UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

GORDON INSTITUTE
OF BUSINESS SCIENCE
University of Pretoria

MBA 2011/12

Fundamental momentum as an investment timing indicator for value portfolios

Marinus Yates
23061210

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

7 November 2012

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Abstract

The problem associated with value shares is that they may remain undervalued for an extended period of time. Therefore, determining when to buy value shares has been the focus of many investors and academics. Studies have determined fundamentals provide valuable information when selecting shares while price momentum provides a decent timing indicator. This research examines a novel share selection approach which seeks to combine fundamentals with momentum to obtain a leading timing indicator.

This research seeks to determine if the fundamental momentum indicator can successfully and consistently separate value winners from value losers. The value portfolios were formed using a composite valuation measure made of three separate indicators. The Value portfolio was then ranked based on the strength of the fundamental momentum indicator.

This research identified that Leverage Factor and Current Ratio momentum was able to separate value winners from losers in a consistent manner. However, only Current Ratio momentum was capable of creating portfolios which could consistently outperform the market. Therefore, this research identified that fundamental momentum could be used as a timing indicator when acquiring value shares.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Keywords

Value strategies, fundamental analysis, momentum, composite value measures, investment timing

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

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.

_____ _____

Marinus Yates Date

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Acknowledgements

I would like to thank Dieter Halfer, my supervisor, for his guidance throughout this process.

I would also like to thank Stephanie for her patience and understanding. She has provided me with tremendous support throughout this period.

I would like to thank my Honda 250X for keeping me warm at night. Also I would like to thank my ninja skills for those amazingly sharp reflexes and my ability to enter the house without waking anyone.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

TABLE OF CONTENTS

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Table of Figures

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

1. INTRODUCTION TO THE RESEARCH PROBLEM

1.1 Research Title

Fundamental momentum as an investment timing indicator for value portfolios.

1.2 Introduction

Determining when to invest in equity shares has been the focus of many investors' strategies. Muller & Ward (2012) argue that investment finance is a methodology which allows investors to consistently beat the market. Beating the market refers to earning returns in excess of the market average. There are a plethora of different investing styles, each with the aim of trying to extract as much gains as possible from the market. These investing strategies include contrarian investing, momentum investing and value investing to name but a few.

Extracting value is difficult as markets have proven to be volatile, impulsive and erratic. According to Timmermann & Granger (2004), a market is efficient if the share price reflects all the information available. If this was true and markets were efficient, there would be a large degree of consensus and therefore the market would react similarly to new information. Therefore, the best outcome would be to match the market's performance because investors would be unable to persistently beat the market over a period of time.

1.3 Research Problem

Yu & Kim (2009) argue that markets respond gradually to new information as earnings surprises and markets can predict large drifts in future returns. This argument disagrees with the efficient market hypothesis. In support of this, Yu & Kim (2009) claim that profitable investments are only possible if the investment is purchased at a reasonable price.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

A method that could be used to identify reasonable priced shares is the theory of value investing. Value investing is the science of buying cheap shares based on the use of fundamental analysis (Muller & Ward, 2012). Pätäri, Leivo, & Honkapuro (2012) suggest that the price of value stocks may remain low for an extended period of time as they are out of favour with investors. The argument proposes that due to the uncertainty of how long a value stock will remain undervalued, a value portfolio could be complemented with a timing indicator. The timing indicator would potentially indicate when to buy undervalued stocks (Pätäri et al., 2012).

Pätäri et al. (2012) have indicated that various studies have been performed to investigate the use of earnings momentum and price momentum as a timing indicator. The added value of these momentum indicators originates from the fact that value stocks may remain undervalued for some time. This would ensure that the stocks are not bought too early (Pätäri et al., 2012). Their findings indicate that value stocks outperformed the stock market when combined with share price momentum (Pätäri et al., 2012).

Han, Hong, & Warachka (2009) argue that expected stock returns are driven by adjustments to the changes in investors' cash flow estimate. If cash flow positively exceeds an investor's estimate, optimistic information sources exert a greater influence on future cash flow estimates. This will result in higher earnings expectations and stock price growth. This argument is supported by Myers, Myers, & Skinner (2007) as they propose that managers may smooth earnings results to try and extend earnings strings to avoid negative market sentiment and share price reversal. However, this continual earnings growth may be a result of strong and consistent economic performance which is translated from financial reporting practices (Myers et al., 2007). It therefore could be argued that fundamental ratios, taken from financial statements, give predictive power of future stock returns. This occurs especially when investors are unable to incorporate fundamental signals into their earnings forecasts. Therefore, these fundamental ratios are potentially good candidates as timing indicators (Xue & Zhang, 2011).

