfolio losing much more over the 2007 period than the "win win" portfolio.

Figure 5.8: Portfolio Performance of "lose lose" portfolio using a 12 month fundamental momentum and 6 month price momentum combination investment strategy

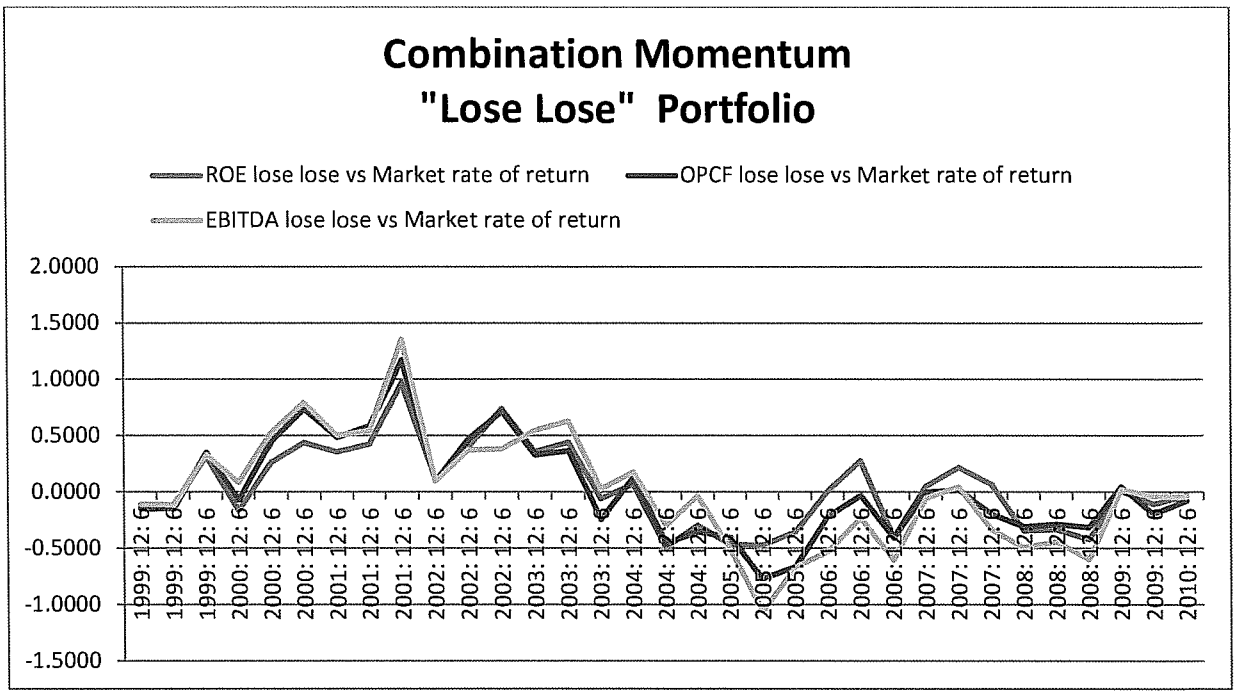


Figure 5.9: Portfolio Performance of "win win" portfolio using a 12 month fundamental momentum and 6 month price momentum combination investment strategy

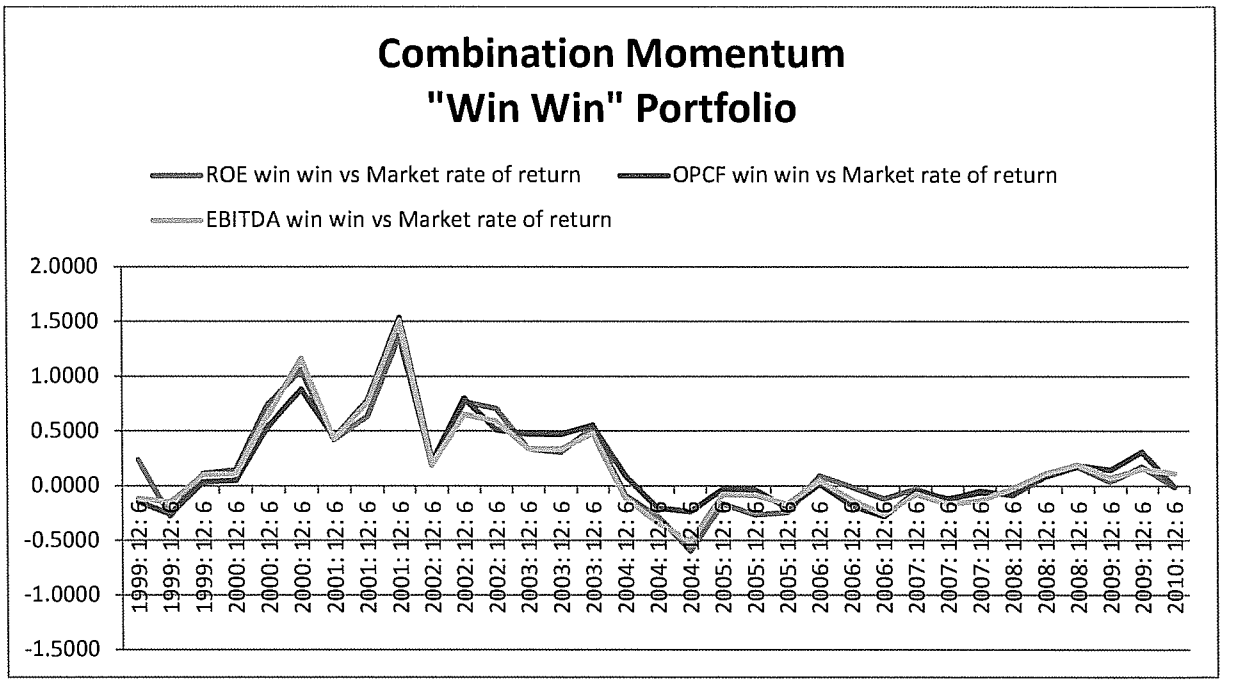


Figure 5.10: Portfolio Performance of "lose lose" portfolio using a 24 month fundamental momentum and 12 month price momentum combination investment strategy

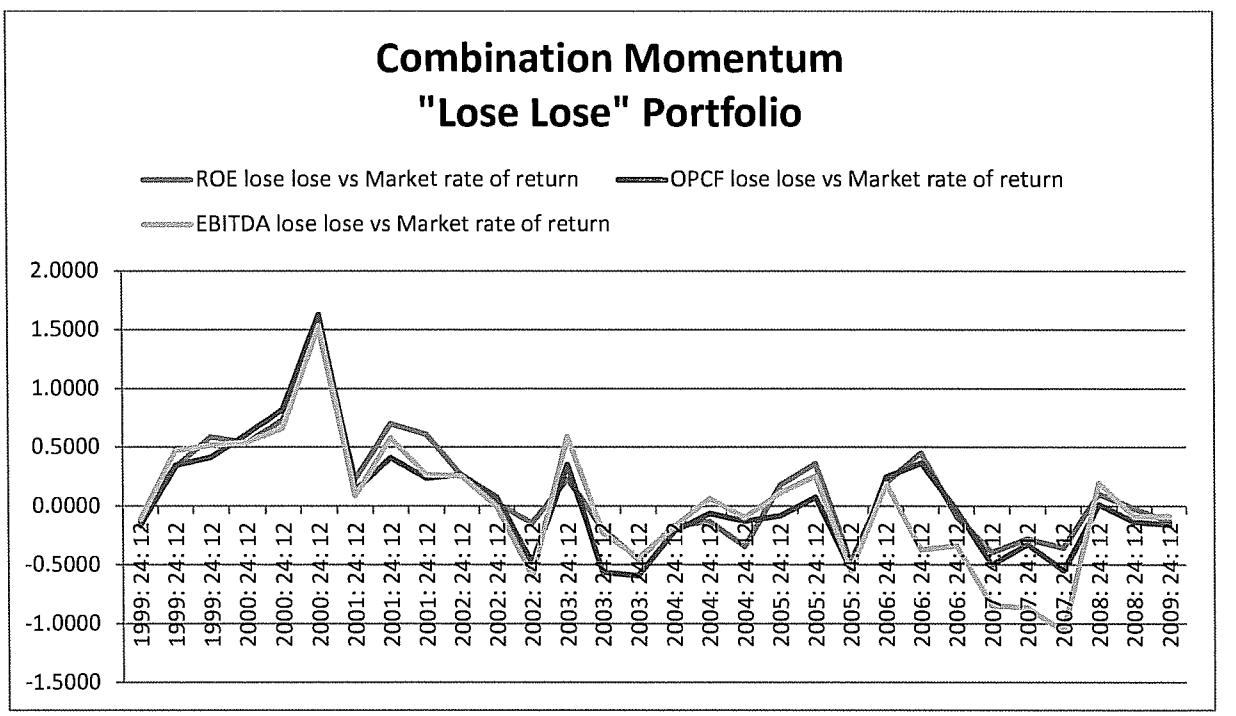
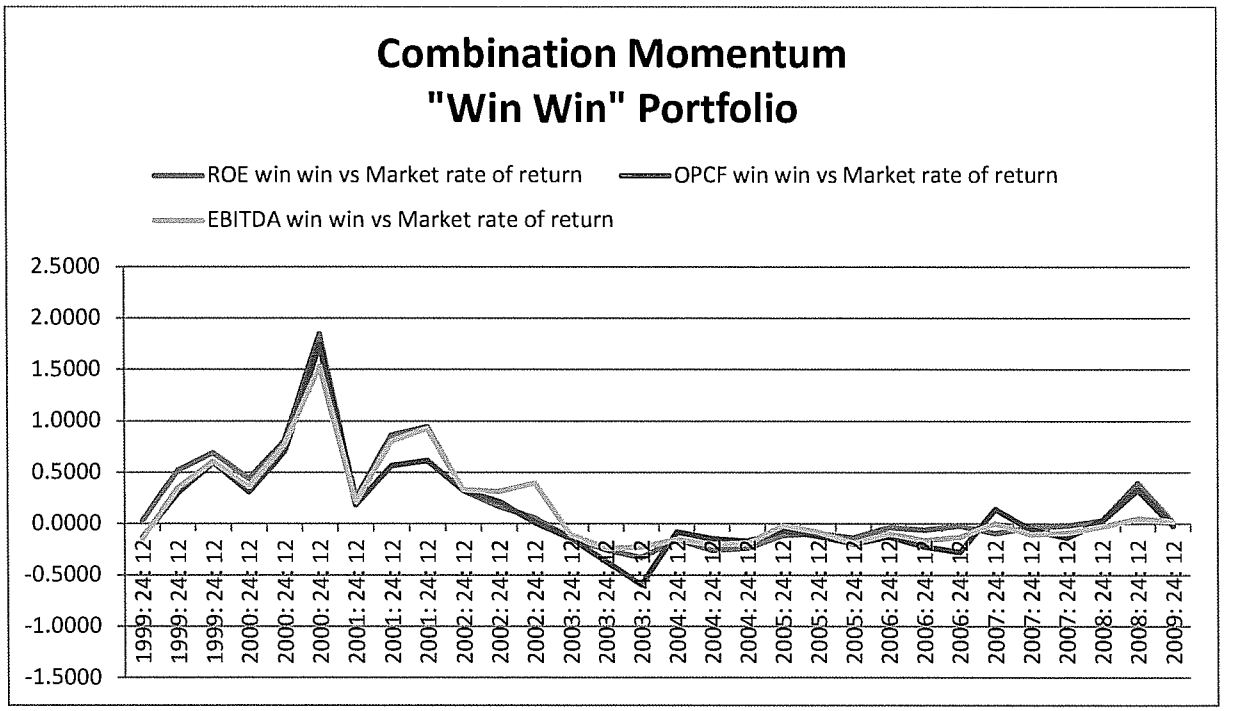


Figure 5.11: Portfolio Performance of "win win" portfolio using a 24 month fundamental momentum and 12 month price momentum combination investment strategy



5.6 CONCLUSION

The results have explored essentially three different investment strategies over a 12 year period. In stage 1 which applied price momentum, quintile 5 (winner stocks) outperformed quintile 1 (loser stocks). Further, unlike in stage 2 and 3, returns in this stage were much more consistent. Across the different review periods, the graphs indicate that 6 month price momentum works better.

In stage 2, which applied fundamental momentum, both quintile 1 and 5 performed better using a 12 month review period compared to a 24 month review period. ROE momentum performed better in the 12 month review period for quintile 5. This stage showed a pattern of fundamental momentum working in the earlier periods, but post 2003/2004 returns did not beat the market as much. This pattern was not evident in stage 1.

In stage 3, we applied combination momentum and the results indicated that the "win win" portfolio performed better than the "lose lose" portfolio in both combinations. Of the two combinations used, the higher returns were earned using 12 month fundamental momentum and 6 month price momentum combination.

Table 5.27 shows a summary of the results per stage with reference to the applicable tables. Highlighted in red are highest amount of times quintile 5's mean and risk adjusted mean (or in the case of stage 3, the "win win" portfolio) beats the market, as well as the strength of that phenomenon.

Overall, we find evidence of all three strategies beating the market but stage 1 was most profitable.

Table 5.27: Results summary of all three investment strategies

							Direction of difference				Significance (α = 0.05)				Effect size			
Stage	Review period	Predictor	Hold period	Table Ref	No. of observations	Sig Q1 vs Q5 (α= 0.05)	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return
1	3 months	Stock price	3 months 6 months 9 months 12 months	5.1 & 5.5	48	34	12	41	11	31	4	20	4	20	0	8	0	13
	6 months		3 months 6 months 9 months 12 months	5.2 & 5.6	48	40	8	43	4	42	1	26	0	27	0	13	0	18
	9 months		3 months 6 months 9 months 12 months	5.3 & 5.7	48	17	18	31	14	26	4	11	6	21	0	4	2	12
	12 months		3 months 6 months 9 months 12 months	5.4 & 5.8	48	10	30	22	16	13	2	7	1	7	0	0	0	4
2	12 months	ROE	12 months 24 months 36 months	5.9 & 5.12	30	3	17	22	12	18	7	9	3	9	0	2	0	3
	24 months		12 months 24 months 36 months		33	2	17	18	12	11	8	7	4	3	0	2	0	2
	12 months	OPCF	12 months 24 months 36 months	5.10 & 5.13	30	1	18	21	12	15	8	12	3	10	0	1	2	1
	24 months		12 months 24 months 36 months		33	0	15	17	12	17	7	6	2	5	0	1	0	1
	12 months	EBITDA	12 months 24 months 36 months	5.11 & 5.14	30	1	15	19	11	16	6	5	1	4	0	0	0	0
	24 months		12 months 24 months 36 months		33	0	14	12	10	10	3	7	1	4	0	1	0	1
3	12 month Fundamental:6 month stock price	ROE	12 months 24 months 36 months	5.15 & 5.21	33	4	18	19	12	19	8	11	2	11	0	3	1	6
		OPCF	12 months 24 months 36 months	5.16 & 5.22	33	4	14	19	10	19	9	13	5	10	1	3	1	3
		EBITDA	12 months 24 months 36 months	5.17 & 5.23	33	8	16	19	11	20	6	11	4	12	0	1	1	3
	24 month Fundamental:12 month stock price	ROE	12 months 24 months 36 months	5.18 & 5.24	30	2	16	15	12	17	10	9	5	10	1	4	0	9
		OPCF	12 months 24 months 36 months	5.19 & 5.25	30	5	15	14	12	14	6	8	4	11	1	3	0	5
		EBITDA	12 months 24 months 36 months	5.20 & 5.26	30	6	15	14	10	13	7	10	3	9	0	2	0	5

6. DISCUSSION OF RESULTS

6.1 INTRODUCTION

This research examined three different investment strategies using stocks listed on Johannesburg Stock Exchange over a 12 year period. Though the results differ, their commonality lies in the use of momentum to identify winning and losing stocks.

Detailed below is a discussion of the results per the respective hypotheses raised in Chapter 3 of this document.

6.2 RESULTS DISCUSSION FOR HYPOTHESIS 1

The findings for hypothesis 1 confirms the existence of momentum on the Johannesburg Stock Exchange and is consistent with other South African studies on momentum (Van Rensburg and Robertson, 2003; Boshoff, 2008; Friedrich ,2010 and Snyman, 2011).

The findings show the best performance from the 3, 6, and 9 month momentum strategies. Overall, quintile 5 (winner stocks) outperformed quintile 1 (loser stocks) making momentum a common element in winning stocks. Based on the performance of these momentum portfolios over the 12 year period, a further observation is that there does exist a relationship between momentum and expected future stock returns.

This is not a new finding and was not the prime focus of this paper. Instead these portfolios were constructed for comparability to the other investment strategies explored in this paper. In fact, it is the very success of this strategy that has led to application of momentum to other investment strategies in this paper.

The reason behind the success of this investment strategy has been at the forefront of much academic debate and is beyond the scope of this paper. However, it can be concluded that momentum is a common feature in winning stocks and prevalent on the Johannesburg Stock Exchange.

6.3 RESULTS DISCUSSION FOR HYPOTHESIS 2

Using fundamental analysis to predict stock returns is not a new concept and has long captured the interest of academia (Abarbanell and Bushee, 1997; Piotroski, 2000; Mohanram, 2005; Elluech, 2009; Hand and Green, 2009; Richardson, Tuna and Wysocki, 2010; Lewellen, 2010; Hancock and Seng, 2012). Hypothesis 2 was aimed at applying momentum, primarily a technical analysis tool, to three respective fundamental variables, namely ROE, OPCF and EBITDA.

As is evident in Table 5.27, the findings for hypothesis 2 indicate that fundamental momentum can beat the market even after adjusting for risk. The fact that these above market returns can be earned by constructing stock portfolios from publicly available information challenges the Efficient Market Hypothesis (Fama, 1970). This in turn raises the question of whether these anomalous returns are earned because of an inefficient market or an incomplete assessment of risk.

Bernard, Thomas and Wahlen (1996) examined six accounting based stock price anomalies to establish how much of the anomalous returns can be explained by market inefficiency and how much by risk premium. It was concluded that while some anomalies like the earnings momentum anomaly can be explained by market mispricing, the book to market anomaly can be explained by the risk premium. It was also found that the explanation for the price momentum anomaly is mixed.

In this case, stocks were picked based on fundamental momentum. Thus, the portfolio was constructed using fundamentally strong companies whose stock price rose over the respective holding periods. This then indicates more of a market mispricing because the risk premium on a fundamentally strong stock should be much lower.

Table 5.27 shows the highest number of significant differences for quintile 5 (winner stocks) based on the ROE variable. The ROE measure is not only a composite measure of the financing, investing and operational decisions in a company, but also a publicly available measure of return to shareholders. Whether this necessarily makes it the preferred fundamental variable to OPCF and EBITDA is not clear in these results and could possibly be a point for further investigation.

Another key observation from Table 5.27 whilst returns are earned using a 24 month review period, the highest number of significant differences was earned using a 12 month review period. This could indicate that a 24 month review period was a sufficient amount of time for the market to adjust and incorporate the fundamentals in the share price. Alternatively, fundamental

momentum like price momentum could be constrained to a short term period. Again, this could be an interesting aspect to consider for further research.

Table 5.27 shows low counts on the strength of this phenomenon and perhaps in extending the sample period and the fundamental variables, the viability of this strategy can be further assessed.

6.4 RESULTS DISCUSSION FOR HYPOTHESIS 3

While fundamental and technical analysis has both achieved academic and practical recognition, respectively, for its use in predicting future stock prices, there is no rule or reason which precludes why these two methods should be carried out in isolation.

The combination of these two methods is both possible and successful as is evident in the work by Bettman, Sault and Schultz (2009), who proposed a hybrid stock valuation model using book value and earnings per share as the fundamental variables and price momentum as the technical variable, revealing superior explanatory power relative to considering either fundamental or technical analysis in isolation.

The results for this hypothesis was based on combination portfolios incorporating both fundamental and price momentum. The 12 month fundamental momentum combined with the 6 month price momentum was supported by the fact that 6 month price momentum was the best performer in stage 1 and 12 month fundamental momentum was the best performer in stage 2. Likewise the second combination of 24 month fundamental momentum and 12 month price momentum was supported by their underperformance in stages 1 and 2 respectively. This essentially created the “win win” and “lose lose” portfolios.

The findings in Table 5.27 show the highest number of significant difference in the 12 month fundamental momentum 6 month price momentum combination across all the fundamental variables. By applying the effect size (Cohen, 1992) the combination using ROE reflected more counts of the strength of the phenomenon in both the 12 month and 24 month review periods. This is consistent with our findings in stage 2 making ROE momentum a consideration for further analysis.