Peel, Peel, & Venetis (2004) argue that fundamental ratios are persistent and therefore these dynamic variables should be properly modelled. This indicates that fundamental ratios appear to move in a continuous direction. Therefore, it could be argued that these fundamental ratios exhibit a form of momentum. As mentioned above, price momentum and earnings momentum have previously been used as a timing indicator

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

for buying stocks. However, it has also been suggested that earnings and stock prices are a result of a delayed reaction to fundamental signals. Therefore, it would be appropriate to use fundamental momentum as an investment timing indicator when selecting value stocks. This research will find purpose in proving whether fundamental momentum, when used in conjunction with value stocks, will yield improved stock performance.

1.4 Research Aim

The aim of this research is to identify if fundamental momentum could be used as an investment timing indicator. This research will aim to build on and add to previous research conducted in the field of investment timing indicators. This research will aim to integrate the benefits of value investing with those of momentum investing.

1.5 Research Objective

This research was conducted in a four step process. The objectives listed below outline the intentions of these 4 steps to address the aim of this research:

- Identify applicable methods, value ratios and fundamental ratios outlined in the literature study. This is to obtain accurate ratios that may be pertinent to the implementation of fundamental momentum.

- Construct a value portfolio using the identified value ratio which is considered suitable. The fundamental momentum indicator will be used to segment the portfolio on the strength of the indicator.

- Examine the differences in performance between traditional value portfolios and the value portfolios with the newly identified fundamental momentum indicator.

- Suggest guidelines that could result in stock selection and timing indicators that would reliably add value to a portfolio and future investors.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

2. LITERATURE REVIEW

A number of investment theories have been developed to identify trends in the market that explain the deviation from fundamental factors, including momentum and behavioural biases (Cooper, Gutierrez, & Hameed, 2004). The literature review commenced by evaluating the efficient market hypothesis. This successfully introduced competitive economic theory to stock prices and also introduced a relationship between the flow of information and the stock price. This topic led to a large body of research into the area of information and behavioural finance (Shiller, 2003). Behavioural finance is finance from the broader social science perspective, which includes psychology and sociology. Behavioural finance stands in sharp contradiction of the efficient market theory (Shiller, 2003).

The efficient market theory reached its height of dominance in the 1970's (Shiller, 2003). Shiller (2003) stated:

> "At that time, the rational expectations revolution in economic theory was in its first blush of enthusiasm, a fresh new idea that occupied the center of attention".

The prominent financial models of the times linked speculative asset prices to economic fundamentals. This was executed using rational expectations to tie together finance and the economic outlook (Shiller, 2003). During this time, concern grew over these models and saw the migration towards a more diverse way of thinking about financial markets and the economy. This was not aligned with the efficient market theory of the time (Shiller, 2003).

The literature study has studied the arguments for and against the efficient market hypothesis. Thereafter, it focused on the effects of market inefficiency and the benefits for investors when mispricing occurs. The literature study identified which financial and market indicators could provide a leading indicator for expected earnings in the near future. The literature study specifies which measures an investor may use to identify if a company may be deemed over or under valued. The literature study focused specifically on earnings and price momentum and how the theory of momentum may be suitable in its application as a timing indicator.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

2.1 Market Inefficiency

The term “efficient market” was first used by Fama (1965, pg 56) where it was defined as:

> “a market where there are large numbers of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants.”

Therefore, market efficiency is used to describe a market where information is impounded into the prices of the assets immediately. Accordingly, Fama (1965) argues that in an efficient market the price of a stock would be a good estimate of its intrinsic value. However, it could be argued that if all information is available to all participants and the market fails to incorporate this information or historical financial data into the share price in a timely manner, it preludes to market inefficiency. The empirical evidence appears to suggest that even extremely competitive markets are not efficient as historical data can be used to predict near future returns with a probability which is better than chance (Zunino, Zanin, Tabak, Pérez, & Rosso, 2009). Therefore, if a market is seen as predictable or if time series observations do not exhibit a random walk, it preludes to market inefficiency (Zunino et al., 2009).

Xue & Zhang (2011) propose that the source of abnormal returns is a result of under-reaction, by stock markets, to information contained in the financial statements. In addition, Sloan (1996) suggests that investors tend to fixate on detecting mispriced stocks and focus closely on earnings and not the accrual of the cash flow components of earnings. In doing so, they fail to correctly identify the different properties and components of earnings (Sloan, 1996).

Empirical research in finance has identified overreaction and under-reaction as two families of pervasive regularities (Barberis, Shleifer, & Vishny, 1998). It has been argued that news is only slowly incorporated into prices, therefore giving predictive power for future returns. However, consistently long records of good news results in stocks which are overvalued (Barberis et al., 1998).

An alternative argument to the over and under-reaction debate is by Yee (2008) who suggests that mispricing does not produce market inefficiency. This is possible if each

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

investor has a diverse set of beliefs and personal or privately held information (Yee, 2008). This would result in the valuations of each investor being different from the rest as they are influenced by behavioural biases such as limited attention and over confidence (Xue & Zhang, 2011). Therefore, mispricing relative to fundamental information may persist for months and even years (Yee, 2008).

It was evident from the above literature that there appeared to be a strong case against market efficiency and that above average returns are possible if stocks are bought at the right price. The ability of an investor to buy stocks at a price which is below the intrinsic value of the company provides a strong argument against market efficiency (Cubbin, Eidne, & Firer, 2006).

As a result of market inefficiency, each investor and investment strategy tries to determine what the correct price actually is. The most common investment strategies are growth investing, value investing, fundamental analysis and momentum.

2.2 Growth Investing

Growth stocks are those firms with sales and earnings growth rates which exceed the industry average (Chahine, 2009). Therefore, growth stock firms have positive net present value opportunities. This was supported by Yan & Zhao (2010) who add that growth stocks are perceived to have high growth potential and are characterised by strong past performance. According to Chahine (2009), growth stocks can be identified by a high price-to-earnings (P/E) ratio. Fama & French (2006a) add that a low book-to-market (B/M) ratio indicates that a stock is a growth stock. Investors are willing to pay for these growth stocks, with high P/E ratios, as they expect future earnings to grow. In addition, it is expected that these earnings will grow at rates which are greater than the market average (Chahine, 2009).

According to Yan & Zhao (2010), growth stocks are also referred to as glamour stocks which have high prices relative to their value as they are in favour with investors. Chahine (2009) argue that “investors may irrationally place too high a premium on the potential growth of these companies”. Sharma & Preeti (2009) propose that investors classify stocks as either value or growth stocks. Bodie, Kane, & Marcus (2011) suggest that investors in growth firms must believe that the firms will experience rapid growth to

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

justify the prices at which the stocks sell. However, Cubbin et al. (2006) has determined that growth portfolios outperform value portfolios in the short term. However, value portfolios start to outperform growth portfolios for holding periods longer than 12 months.

2.3 Value Investing

Value investing was established by Graham and Dodd as early as 1934 (Yan & Zhao, 2010). According to Sharma & Preeti (2009), value investors look for stocks which are trading at prices less than their apparent value. This value is calculated using fundamental analysis which aims to determine the health of an organisation using several financial accounting ratios. Value stocks are perceived to have low growth potential as they are out of favour with investors (Yan & Zhao, 2010).

Evidence was found that portfolios composed of value stocks outperform diversified portfolios in the long run (Bird & Casavecchia, 2007). This provided evidenced of a value premium as shown by Fama & French (2006b) and Brown, Yan Du, Rhee, & Zhang (2008). Bird & Casavecchia (2007) argue that value stocks tend to underperform over a 12 month holding period. This is four months longer than that described by Cubbin et al. (2006). This indicates that the normal valuation metrics such as earnings-to-price (E/P), book-to-market (B/M) and sales-to-price (S/P) are not completely effective. However, they do provide a logical basis for identifying stocks that are potential candidates for a market reversion after recent poor market performance (Bird & Casavecchia, 2007). The comparative efficiency of these different valuation criteria varies across stock markets and sample periods, according to Pätäri et al. (2012).

According to Fama & French (1998), the B/M criterion resulted in the greatest value premium in six of the thirteen regional stock markets (USA, UK, Belgium, Switzerland, Singapore and Japan). The cashflow-to-price (CF/P) was the best in four stock markets (Germany, Italy, Hong Kong and Australia). Earnings-to-price (E/P) resulted in superior performance in the Netherlands and Sweden, whereas dividend yield (D/P) was the best criterion for France in the period from 1975 to 1995 (Fama & French, 1998). Therefore, it was evident that there is support for using multiple value criteria to determine the best value stocks in a specific market and over a specific time period (Pätäri et al., 2012). According to recent results observed by Leivo & Pätäri (2011), a

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

composite valuation measure enhanced the performance of a value portfolio. This was beneficial as Pätäri et al. (2012) argued that different valuation measures have varying results in different countries.