The findings indicate evidence of above market returns using combination momentum and possible further exploration of different combinations could uncover further above market returns.

7. CONCLUSION AND RECOMMENTIONS

7.1 ACADEMIC AND PRACTICAL IMPLICATIONS

From an academic perspective, the findings in this paper have hopefully raised an interest in exploring the viability of fundamental momentum portfolios across different fundamental variables as well combination momentum portfolios.

Basiewicz & Auret (2010) suggest that the focus of asset pricing has shifted from theoretical modelling towards empirical analysis. Theoretic models like the Efficient Market Hypothesis (Fama, 1970) postulate that the market cannot be beaten. Yet in this paper, using a limited sample we explored three investments strategies that do show counts of beating the market.

Perhaps then some of the answers to asset pricing should be approached by further empirical observations as opposed to trying to fit in the empirical evidence with the underlying financial theories.

From a practical perspective, the success of the momentum effect remains a reality for investors and portfolio managers with an array of evidence of its existence on the JSE (Van Rensburg and Robertson, 2003; Boshoff, 2008; Friedrich ,2010 and Snyman, 2011). Whilst this paper was not aimed at changing investment philosophies already adopted by investment practitioners, the results in this paper does suggest some merit in exploring fundamental momentum, not only as stand-alone strategy but in hybrid valuation models as well.

7.2 CONCLUSION AND RECOMMENDATIONS

This study sought to examine the explanatory power for future stock returns using fundamental momentum both as a stand-alone strategy and in a combination strategy. In essence the author attempted to uncover a further anomaly – an investment strategy that earned above market returns.

The research conducted showed evidence of above market returns found in all three investment strategies tested on the JSE during 1999 – 2010. This anomalous behaviour of the sampled JSE listed stocks suggests that the market may be inefficient, consistent with other South African studies (Hoffman, 2012).

Whether this anomalous behaviour is consistent is a point for further examination. As was defined by Tversky & Kahneman (1986) an anomaly is only such if it exhibits continued deviations from the underlying theory. Given that this study had been done on a limited sample using a limited sample period, it is suggested that further investigation into fundamental momentum be considered for further research. In so doing, this trend can further be examined to establish whether the patterns reflected in this study are time specific.

This research also found evidence of ROE momentum as a better fundamental predictor compared to OPCF and EBITDA. Whether this suggests that ROE is better or more preferred by investors is not conclusive in this study. This study sought to select fundamental variables that could reasonably be expected to provide indications of higher expected cash flows. The intention hereof was that higher expected cash flows would lead to higher returns. This leaves room for further studies to explore the choice of fundamental variables a bit more.

Finally, a common observation across three investment strategies reported in this paper, is that momentum was characteristic of the winning stocks. The results indicated that even in instances where quintile 1 (loser portfolio) generated positive returns, it was still out performed by quintile 5 (winner portfolio). This has important implications investment decision making.

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APPENDICES

Appendix 1: Stage 1: 3 month review period – Quintile composition and T-statistic

					t statistic				Quintile composition			
Period	Review period	Hold months	Valid N Q1	Valid N Q5	Q1 vs Market rate of return	Q5 vs Market rate of return	adjusted Q1 vs Market rate of	adjusted Q5 vs Market rate of	Q1 Loser	Q1 Winner	Q5 Loser	Q5 Winner
1999	3	3	22	22	-1.6907	0.3127	-5.68181	-2.36242				
		6	22	22	-5.2215	0.3498	-17.0356	-1.8132				
		9	22	22	-7.9617	1.0363	-16.8609	3.860379				
		12	22	22	-6.9041	1.5635	-15.3699	2.967357	50%	0%	0%	50%
2000	3	3	22	22	-1.8241	-1.1735	-11.2897	-16.8285				
		6	22	22	0.8596	-0.9411	0.124792	-5.80028				
		9	22	22	0.4393	-0.0134	0.013312	-1.85006				
		12	22	22	-3.0155	0.1046	-10.2468	-1.38599	50%	0%	0%	50%
2001	3	3	22	22	-0.9344	0.5064	-4.51428	0.254322				
		6	22	22	0.0707	3.0038	-2.78297	3.682287				
		9	22	22	-2.6402	2.1073	-4.58277	3.986824				
		12	22	22	-2.1308	0.1801	-3.06602	1.573568	50%	0%	0%	50%
2002	3	3	22	22	2.5885	2.1035	0.3271	-3.41723				
		6	22	22	1.5555	4.4567	-6.07919	5.656774				
		9	22	22	2.9263	5.8116	2.730269	8.060141				
		12	22	22	3.4807	5.1105	1.596821	5.588208	50%	0%	0%	50%
2003	3	3	22	22	-1.2930	0.0575	-4.03735	-1.26932				
		6	22	22	-1.8525	1.5608	-4.1503	2.841622				
		9	22	22	-1.7147	2.7366	-1.99077	3.798886				
		12	22	22	-1.4124	2.8854	-1.61979	2.81022	50%	0%	0%	50%
2004	3	3	22	22	1.7878	3.7869	-53.1865	1.250083				
		6	22	22	-0.9894	3.7797	-5.20127	9.496448				
		9	22	22	1.2378	4.8151	1.765718	5.718955				
		12	22	22	1.3481	3.5632	1.686821	2.541159	50%	0%	0%	50%
2005	3	3	22	22	-1.0032	0.2975	-11.6127	-1.2299				
		6	22	22	-0.9620	0.4605	1.648609	1.063868				
		9	22	22	-1.8741	1.4299	2.426733	0.386855				
		12	22	22	-1.5836	1.6263	2.02545	0.100903	50%	0%	0%	50%
2006	3	3	21	22	-1.5008	-1.7436	-11.4132	-13.1518				
		6	21	22	-2.3110	-0.0627	-8.5036	-0.59288				
		9	21	22	-1.6711	1.2020	-2.72803	4.169345				
		12	21	22	-2.1587	1.2515	-2.25006	2.533556	50%	0%	0%	50%
2007	3	3	21	22	-1.3453	1.0988	-8.48863	0.925589				
		6	21	22	-2.9656	1.4304	-9.31802	3.198385				
		9	21	22	-4.0971	1.2966	-12.8204	1.666223				
		12	21	22	-7.1895	-0.8472	-24.3699	-2.16604	50%	0%	0%	50%
2008	3	3	22	22	-4.3697	-3.8831	-42.5659	-35.1022				
		6	22	22	-0.6981	2.8978	-10.8154	-8.11615				
		9	22	22	-0.8155	3.5090	-10.3304	-5.91736				
		12	22	22	-1.3390	3.1692	-12.3179	-6.62349	50%	0%	0%	50%
2009	3	3	22	22	-0.1097	2.2129	-3.60744	9.985551				
		6	22	22	0.0808	1.4184	1.541696	0.559942				
		9	22	22	-2.1069	1.2128	-2.24619	0.283839				
		12	22	22	-1.5043	1.3960	-1.06411	0.966525	50%	0%	0%	50%
2010	3	3	22	22	1.5518	3.8555	-73.0283	-4.39354				
		6	22	22	-1.8800	3.8065	-20.4477	9.73147				
		9	22	22	-2.9228	3.1034	-14.6195	6.518212				
		12	22	22	-3.7932	2.7085	-12.8401	6.070566	50%	0%	0%	50%

Appendix 2: Stage 1: 6 month review period – Quintile composition and T-statistic

					t statistic				Quintile composition			
Period	Review period	Hold months	Valid N Q1	Valid N Q5	Q1 vs Market rate of return	Q5 vs Market rate of return	adjusted Q1 vs Market rate of	adjusted Q5 vs Market rate of	Q1 Loser	Q1 Winner	Q5 Loser	Q5 Winner
1999	6	3	22	22	-3.8856	-1.0298	-25.2332	-12.1102				
		6	22	22	-5.9516	0.9723	-15.9051	-0.01406				
		9	22	22	-5.5940	1.1289	-17.3858	0.075623				
		12	22	22	-6.6718	1.1282	-21.2067	0.153845	50%	0%	0%	50%
2000	6	3	22	22	-1.0024	2.0169	-5.20928	2.44168				
		6	22	22	-2.0107	2.0826	-5.97726	2.595382				
		9	22	22	-1.5583	2.1483	-4.65314	2.419836				
		12	22	22	-1.3530	1.6198	-2.6929	1.658684	50%	0%	0%	50%
2001	6	3	22	22	0.7734	5.8495	-3.07197	7.632724				
		6	22	22	-2.1667	3.1860	-5.08721	11.15722				
		9	22	22	-2.1080	1.0798	-3.61717	3.530848				
		12	22	22	-1.2384	2.2314	-2.33934	3.180169	50%	0%	0%	50%
2002	6	3	22	22	-0.5219	4.2341	-10.2717	5.480855				
		6	22	22	1.2829	4.4912	0.777146	5.852623				
		9	22	22	2.0014	4.3970	0.120398	4.615048				
		12	22	22	1.4772	4.2689	0.019444	4.720893	50%	0%	0%	50%
2003	6	3	22	22	-1.2172	4.8409	-7.51814	23.94398				
		6	22	22	-1.8352	5.8093	-2.86113	23.76126				
		9	22	22	-1.7894	3.8397	-2.2543	6.262774				
		12	22	22	-0.8053	5.5264	-1.19226	12.27545	50%	0%	0%	50%
2004	6	3	22	22	-1.5172	2.1155	-3.75625	7.473555				
		6	22	22	-1.5561	5.2405	-0.85697	8.326364				
		9	22	22	-0.6748	2.4502	-0.06279	1.008644				
		12	22	22	0.0045	2.4490	1.252481	0.808759	50%	0%	0%	50%
2005	6	3	22	22	-0.3422	1.1856	-0.70203	0.255092				
		6	22	22	0.0111	1.6359	-0.41374	1.29454				
		9	22	22	-4.6514	1.9365	-6.578	0.808463				
		12	22	22	-4.5423	1.4695	-5.94045	0.182781	50%	0%	0%	50%
2006	6	3	20	22	-1.7993	0.9195	-8.9815	0.687749				
		6	20	22	-2.0565	1.5470	-4.39545	6.393549				
		9	20	22	-1.5468	0.8892	-2.09844	2.150548				
		12	20	22	-2.1690	0.9947	-2.93075	1.804166	50%	0%	0%	50%
2007	6	3	19	22	-3.0215	1.1870	-15.4899	1.396145				
		6	19	22	-3.7380	0.8511	-13.1972	-0.2592				
		9	19	22	-6.1417	-1.0243	-22.0056	-4.54794				
		12	19	22	-7.1044	-2.4931	-23.4557	-8.11646	50%	0%	0%	50%
2008	6	3	20	20	1.1716	7.9050	-9.64223	9.463155				
		6	20	20	0.2281	6.1205	-12.811	4.979465				
		9	20	20	-0.7434	5.1351	-18.3086	2.465372				
		12	20	20	-0.1313	3.3981	-8.07898	2.12024	50%	0%	7%	43%
2009	6	3	21	22	-0.0934	1.2421	-0.24304	0.683369				
		6	21	22	-3.0214	1.1369	-5.75892	0.52944				
		9	21	22	-2.9575	1.3638	-4.79071	1.617979				
		12	21	22	-1.8401	2.1139	-3.86073	4.387848	50%	0%	0%	50%
2010	6	3	21	22	-2.6388	2.3884	-12.6788	26.30166				
		6	21	22	-1.9369	2.7290	-1.41689	29.57577				
		9	21	22	-3.7691	-0.5893	-8.85506	-0.10395				
		12	21	22	-2.8368	-0.1709	-5.87195	0.461997	50%	0%	0%	50%

Appendix 3: Stage 1: 9 month review period – Quintile composition and T-statistic

					t statistic				Quintile composition			
Period	Review period	Hold months	Valid N Q1	Valid N Q5	Q1 vs Market rate of return	Q5 vs Market rate of return	adjusted Q1 vs Market rate of	adjusted Q5 vs Market rate of	Q1 Loser	Q1 Winner	Q5 Loser	Q5 Winner
1999	9	3	22	22	0.7079	0.6019	-0.08703	2.459162				
		6	22	22	0.8350	0.9311	0.011114	0.837784				
		9	22	22	0.6035	0.0463	-0.01682	-0.8981				
		12	22	22	0.6815	0.9270	-0.08166	-0.01105	50%	0%	0%	50%
2000	9	3	22	22	-3.8601	-0.5043	-26.0012	-9.95578				
		6	22	22	-1.7611	0.2634	-7.77903	-2.79307				
		9	22	22	-1.3899	0.3432	-3.43947	-0.43855				
		12	22	22	0.1295	1.3474	-0.87074	0.821464	50%	0%	0%	50%
2001	9	3	22	22	-1.7235	-4.3562	-2.07946	-0.59966				
		6	22	22	-1.8593	-4.8148	-2.56809	-7.00913				
		9	22	22	-0.1460	-2.1305	-0.55691	2.108543				
		12	22	22	0.2707	0.8801	-0.23498	2.139679	50%	0%	0%	50%
2002	9	3	22	22	2.9453	2.3377	4.240601	2.292921				
		6	22	22	2.2111	6.0158	1.0901	8.931691				
		9	22	22	2.2060	4.0523	1.928723	5.320569				
		12	22	22	2.6230	3.8544	2.626913	5.194643	50%	0%	0%	50%
2003	9	3	22	22	-0.5325	1.6159	0.052658	2.642643				
		6	22	22	0.5990	1.4459	3.134124	3.197417				
		9	22	22	1.0805	2.1447	2.611263	4.005677				
		12	22	22	-0.1920	2.0871	1.316216	2.539539	50%	0%	0%	50%
2004	9	3	22	22	0.6523	4.6669	1.003602	11.79395				
		6	22	22	0.9963	2.8999	1.415127	7.880988				
		9	22	22	0.8186	2.3198	1.03824	6.117211				
		12	22	22	0.1831	2.2373	-0.40691	3.078985	50%	0%	0%	50%
2005	9	3	22	22	-0.2938	1.1281	-1.22041	0.851083				
		6	22	22	-1.6303	0.8303	-2.5936	0.512608				
		9	22	22	-1.5559	0.3248	-2.16394	-0.0884				
		12	22	22	-1.7640	-0.3054	-2.30704	-0.69834	48%	2%	0%	50%
2006	9	3	17	20	-2.1961	-0.0657	-6.36796	3.941704				
		6	17	20	-1.7719	0.2041	-2.94619	7.516871				
		9	17	20	-2.7973	0.3109	-4.18176	4.163467				
		12	17	20	-2.0951	0.0413	-2.69071	1.082457	50%	0%	0%	50%
2007	9	3	16	22	-2.4293	-0.4667	-14.1789	-6.26896				
		6	16	22	-4.2767	-2.5668	-17.228	-13.0349				
		9	16	22	-5.6498	-3.9100	-23.861	-16.5382				
		12	16	22	-2.7115	-1.0844	-17.487	-13.2305	50%	0%	0%	50%
2008	9	3	17	21	-0.7775	1.2240	-23.7616	-4.29637				
		6	17	21	-0.5426	0.6690	-14.1705	-5.35885				
		9	17	21	-0.7459	-0.3532	-5.55588	-4.32075				
		12	17	21	0.6034	-0.1645	0.181215	-1.56642	50%	0%	2%	48%
2009	9	3	19	22	-4.2378	-1.7838	-17.8901	-12.1314				
		6	19	22	-4.6810	0.2837	-16.2737	7.134367				
		9	19	22	-3.4099	2.1208	-16.5777	4.820988				
		12	19	22	-2.8981	1.1069	-7.10934	3.301872	50%	0%	0%	50%
2010	9	3	20	22	0.6886	-0.5182	4.22396	-4.92782				
		6	20	22	-2.4081	-2.2723	-9.33414	-6.59962				
		9	20	22	-1.7300	-1.6644	-6.23508	-4.99865				
		12	20	22	-1.1330	-0.3093	-5.51949	-2.47779	50%	0%	0%	50%

Appendix 4: Stage 1: 12 month review period – Quintile composition and T-statistic

					t statistic				Quintile composition			
Period	Review period	Hold months	Valid N Q1	Valid N Q5	Q1 vs Market rate of return	Q5 vs Market rate of return	adjusted Q1 vs Market rate of	adjusted Q5 vs Market rate of	Q1 Loser	Q1 Winner	Q5 Loser	Q5 Winner
1999	12	3	22	22	1.1098	2.3876	-0.84353	-7.1918				
		6	22	22	-0.1415	1.0398	-3.8073	-8.28797				
		9	22	22	1.0792	0.1875	0.319308	-2.893				
		12	22	22	0.6376	-0.8390	0.178722	-4.79865	50%	0%	0%	50%
2000	12	3	22	22	0.7653	-0.6209	-0.51739	-10.1447				
		6	22	22	0.8520	-0.7531	0.400661	-3.63952				
		9	22	22	1.6215	-0.1960	1.062285	-2.78377				
		12	22	22	0.7760	-1.2177	0.1682	-1.98574	50%	0%	0%	50%
2001	12	3	22	22	-0.5796	-2.4361	-5.96882	-20.5565				
		6	22	22	0.5085	0.8903	-0.93149	-3.24838				
		9	22	22	1.4436	2.4518	0.69456	1.515082				
		12	22	22	2.2189	3.6902	1.825902	4.322506	50%	0%	0%	50%
2002	12	3	22	22	0.7421	3.6866	-2.87846	-8.5294				
		6	22	22	0.9714	1.0236	-1.03632	-6.26115				
		9	22	22	0.6014	1.8394	-0.50853	1.004876				
		12	22	22	1.2478	1.6599	1.067066	2.271617	50%	0%	0%	50%
2003	12	3	22	22	0.9978	-1.2747	-8.54615	-23.5713				
		6	22	22	2.1362	1.0159	-6.44752	-2.58322				
		9	22	22	-0.0205	1.4396	0.094889	4.347592				
		12	22	22	0.9430	2.1841	1.609788	3.552308	50%	0%	0%	50%
2004	12	3	22	22	0.8979	-3.3097	0.857434	-32.8317				
		6	22	22	1.0237	-2.8878	1.281937	-12.083				
		9	22	22	0.5282	-1.6403	-0.02957	1.205071				
		12	22	22	0.5232	-1.5537	-0.31707	2.337705	50%	0%	0%	50%
2005	12	3	21	22	-0.9384	-0.0691	-2.16912	0.637063				
		6	21	22	-0.6835	-1.6008	-1.16982	-3.07868				
		9	21	22	-0.5721	-1.6328	-0.88459	-2.49297				
		12	21	22	-0.6480	-1.2395	-0.98251	-1.1664	50%	0%	0%	50%
2006	12	3	16	21	0.3793	-0.4327	0.09341	-1.93205				
		6	15	21	0.0054	0.3566	-0.28639	1.331335				
		9	15	21	0.0323	-0.2909	-0.29034	-0.14626				
		12	16	21	0.6465	0.2906	0.15189	0.512661	50%	0%	0%	50%
2007	12	3	14	21	-3.7098	-4.2511	-33.7501	-47.9339				
		6	14	21	-5.2693	-5.6938	-38.3231	-44.6823				
		9	14	21	-1.0687	-0.5267	-11.0545	-35.0677				
		12	14	21	-0.4350	-1.5626	-11.4145	-22.073	50%	0%	0%	50%
2008	12	3	14	20	-0.6944	0.3283	-18.4826	-35.5526				
		6	14	20	-0.9179	-1.5689	-6.61696	-11.4621				
		9	14	20	0.7645	-1.8755	0.164005	-5.01088				
		12	14	20	0.5338	-3.8902	-0.07772	-7.50365	50%	0%	5%	45%
2009	12	3	15	22	-0.6493	0.5385	-4.6008	-11.257				
		6	15	22	0.6378	2.1524	-1.97524	-5.38505				
		9	15	22	0.2962	1.7152	-0.27023	3.96414				
		12	15	22	0.5511	1.4567	0.505118	7.039998	50%	0%	0%	50%
2010	12	3	16	22	-2.4624	-1.7457	-29.335	-10.133				
		6	16	22	-0.6586	-1.1285	-7.56078	-7.93179				
		9	16	22	-0.0265	0.0849	-5.60754	-5.08063				
		12	16	22	-1.3925	0.0599	-6.79381	-2.41153	50%	0%	0%	50%