Leivo & Pätäri (2011) support the use of Earnings Interest, Taxes, Depreciations and Amortizations to Enterprise Value (EBITDA/EV) as a value indicator. This ratio may be beneficial as the EBITDA/EV acknowledges the debt of the company and may resolve the problem of spurious undervaluation stemming from characteristics of price related earnings multiples. A particular problem with the valuation criteria is that it fails to provide information on the financial health of the selected companies (Bird & Casavecchia, 2007). The components of the valuation metrics are shown below in Table 1 as described by the respective authors, also shown in Table 1.

Table 1: Valuation Metrics

Name	Equation	Used by
E/P	$E/P = {Earnings\ Per\ Share}/{Market\ Price\ Per\ Share}$	(Pätäri et al., 2012) (Leivo & Pätäri, 2011)
B/M	$B/M = {Book\ Value\ of\ Firm}/{Market\ Value\ of\ Firm}$	(Pätäri et al., 2012) (Leivo & Pätäri, 2011)
S/P	$S/P = {Revenue\ Per\ Share}/{Share\ Price}$	(Bird & Casavecchia, 2007)
CF/P	$CF/P = {Cash\ Flow\ Per\ Share}/{Share\ Price}$	(Pätäri et al., 2012) (Fama & French, 1998)
D/P	$D/P = {Dividends\ Per\ Share}/{Share\ Price}$	(Pätäri et al., 2012) (Leivo & Pätäri, 2011)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

EBITDA/EV	$EBITDA = Earnings\ Before\ Intereste, Tax, Depreciation, Ammortization$ $EV = Market\ Capitalisation + debt, minority\ interest + preferered\ shares - total\ cash\ and\ cash\ equavalents$	(Pätäri et al., 2012) (Leivo & Pätäri, 2011)

Firms may still have good fundamental factors or health indicators in spite of being out of favour with investors (Bird & Casavecchia, 2007). Value investing makes use of fundamental analysis as it takes information from a firm's financial statements to determine whether a stock is undervalued.

Yan & Zhoa (2010) also indicate that numerous studies have proven that value stocks outperform growth stocks in the long run. The reason that some value stocks remain undervalued may be the result of investor's slow response to these valuation factors or their focus on the current growth (glamour) stocks (Leivo & Pätäri, 2011). Therefore, investment in these stocks may be premature as market sentiment is low (Bird & Casavecchia, 2007). Bird & Casavecchia (2007) illustrated that a value portfolio could be complemented with momentum signals as they found that high price momentum is a reflection of market sentiment.

2.4 Momentum

Momentum is the rate of change in a shares stock price, volume or earnings. Share price momentum implies that the share price is likely to keep moving in the same direction in the near future. The momentum strategy relies on short term movements in the share price rather than fundamental value (Investopedia, 2012). Price momentum is usually based on the previous share price observations over a three to twelve month period (Chan, Jegadeesh, & Lakonishok, 1996).

Leivo & Pätäri (2011) debate whether momentum is induced by slow information diffusion or by the investors over or under-reaction to information. Investors also overweight information which is consistent with their original view and underweight information which is inconsistent with their original view. This could produce momentum in the form of a delayed overreaction (Cubbin et al., 2006).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

2.4.1 Earnings Momentum

According to Chan et al. (1996), the source of momentum is a major unresolved puzzle. To try and rationalise the movement in stock prices, investors have looked to earnings as a means to understand the movements of stock prices. This is understandable as earnings give a good indication of the projected profitability. The bulk of the evidence points to an investors delayed reaction to past returns and to past earnings (Chan et al., 1996). However, trend chasers reinforce the movement in stock prices even in the absence of fundamental information (Chan et al., 1996).

Myers, Myers, and Skinner (2007) describe earnings momentum as long strings of consecutive increases in earnings. Investors in growth stocks tend to rely heavily on past growth rates when extrapolating into the future. It was found that firms report several years of consecutive increases and these strings are longer than those expected by chance (Myers et al., 2007).

Myers et al. (2007) argued that the managers of these firms strategically exercise their financial reporting discretion to sustain their firms earning strings. It was argued that this was done to ensure that they do not receive negative market reaction associated with a loss of momentum. The market reactions appear to be more unfavourable for organisations with longer earning strings. Therefore, it was argued that in extreme cases, management actions could lead to accounting fraud (Myers et al., 2007). Chordia & Shivakumar (2006) adds that price momentum includes a systematic component of earning momentum and is therefore a manifestation of earning momentum.