Appendix 5: Stage 2: ROE 12 and 24 month review period – Quintile composition and T-statistic

						t statistic				Quintile composition			
Period	Fundamental variable	Review period	Hold months	Valid N Q1	Valid N Q5	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 Loser	Q1 Winner	Q5 Loser	Q5 Winner
1999	ROE	12 months	12	22	22	-1.65113	0.73775	-7.46450	0.24146	50%	0%	0%	50%
			24	22	22	-1.96346	-1.32875	-2.62600	-2.36874				
			36	22	22	-0.06141	1.17590	-0.44473	0.71287				
1999	ROE	24 months	12	22	22	-2.04737	0.76987	-2.97009	0.43440	50%	0%	0%	50%
			24	22	22	-0.75054	2.13696	-1.45975	1.30126				
			36	22	22	0.73925	1.62297	0.00385	0.53812				
2000	ROE	12 months	12	22	22	0.38438	0.75208	0.12921	0.36599	50%	0%	0%	50%
			24	22	22	2.94691	3.24015	2.15766	2.26519				
			36	22	22	2.56406	4.04477	0.98052	2.08021				
2000	ROE	24 months	12	22	22	2.92953	4.28337	2.88429	5.65642	50%	0%	0%	50%
			24	22	22	2.63271	4.09321	2.55094	4.23816				
			36	22	22	2.21827	3.46718	0.92238	1.44573				
2001	ROE	12 months	12	22	22	2.39120	2.70545	1.84114	2.54259	50%	0%	0%	50%
			24	22	22	2.34581	4.17289	1.15620	5.43633				
			36	22	22	2.88908	3.66993	0.63999	2.82429				
2001	ROE	24 months	12	22	22	2.52120	0.96034	3.19712	1.36842	50%	0%	0%	50%
			24	22	22	2.28640	2.40148	1.33809	1.46722				
			36	22	22	2.00440	1.74726	-0.26860	-0.07889				
2002	ROE	12 months	12	22	22	1.78703	1.73836	2.37010	2.18151	50%	0%	0%	50%
			24	22	22	2.01679	2.70578	0.99412	1.34839				
			36	22	22	1.59866	1.91550	-0.35425	-0.30340				
2002	ROE	24 months	12	22	22	2.19720	1.94378	2.12256	2.74001	50%	0%	0%	50%
			24	21	22	1.73739	0.48358	0.64967	0.11661				
			36	21	22	1.04001	0.10358	-1.17306	-1.56220				
2003	ROE	12 months	12	22	22	1.69300	2.52062	1.23709	3.55963	50%	0%	0%	50%
			24	22	21	0.31801	0.31217	-0.56703	0.30825				
			36	22	21	-1.21883	0.28532	-2.44514	-1.54426				
2003	ROE	24 months	12	22	22	-0.41816	0.47238	-0.12555	-0.34185	50%	0%	0%	50%
			24	21	21	-1.22477	-4.22110	-1.81052	-3.56551				
			36	21	21	-0.78900	-2.64819	-1.95334	-3.24884				
2004	ROE	12 months	12	22	22	0.48458	0.88859	-0.34405	5.11761	50%	0%	0%	50%
			24	20	22	-2.12646	-1.27284	-2.60712	-0.72469				
			36	20	22	-0.36832	-1.30860	-1.58565	-2.37506				
2004	ROE	24 months	12	21	22	-0.37237	-1.43805	-0.59087	-1.58936	50%	0%	0%	50%
			24	21	22	0.02021	-0.14260	-0.73766	-0.75114				
			36	21	22	-1.41457	0.01888	-1.76241	-0.37269				
2005	ROE	12 months	12	22	22	-0.73226	-1.67287	-1.01787	-1.17499	50%	0%	0%	50%
			24	22	22	0.38352	-2.56331	-0.60118	-2.82163				
			36	22	22	0.46664	-3.96872	-0.03340	-7.11728				
2005	ROE	24 months	12	17	21	1.49297	-1.77895	0.89460	-3.04444	50%	0%	0%	50%
			24	17	21	1.18327	-2.95683	0.79089	-10.96438				
			36	16	21	-2.51173	-3.67842	-5.00553	-7.37431				
2006	ROE	12 months	12	17	22	1.07488	1.65731	0.48524	4.61752	50%	0%	0%	50%
			24	17	22	0.79329	0.70699	0.50502	-2.97031				
			36	16	22	-4.73543	-0.56149	-9.96969	-1.48774				
2006	ROE	24 months	12	14	21	-0.89819	0.55307	-11.46187	-8.03761	50%	0%	0%	50%
			24	14	21	0.39637	-0.55633	0.15677	-3.70031				
			36	14	21	-0.69148	0.30097	-0.99889	-0.09115				
2007	ROE	12 months	12	17	22	-1.21965	0.55007	-15.33642	-9.36937	50%	0%	0%	50%
			24	17	22	0.24241	-1.43266	0.07072	-5.72296				
			36	17	22	-1.47051	-0.46092	-2.08241	-1.21001				
2007	ROE	24 months	12	11	21	0.23392	-0.89926	-0.18854	0.08380	50%	0%	0%	50%
			24	11	21	-1.53063	-0.38112	-1.83788	-0.21829				
			36	11	21	-0.64845	-0.67836	-0.95400	-0.99706				
2008	ROE	12 months	12	20	22	-3.62874	0.77831	-5.70668	0.04596	50%	0%	0%	50%
			24	20	22	-2.00383	0.02580	-2.39695	0.38520				
			36	20	22	-2.48948	-0.19280	-2.85918	-0.56185				
2008	ROE	24 months	12	10	22	0.50392	-0.73147	0.41287	-1.49264	50%	0%	0%	50%
			24	10	22	0.16638	0.15373	-0.11890	-0.21364				
			36	0	0	0.00000	0.00000	0.00000	0.00000				
2009	ROE	12 months	12	20	21	-0.48398	0.81763	-0.81953	1.64651	50%	0%	0%	50%
			24	20	21	-1.93851	1.51858	-3.75958	1.30782				
			36	0	0	0.00000	0.00000	0.00000	0.00000				
2009	ROE	24 months	12	14	21	-1.19183	0.68869	-3.99949	-0.09310	50%	0%	0%	50%
			24	0	0	0.00000	0.00000	0.00000	0.00000				
			36	0	0	0.00000	0.00000	0.00000	0.00000				
2010	ROE	12 months	12	20	20	-2.18344	-0.01851	-6.81441	-4.32114	50%	0%	5%	45%
			24	0	0	0.00000	0.00000	0.00000	0.00000				
			36	0	0	0.00000	0.00000	0.00000	0.00000				

Appendix 6: Stage 2: OPCF 12 and 24 month review period – Quintile composition and T-statistic

						t statistic				Quintile composition			
Period	Fundamental variable	Review period	Hold months	Valid N Q1	Valid N Q5	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 Loser	Q1 Winner	Q5 Loser	Q5 Winner
1999	OPCF	12 months	12	22	22	-0.75074	-0.07339	-3.51901	-3.38085	50%	0%	0%	50%
			24	22	22	-0.39969	-1.35796	-0.85057	-2.18230				
			36	22	22	1.04415	0.16758	0.36057	-0.43263				
1999	OPCF	24 months	12	22	22	-1.23344	-2.17945	-1.86757	-3.53757	50%	0%	0%	50%
			24	22	22	1.65118	0.37167	1.03178	-0.11201				
			36	22	22	2.32230	1.04168	0.90793	0.29798				
2000	OPCF	12 months	12	22	22	0.55949	-0.77404	0.33700	-1.23422	50%	0%	0%	50%
			24	22	22	2.22097	1.67092	0.92788	1.23672				
			36	21	22	2.59109	2.70717	1.24570	2.38662				
2000	OPCF	24 months	12	22	22	3.27688	3.07729	3.32505	2.68104	50%	0%	0%	50%
			24	22	22	3.15612	3.87976	1.65565	4.72401				
			36	21	22	3.10783	3.56464	0.84433	1.43937				
2001	OPCF	12 months	12	22	22	2.54982	2.87922	1.99765	2.76944	50%	0%	0%	50%
			24	22	22	3.73817	2.39320	4.75184	1.82847				
			36	22	22	3.01053	2.64151	1.06018	0.88442				
2001	OPCF	24 months	12	22	22	2.00765	2.01879	2.58896	2.90084	50%	0%	0%	50%
			24	22	22	2.60047	2.92007	1.03451	0.99401				
			36	22	21	1.79005	3.31045	-0.41177	0.70950				
2002	OPCF	12 months	12	22	22	2.33724	1.89120	4.44240	2.62336	50%	0%	0%	50%
			24	22	22	2.89218	2.50250	1.26316	0.70730				
			36	22	21	2.08453	2.09456	-0.25900	0.02923				
2002	OPCF	24 months	12	22	22	1.65320	1.56668	1.40166	1.54230	50%	0%	0%	50%
			24	22	22	1.34423	0.94936	0.04509	0.35386				
			36	22	22	1.03598	-0.40860	-1.22696	-1.55487				
2003	OPCF	12 months	12	22	22	1.22677	4.13655	0.80858	5.80604	50%	0%	0%	50%
			24	21	22	0.13885	2.24540	-0.85419	1.72492				
			36	21	22	-0.54081	1.51411	-1.88232	-0.80703				
2003	OPCF	24 months	12	22	22	-2.95725	-1.71227	-3.29118	3.04547	50%	0%	0%	50%
			24	22	22	-3.28091	-2.83144	-3.57766	-2.57212				
			36	22	22	-1.49010	-4.26692	-2.37328	-4.64181				
2004	OPCF	12 months	12	22	22	-1.84605	0.98664	-2.09236	-0.04102	50%	0%	0%	50%
			24	21	21	-3.33492	-0.16880	-3.64552	-0.92570				
			36	21	21	-2.47128	0.40227	-3.11605	-1.33497				
2004	OPCF	24 months	12	21	22	-0.92759	-2.15303	-1.27379	-0.88712	50%	0%	0%	50%
			24	21	22	-0.06562	-1.39368	-0.77517	-0.71430				
			36	21	22	-0.89087	-2.06857	-1.20975	-3.72757				
2005	OPCF	12 months	12	22	22	0.08937	-0.51218	-0.11804	2.00153	50%	0%	0%	50%
			24	22	22	0.25298	0.80977	-0.65967	-0.09569				
			36	22	22	-0.25490	-0.18930	-0.61601	-0.55645				
2005	OPCF	24 months	12	20	20	0.36343	1.07469	0.93816	0.81001	50%	0%	0%	50%
			24	20	20	-0.34804	0.57183	-3.77838	0.08218				
			36	20	20	-1.21930	-1.30770	-2.38770	-2.89534				
2006	OPCF	12 months	12	18	22	0.15560	2.14254	-0.19274	2.69955	50%	0%	0%	50%
			24	18	22	0.49690	0.81142	0.21931	0.32522				
			36	17	22	-2.04472	-0.92985	-3.49961	-1.88803				
2006	OPCF	24 months	12	16	21	-1.17687	-1.57048	-32.07396	-17.07617	50%	0%	0%	50%
			24	16	21	0.26565	-2.50009	0.08579	-7.68537				
			36	16	21	-1.06149	-2.55577	-1.84629	-4.72360				
2007	OPCF	12 months	12	22	22	-1.72052	-0.28178	-25.42123	-13.74138	50%	0%	0%	50%
			24	22	22	0.05499	-0.71161	-0.07511	-3.55572				
			36	22	22	-1.70556	0.19512	-2.88393	-0.23532				
2007	OPCF	24 months	12	19	21	-2.96177	0.82754	-5.02875	0.07983	50%	0%	0%	50%
			24	19	21	-2.04418	0.19936	-2.36457	0.59318				
			36	19	21	-1.03711	-0.18586	-1.42926	-0.56689				
2008	OPCF	12 months	12	20	22	-2.54127	0.33710	-3.92213	-0.25832	50%	0%	0%	50%
			24	20	22	-1.38844	-0.45578	-1.77602	-0.11848				
			36	20	22	-1.61154	-0.76415	-1.97171	-1.21295				
2008	OPCF	24 months	12	14	21	0.07374	1.33809	0.06813	3.58646	50%	0%	0%	50%
			24	14	21	-1.09506	0.44895	-2.00423	0.16731				
			36	0	0	0.00000	0.00000	0.00000	0.00000				
2009	OPCF	12 months	12	20	21	0.38735	1.88754	0.61436	6.37756	50%	0%	0%	50%
			24	20	21	-1.27717	2.16823	-2.37761	2.18986				
			36	0	0	0.00000	0.00000	0.00000	0.00000				
2009	OPCF	24 months	12	13	22	0.89709	1.21355	-0.85936	0.82030	50%	0%	0%	50%
			24	0	0	0.00000	0.00000	0.00000	0.00000				
			36	0	0	0.00000	0.00000	0.00000	0.00000				
2010	OPCF	12 months	12	20	22	-2.36287	-1.68051	-10.28430	-8.21482	50%	0%	0%	50%
			24	0	0	0.00000	0.00000	0.00000	0.00000				
			36	0	0	0.00000	0.00000	0.00000	0.00000				

Appendix 7: Stage 2: EBITDA 12 and 24 month review period – Quintile composition and T-statistic

						t statistic				Quintile composition			
Period	Fundamental variable	Review period	Hold months	Valid N Q1	Valid N Q5	Q1 vs Market rate of return	Q5 vs Market rate of return	Risk adjusted Q1 vs Market rate of return	Risk adjusted Q5 vs Market rate of return	Q1 Loser	Q1 Winner	Q5 Loser	Q5 Winner
1999	EBITDA	12 months	12	22	22	0.68929	-0.54900	0.20998	-2.50237	50%	0%	0%	50%
			24	22	22	-1.32888	-0.40640	-1.95899	-0.85101				
			36	22	22	0.94475	0.41906	0.31459	-0.09742				
1999	EBITDA	24 months	12	22	22	-0.87019	-1.47042	-1.38490	-2.33200	50%	0%	0%	50%
			24	22	22	1.23459	-0.30787	0.53121	-1.01745				
			36	22	22	1.28084	0.72399	0.28700	0.14808				
2000	EBITDA	12 months	12	22	22	0.00326	-3.43413	-0.46139	-6.52243	50%	0%	0%	50%
			24	22	22	1.98151	1.06740	0.72326	0.47554				
			36	21	22	0.89164	1.65789	0.40506	0.49910				
2000	EBITDA	24 months	12	22	22	2.73830	2.83065	2.58508	2.56809	50%	0%	0%	50%
			24	22	22	1.91621	4.29713	1.43500	4.36491				
			36	22	22	1.87854	3.58599	0.69568	1.42887				
2001	EBITDA	12 months	12	22	22	2.89411	2.25008	2.28137	1.88484	50%	0%	0%	50%
			24	22	22	2.11753	1.51031	1.23103	0.95953				
			36	22	22	2.50770	1.79696	0.60351	0.56466				
2001	EBITDA	24 months	12	22	22	-0.02388	1.08341	-0.50098	1.14223	50%	0%	0%	50%
			24	22	22	1.47334	1.97063	0.53089	0.95563				
			36	22	22	0.71024	1.27257	-0.82775	-0.58882				
2002	EBITDA	12 months	12	22	22	1.04509	0.30394	1.11807	0.17352	50%	0%	0%	50%
			24	22	22	1.78865	1.30174	0.81811	1.39840				
			36	22	22	1.17617	1.01734	-0.59367	-0.21933				
2002	EBITDA	24 months	12	22	22	1.59619	2.40715	1.62157	3.22665	50%	0%	0%	50%
			24	22	21	-0.05199	2.10327	0.50604	0.84916				
			36	22	21	-0.73383	1.83815	-2.12432	-0.80438				
2003	EBITDA	12 months	12	22	22	2.06456	1.76524	1.50333	3.41330	50%	0%	0%	50%
			24	21	22	0.96102	-0.06170	-0.23917	0.67071				
			36	21	22	-0.83717	0.07017	-2.16434	-1.70205				
2003	EBITDA	24 months	12	22	22	0.36864	-0.60670	-0.40643	0.56414	50%	0%	0%	50%
			24	21	21	-2.10723	-3.45290	-2.61547	-1.94270				
			36	21	21	-1.92410	-2.31209	-2.60043	-2.76116				
2004	EBITDA	12 months	12	22	22	0.49399	-1.25336	-0.33965	0.18108	50%	0%	0%	50%
			24	20	22	-1.84149	-4.33098	-2.38047	-3.58426				
			36	20	22	-0.40694	-3.34143	-1.57341	-3.82915				
2004	EBITDA	24 months	12	21	22	-0.26319	-1.24772	-0.47682	2.19099	50%	0%	0%	50%
			24	21	22	0.34358	-1.17581	-0.58737	-0.77289				
			36	21	22	-0.35927	-1.63365	-0.62723	-2.87856				
2005	EBITDA	12 months	12	22	22	-0.14101	-1.68287	-0.33037	0.81430	50%	0%	0%	50%
			24	22	22	0.01445	0.02126	-0.78443	-0.44340				
			36	22	22	-0.15607	-0.32925	-0.52403	-0.69648				
2005	EBITDA	24 months	12	18	21	0.20584	-1.36342	-0.13799	-2.64426	50%	0%	0%	50%
			24	18	21	-0.03394	-2.46693	-0.40319	-9.12474				
			36	18	21	-3.24052	-2.63168	-5.63773	-4.92635				
2006	EBITDA	12 months	12	17	22	-2.50157	2.06599	-5.15943	1.52017	50%	0%	0%	50%
			24	17	22	-0.96171	0.88822	-4.42648	0.55876				
			36	17	21	-3.22082	-3.16269	-6.47307	-6.21178				
2006	EBITDA	24 months	12	14	22	-0.03247	-1.16944	-6.51234	-12.01445	50%	0%	0%	50%
			24	14	22	-2.97611	0.08139	-7.47268	-0.05878				
			36	14	22	-3.03949	-1.27531	-5.10853	-2.18262				
2007	EBITDA	12 months	12	17	22	-1.45769	-2.27663	-12.70440	-38.97947	50%	0%	0%	50%
			24	17	22	-0.02004	-2.85924	-0.07039	-10.82048				
			36	17	22	-2.00414	-1.59226	-3.00297	-3.17820				
2007	EBITDA	24 months	12	10	21	-4.06831	-2.20441	-7.94535	-3.38752	50%	0%	0%	50%
			24	10	21	-2.30817	-2.35757	-2.88465	-2.86107				
			36	10	21	-2.27994	-4.66722	-2.48102	-6.29037				
2008	EBITDA	12 months	12	20	22	-3.48162	0.70593	-5.40605	-0.00428	50%	0%	0%	50%
			24	20	22	-1.67608	-0.06834	-2.05977	0.39331				
			36	20	22	-2.05520	0.07702	-2.33357	-0.35872				
2008	EBITDA	24 months	12	8	22	0.87127	-0.96658	0.79879	-2.09521	50%	0%	0%	50%
			24	8	22	0.36510	-0.87190	0.02975	-1.73387				
			36			0.00000	0.00000	0.00000	0.00000				
2009	EBITDA	12 months	12	19	22	-0.05467	1.22243	0.20065	2.39764	50%	0%	0%	50%
			24	19	22	-0.55606	1.92542	-1.24542	1.81934				
			36	0	0	0.00000	0.00000	0.00000	0.00000				
2009	EBITDA	24 months	12	13	22	0.24234	0.01245	-0.44165	-7.40090	50%	0%	0%	50%
			24	0	0	0.00000	0.00000	0.00000	0.00000				
			36	0	0	0.00000	0.00000	0.00000	0.00000				
2010	EBITDA	12 months	12	20	22	-1.95585	0.57913	-6.78862	-0.33496	50%	0%	0%	50%
			24	0	0	0.00000	0.00000	0.00000	0.00000				
			36	0	0	0.00000	0.00000	0.00000	0.00000				

Appendix 8: Stage 3: ROE 12: 6 month review period - T-statistic

						t statistic			
Period	Fundamental variable	Review period	Hold months	Valid N loselose	Valid N winwin	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return
1999	ROE 12	12: 6 months	12	35	16	-1.68336	0.5348	-8.11573	0.155415
	ROE 12	12: 6 months	24	35	16	-0.85333	-2.30581	-1.67944	-4.67198
	ROE 12	12: 6 months	36	35	16	1.84283	0.703595	1.123772	0.363414
2000	ROE 12	12: 6 months	12	47	8	-1.98508	1.250472	-3.2176	6.013579
	ROE 12	12: 6 months	24	47	8	1.829152	2.405952	1.100282	2.393033
	ROE 12	12: 6 months	36	47	8	2.472093	2.735338	1.29146	2.200977
2001	ROE 12	12: 6 months	12	34	28	2.573251	4.086149	2.049835	4.70407
	ROE 12	12: 6 months	24	34	28	3.232772	6.104796	3.239873	9.346777
	ROE 12	12: 6 months	36	33	28	2.764618	4.633711	0.933231	2.495729
2002	ROE 12	12: 6 months	12	30	32	1.0137	2.297992	1.060782	4.188982
	ROE 12	12: 6 months	24	30	32	1.749021	3.136472	0.770643	1.590681
	ROE 12	12: 6 months	36	30	32	1.656145	2.147724	-0.65779	-0.31756
2003	ROE 12	12: 6 months	12	28	37	1.819436	3.460856	1.282789	5.853144
	ROE 12	12: 6 months	24	28	37	1.129085	1.811053	-0.5371	1.199037
	ROE 12	12: 6 months	36	28	37	-0.11916	1.780636	-1.87809	-1.28437
2004	ROE 12	12: 6 months	12	24	35	0.223124	-1.24738	-0.49082	3.102098
	ROE 12	12: 6 months	24	23	35	-1.24767	-2.24469	-1.92238	-0.96217
	ROE 12	12: 6 months	36	23	35	-0.49956	-2.8519	-1.63773	-3.78176
2005	ROE 12	12: 6 months	12	18	42	-3.00364	-2.70955	-4.05162	-0.68266
	ROE 12	12: 6 months	24	18	42	-1.18818	-2.31387	-1.43737	-2.20177
	ROE 12	12: 6 months	36	18	42	-1.1676	-2.41123	-1.2564	-3.91587
2006	ROE 12	12: 6 months	12	19	33	0.034287	1.024641	-0.29915	1.935055
	ROE 12	12: 6 months	24	19	33	0.888401	-0.13319	0.57103	-3.82945
	ROE 12	12: 6 months	36	18	33	-2.19378	-1.04955	-3.22771	-2.26643
2007	ROE 12	12: 6 months	12	22	28	0.85285	-0.46702	-11.1204	-15.7339
	ROE 12	12: 6 months	24	22	28	0.642459	-1.46136	0.288387	-5.76036
	ROE 12	12: 6 months	36	22	28	0.360129	-0.33042	-0.04188	-1.02125
2008	ROE 12	12: 6 months	12	51	13	-5.06309	-1.40888	-8.63252	3.8665
	ROE 12	12: 6 months	24	51	13	-3.19476	0.423627	-3.76647	1.009427
	ROE 12	12: 6 months	36	51	13	-3.47995	0.719829	-4.22008	0.699484
2009	ROE 12	12: 6 months	12	25	17	0.167491	0.36984	0.608632	1.106217
	ROE 12	12: 6 months	24	25	17	-0.82832	0.94593	-1.66951	0.890998
2010	ROE 12	12: 6 months	12	21	15	-0.61409	-0.14246	-9.45072	-4.18838

Appendix 9: Stage 3: OPCF 12: 6 month review period - T-statistic

						t statistic			
Period	Fundamental variable	Review period	Hold months	Valid N loselose	Valid N winwin	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return
1999	OPCF 12	12: 6 months	12	33	27	-1.85841	-2.4585	-7.86305	-15.8027
	OPCF 12	12: 6 months	24	33	27	-0.97779	-1.88067	-1.80421	-3.12588
	OPCF 12	12: 6 months	36	33	27	1.813186	0.189629	1.036542	-0.4689
2000	OPCF 12	12: 6 months	12	47	14	-0.62966	0.334282	-1.30713	0.812002
	OPCF 12	12: 6 months	24	47	14	2.865468	2.257927	1.948672	2.057532
	OPCF 12	12: 6 months	36	47	14	3.549868	2.616075	1.764533	1.670618
2001	OPCF 12	12: 6 months	12	31	25	3.319536	4.718086	3.018892	6.311279
	OPCF 12	12: 6 months	24	31	25	4.762096	4.027307	5.772122	3.657052
	OPCF 12	12: 6 months	36	30	25	3.512309	3.761016	1.4822	1.465879
2002	OPCF 12	12: 6 months	12	34	34	0.94033	2.377223	0.919465	3.707243
	OPCF 12	12: 6 months	24	34	34	2.167752	2.674595	1.050179	0.843022
	OPCF 12	12: 6 months	36	34	33	1.780672	2.121229	-0.68532	0.200323
2003	OPCF 12	12: 6 months	12	35	32	2.079902	4.891573	1.732681	9.154067
	OPCF 12	12: 6 months	24	34	32	1.112847	2.970517	-0.62867	3.281882
	OPCF 12	12: 6 months	36	34	32	-0.59053	2.136619	-2.31492	-0.47088
2004	OPCF 12	12: 6 months	12	25	42	0.439568	0.490626	-0.34959	-0.38419
	OPCF 12	12: 6 months	24	24	41	-1.30193	-1.9557	-2.04257	0.511685
	OPCF 12	12: 6 months	36	24	41	-0.70488	-1.01069	-1.87075	-2.72342
2005	OPCF 12	12: 6 months	12	18	35	-2.29268	-0.50126	-2.93281	5.104642
	OPCF 12	12: 6 months	24	18	35	-2.3543	-0.2143	-2.38052	-0.63146
	OPCF 12	12: 6 months	36	18	35	-3.81679	-1.84473	-5.41526	-3.0457
2006	OPCF 12	12: 6 months	12	21	33	-0.92787	0.159131	-1.22702	0.110364
	OPCF 12	12: 6 months	24	21	33	-0.11489	-2.39892	-0.38701	-10.3036
	OPCF 12	12: 6 months	36	20	33	-2.4837	-2.70005	-3.85233	-5.20338
2007	OPCF 12	12: 6 months	12	28	27	-0.03758	-0.89187	-10.7874	-17.471
	OPCF 12	12: 6 months	24	28	27	0.066628	-1.45663	-0.12914	-6.73023
	OPCF 12	12: 6 months	36	28	27	-1.66765	-0.48245	-3.30608	-1.27758
2008	OPCF 12	12: 6 months	12	43	8	-4.15953	-0.80092	-6.90485	2.167694
	OPCF 12	12: 6 months	24	43	8	-2.37743	0.328283	-2.82331	0.414568
	OPCF 12	12: 6 months	36	43	8	-2.22418	0.520844	-2.78751	0.280189
2009	OPCF 12	12: 6 months	12	25	19	0.439274	1.738045	0.661235	5.418501
	OPCF 12	12: 6 months	24	25	19	-1.42194	1.853692	-2.4574	2.181058
2010	OPCF 12	12: 6 months	12	16	25	-1.521	-0.11438	-15.3455	-1.84927

Appendix 10: Stage 3: EBITDA 12: 6 month review period - T-statistic

						t statistic			
Period	Fundamental variable	Review period	Hold months	Valid N loselose	Valid N winwin	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return
1999	EBITDA 12	12: 6 months	12	28	34	-1.3066	-1.61893	-7.26962	-8.95358
	EBITDA 12	12: 6 months	24	28	34	-0.68796	-0.84225	-1.40945	-1.5146
	EBITDA 12	12: 6 months	36	28	34	1.602	0.601346	0.903605	-0.07244
2000	EBITDA 12	12: 6 months	12	36	22	0.619954	0.829343	0.16594	1.583545
	EBITDA 12	12: 6 months	24	36	22	2.828716	3.413931	1.918858	3.244779
	EBITDA 12	12: 6 months	36	36	22	3.3187	3.380853	1.664551	1.607379
2001	EBITDA 12	12: 6 months	12	25	37	2.776321	4.566936	2.359369	5.129455
	EBITDA 12	12: 6 months	24	25	37	3.675714	4.774909	4.067996	4.286949
	EBITDA 12	12: 6 months	36	24	37	2.940402	5.022925	0.955156	2.254994
2002	EBITDA 12	12: 6 months	12	26	49	0.82422	3.41231	0.828501	7.755142
	EBITDA 12	12: 6 months	24	26	49	1.54787	4.240471	0.672756	3.226002
	EBITDA 12	12: 6 months	36	26	49	0.837594	2.780793	-0.90684	0.136903
2003	EBITDA 12	12: 6 months	12	23	48	2.270766	4.368377	1.519039	8.548648
	EBITDA 12	12: 6 months	24	22	48	1.281899	2.521411	-0.37107	2.510538
	EBITDA 12	12: 6 months	36	22	48	0.043103	1.977651	-1.5272	-1.35028
2004	EBITDA 12	12: 6 months	12	23	50	0.543861	-1.9832	-0.27694	4.246847
	EBITDA 12	12: 6 months	24	22	50	-0.71598	-3.94012	-1.60129	-0.58817
	EBITDA 12	12: 6 months	36	22	50	-0.05191	-3.13441	-1.42184	-4.16067
2005	EBITDA 12	12: 6 months	12	16	59	-3.18632	-1.6756	-4.41037	4.702443
	EBITDA 12	12: 6 months	24	16	59	-5.46622	-0.82291	-6.67374	-0.70846
	EBITDA 12	12: 6 months	36	16	59	-3.46206	-2.05869	-4.75161	-3.52709
2006	EBITDA 12	12: 6 months	12	13	54	-3.34455	0.642147	-5.95791	1.038303
	EBITDA 12	12: 6 months	24	13	54	-1.18831	-2.00053	-2.64462	-9.34468
	EBITDA 12	12: 6 months	36	13	54	-3.12306	-3.16526	-4.86186	-6.03772
2007	EBITDA 12	12: 6 months	12	15	43	-0.54539	-1.73784	-8.29975	-26.5361
	EBITDA 12	12: 6 months	24	15	43	0.087618	-2.47739	-0.00016	-9.74066
	EBITDA 12	12: 6 months	36	15	43	-1.63722	-1.36606	-2.50592	-2.82816
2008	EBITDA 12	12: 6 months	12	32	15	-5.25241	-0.28905	-8.96857	2.933943
	EBITDA 12	12: 6 months	24	32	15	-2.85769	0.591948	-3.4535	1.174254
	EBITDA 12	12: 6 months	36	32	15	-3.56988	0.869798	-4.15128	0.889569
2009	EBITDA 12	12: 6 months	12	19	25	0.190401	0.951048	0.348401	2.717326
	EBITDA 12	12: 6 months	24	19	25	-0.25571	1.022688	-0.71257	0.969008
2010	EBITDA 12	12: 6 months	12	15	23	-0.60302	1.093112	-6.90141	0.532353

Appendix 11: Stage 3: ROE 24: 12 month review period - T-statistic

						t statistic			
Period	Fundamental variable	Review period	Hold months	Valid N loselose	Valid N winwin	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return
1999	ROE 24	24: 12 month	12	41	15	-1.42714	0.356661	-2.33872	3.319381
	ROE 24	24: 12 month	24	41	15	1.967868	2.876657	1.183891	3.590884
	ROE 24	24: 12 month	36	41	15	2.484143	2.543743	0.962345	2.016444
2000	ROE 24	24: 12 month	12	48	18	4.160509	4.873335	3.638906	7.665583
	ROE 24	24: 12 month	24	48	18	3.858173	4.10032	2.544588	4.294198
	ROE 24	24: 12 month	36	47	18	4.391799	3.432251	1.377992	1.205489
2001	ROE 24	24: 12 month	12	46	24	2.621268	3.039637	3.669944	7.090523
	ROE 24	24: 12 month	24	46	24	3.098515	4.636064	1.199639	4.762536
	ROE 24	24: 12 month	36	45	24	2.584106	3.379099	-0.07758	1.329912
2002	ROE 24	24: 12 month	12	27	31	1.842323	3.16964	2.193661	5.633016
	ROE 24	24: 12 month	24	26	31	0.112873	0.951625	-0.43882	0.563146
	ROE 24	24: 12 month	36	26	31	-0.43277	0.223522	-2.12273	-1.60908
2003	ROE 24	24: 12 month	12	23	36	0.705121	-3.72708	-0.17446	15.15888
	ROE 24	24: 12 month	24	22	36	-0.5059	-2.45645	-1.51116	0.749546
	ROE 24	24: 12 month	36	22	36	-0.84442	-1.46257	-1.84383	-2.82467
2004	ROE 24	24: 12 month	12	22	47	-1.06618	-2.07393	-1.25585	-1.14559
	ROE 24	24: 12 month	24	22	47	-0.38166	-2.25496	-1.04119	-2.30516
	ROE 24	24: 12 month	36	22	47	-1.83221	-2.48415	-2.44203	-4.0519
2005	ROE 24	24: 12 month	12	17	41	0.555386	-1.69219	0.105803	-3.4606
	ROE 24	24: 12 month	24	17	41	1.067735	-1.31249	0.69986	-7.64033
	ROE 24	24: 12 month	36	16	41	-2.75448	-1.33581	-4.39252	-2.77399
2006	ROE 24	24: 12 month	12	9	43	2.504793	-0.74745	-4.54747	-24.38
	ROE 24	24: 12 month	24	9	43	0.539432	-0.88695	0.204248	-6.02259
	ROE 24	24: 12 month	36	9	43	-0.25896	-0.16264	-0.51483	-1.00197
2007	ROE 24	24: 12 month	12	17	30	-2.30337	-1.53632	-3.30036	0.696396
	ROE 24	24: 12 month	24	17	30	-1.1575	-0.30441	-1.51314	0.789494
	ROE 24	24: 12 month	36	17	30	-1.32579	-0.11219	-1.66581	-0.46882
2008	ROE 24	24: 12 month	12	41	10	1.453061	0.376591	3.109851	2.541338
	ROE 24	24: 12 month	24	41	10	-0.16468	1.358984	-0.74729	1.188039
2009	ROE 24	24: 12 month	12	30	14	-1.74219	0.179148	-7.04012	-2.32183

Appendix 12: Stage 3: OPCF 24: 12 month review period - T-statistic

						t statistic			
Period	Fundamental variable	Review period	Hold months	Valid N loselose	Valid N winwin	Loselose vs Market rate of retum	Winwin vs Market rate of retum	Risk adjusted Loselose vs Market rate of retum	Risk adjusted Winwin vs Market rate of retum
1999	OPCF 24	24: 12 month	12	31	22	-1.22484	-1.52049	-2.0057	-2.11767
	OPCF 24	24: 12 month	24	31	22	1.671199	2.218375	0.909951	2.839438
	OPCF 24	24: 12 month	36	31	22	1.601883	2.629788	0.519901	1.98055
2000	OPCF 24	24: 12 month	12	47	20	4.620619	5.243785	4.132549	7.776805
	OPCF 24	24: 12 month	24	47	20	4.314387	5.848605	2.916043	9.300614
	OPCF 24	24: 12 month	36	46	20	4.698945	4.090166	1.534479	1.802304
2001	OPCF 24	24: 12 month	12	40	23	1.474778	1.637757	1.839533	2.49982
	OPCF 24	24: 12 month	24	40	23	2.32746	2.954772	1.408261	2.894671
	OPCF 24	24: 12 month	36	40	23	0.96484	1.784634	-0.97226	-0.15433
2002	OPCF 24	24: 12 month	12	26	32	1.84616	2.483189	2.212907	3.006524
	OPCF 24	24: 12 month	24	25	32	0.379911	1.261736	0.06149	0.93721
	OPCF 24	24: 12 month	36	25	32	-1.79598	0.045653	-2.89322	-1.51847
2003	OPCF 24	24: 12 month	12	27	31	0.860618	-3.46068	-0.23818	11.98002
	OPCF 24	24: 12 month	24	25	31	-1.6355	-3.09321	-2.25711	-1.46419
	OPCF 24	24: 12 month	36	25	31	-1.18902	-2.68906	-2.08928	-3.56125
2004	OPCF 24	24: 12 month	12	19	44	-1.21847	-1.62404	-1.49813	5.475572
	OPCF 24	24: 12 month	24	19	44	-0.14706	-1.36716	-0.82886	-0.68978
	OPCF 24	24: 12 month	36	19	44	-0.4255	-1.67267	-0.68058	-2.76824
2005	OPCF 24	24: 12 month	12	17	37	-0.29379	-0.86219	-0.57861	-1.61124
	OPCF 24	24: 12 month	24	17	37	0.272725	-1.69694	0.058814	-9.02035
	OPCF 24	24: 12 month	36	16	37	-3.54925	-2.11341	-6.23657	-4.46182
2006	OPCF 24	24: 12 month	12	12	40	2.775534	-2.50588	-0.66716	-23.9893
	OPCF 24	24: 12 month	24	12	40	0.588139	-3.02258	0.24499	-9.72646
	OPCF 24	24: 12 month	36	12	40	-0.12473	-2.80408	-0.47505	-5.21378
2007	OPCF 24	24: 12 month	12	13	32	-2.77465	0.645266	-4.17106	-0.04789
	OPCF 24	24: 12 month	24	13	32	-1.06027	-0.47252	-1.36867	0.089325
	OPCF 24	24: 12 month	36	13	32	-1.8743	-0.87447	-2.1461	-1.19563
2008	OPCF 24	24: 12 month	12	40	12	0.179029	0.347457	0.299155	3.561651
	OPCF 24	24: 12 month	24	40	12	-1.43733	1.325743	-2.83532	1.230302
2009	OPCF 24	24: 12 month	12	30	23	-2.43925	-0.40532	-10.6988	-6.92828

Appendix 13: Stage 3: EBITDA 24: 12 month review period - T-statistic

						t statistic			
Period	Fundamental variable	Review period	Hold months	Valid N loselose	Valid N winwin	Loselose vs Market rate of return	Winwin vs Market rate of return	Risk adjusted Loselose vs Market rate of return	Risk adjusted Winwin vs Market rate of return
1999	EBITDA 24	24: 12 month	12	31	28	-0.66218	-1.96788	-1.28743	-2.90761
	EBITDA 24	24: 12 month	24	31	28	2.114091	2.394425	1.190293	2.41408
	EBITDA 24	24: 12 month	36	31	28	1.85401	3.22665	0.610306	2.707342
2000	EBITDA 24	24: 12 month	12	36	31	3.66018	4.860427	3.220519	6.167978
	EBITDA 24	24: 12 month	24	36	31	2.967512	5.030974	1.894783	5.133437
	EBITDA 24	24: 12 month	36	36	31	3.588151	4.345836	1.014353	1.783674
2001	EBITDA 24	24: 12 month	12	28	28	0.860086	2.548003	0.985373	5.244206
	EBITDA 24	24: 12 month	24	28	28	1.727154	3.52165	0.34623	2.31568
	EBITDA 24	24: 12 month	36	27	28	1.109	2.599858	-0.17854	-0.00369
2002	EBITDA 24	24: 12 month	12	23	44	1.383588	3.47715	1.172914	5.376106
	EBITDA 24	24: 12 month	24	23	44	-0.0216	1.974299	-0.71768	1.142503
	EBITDA 24	24: 12 month	36	23	44	-1.71932	1.556131	-2.78582	-1.49778
2003	EBITDA 24	24: 12 month	12	18	47	0.993247	-3.04502	-0.09336	17.21339
	EBITDA 24	24: 12 month	24	17	47	-0.44547	-2.67557	-1.28486	1.078419
	EBITDA 24	24: 12 month	36	17	47	-0.63242	-1.05805	-1.46553	-2.87857
2004	EBITDA 24	24: 12 month	12	22	63	-1.1073	-2.92472	-1.3079	-0.39013
	EBITDA 24	24: 12 month	24	22	63	0.179939	-2.25942	-0.70397	-1.60726
	EBITDA 24	24: 12 month	36	22	63	-0.37859	-2.35839	-0.69733	-3.95321
2005	EBITDA 24	24: 12 month	12	18	56	0.346719	-0.2871	-0.06423	-0.51929
	EBITDA 24	24: 12 month	24	18	56	0.782954	-1.28163	0.496321	-8.08121
	EBITDA 24	24: 12 month	36	17	56	-3.40656	-2.3556	-5.5956	-4.76324
2006	EBITDA 24	24: 12 month	12	8	57	2.137061	-2.56704	-3.93022	-36.4669
	EBITDA 24	24: 12 month	24	8	57	-1.9393	-2.7845	-4.64594	-10.7627
	EBITDA 24	24: 12 month	36	8	57	-1.28135	-1.49215	-2.03877	-3.15288
2007	EBITDA 24	24: 12 month	12	7	52	-5.28741	0.027332	-11.3527	-0.61512
	EBITDA 24	24: 12 month	24	7	52	-2.86689	-1.10923	-3.53826	-0.62837
	EBITDA 24	24: 12 month	36	7	52	-3.97184	-0.68963	-5.30595	-1.16986
2008	EBITDA 24	24: 12 month	12	20	14	1.437699	-0.41995	2.027676	0.424427
	EBITDA 24	24: 12 month	24	20	14	-0.42657	0.370563	-0.84136	0.50915
2009	EBITDA 24	24: 12 month	12	25	26	-0.71602	0.386188	-2.42348	-4.85773

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LIST OF ABBREVIATIONS

CAPM	Capital Asset Pricing Model
EBITDA	Earnings before interest, tax, depreciation and amortisation
JSE	Johannesburg Stock Exchange
OPCF	Operating cash flow
ROE	Return on equity