2.4.2 Price Momentum

Both Leivo & Pätäri (2011) and Bird & Cassavechia (2007) have discovered that when price momentum is used in conjunction with value stocks, it enhances the performance of the portfolios by providing an effective timing indicator for stock acquisition. Momentum investing has been found to work best in the short term while value strategies perform considerably better in the long term (Pätäri et al., 2012). It was found that price momentum is a sentiment indicator and is effective in determining a market turnaround (Bird & Casavecchia, 2007). Therefore, price momentum is used as

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

a market sentiment indicator. The momentum provides a good early indication of sustained improvement in the stocks financial health indicators (Bird & Casavecchia, 2007).

Price momentum is synonymous with growth stocks, so any fall in the share price probably indicates that the stock is beyond its pricing cycle (Bird & Casavecchia, 2007). Bird & Cassavechia (2007) propose that more detail is required on momentum and financial health indicators in order to gain a better understanding on how and why they are driving stock valuations.

Richardson, Tuna, & Wysocki (2010) indicate that fundamental analysis can help investors forecast earnings, estimate the risk of these earnings and can therefore help investors assess the intrinsic value of the firm. Therefore, fundamental analysis should provide insight into what is driving stock prices.

2.5 Fundamental Analysis

Financial statement textbooks promote fundamental analysis, based on financial statements, as a method of evaluating a firm's financial prospects such as those found by Graham & Winfield (2010). Xue & Zhang (2011) add that accounting literature has documented how financial ratios, derived from publically available financial statements, have predictive power of future stock returns. Xue & Zhang (2011) go on to discuss that the predictive power of fundamental analysis can be attributed to the failure of investors to incorporate fundamental signals into their earnings forecast.

Piotroski (2000) developed a composite measure that used nine financial variables that would reflect changes in the economic conditions of a firm. This composite variable was given the name F-Score which measured the profitability, financial leverage and operating efficiency of a firm. Other researchers, such as Xue & Zhang (2011) have identified fundamental ratios based on the same three financial aspects: profitability, operating efficiency and liquidity (mentioned in Piotroski (2000)).

The use of the F-Score on high B/M stocks has resulted in an increase of 7.5% on average returns annually. This increased to 23% when the investor actively bought expected winners and sold expected losers (Piotroski, 2000). However, Piotroski

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

(2000) does not propose that the variables used in his composite F-Score are the optimal financial variables, but it does illustrate that financial analysis can aid in predicting future earnings.

The fundamental ratios used by Piotroski (2000), Bird & Casavecchia (2007) and Xue & Zhang (2011) to analyse a firm's potential future earnings are illustrated in Appendix 1. Bird & Casavecchia (2007) use a slightly different variation of the fundamental ratios available. Bird & Casavecchia (2007) believe that their selected ratios may be useful in providing insights into the performance of a firm in the medium term.

The use of historical financial information has been used by investors to help select profitable investment opportunities. However, these strategies seek to benefit from the inability of the market to synthesis the implications of what the financial information is stating (Piotroski, 2000). It is through the analysis of historical fundamental ratios that investors decide to invest in shares in an attempt to earn excess returns. Some argue that returns are compensation for the amount of risk undertaken while others argue that the value/glamour effect is a result of mispricing (Piotroski & So, 2012).

2.6 Risk and Average Returns

The capital asset pricing model (CAPM) has played an important role in finance since it was introduced in 1965 (Reddy, Thomson, & University of the Witwatersrand, 2011). The CAPM provided a powerful, yet easy to understand, way of measuring the relationship between the risk of a stock and its affect on the expected returns (Hoffman & Northwest University, 2012).

According to Fama & French (1992), the CAPM model was developed by Sharp, Lintner and Black and is known as the SLB CAPM model. The CAPM provides a method to link the expected rate of return for a specific stock to the systematic risk of that stock. Systematic risk, which is measured as beta, captures the portion of risk which cannot be eliminated through diversification. In that regard, systematic risk is the risk associated with the market or market segment (Reddy et al., 2011). According to Reddy et al. (2011), the CAPM allows investors to maximise the expected return of their portfolio for a certain amount of risk or variance. This says that an investor can expect higher returns only if the stock is riskier than others (Reddy et al., 2011).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

However, Fama & French (1992) indicate that high risk stocks have a positive relationship between average stock returns through a high beta. This was observed during the periods prior to 1969 in America. However, the relationship between beta and average returns disappeared during the period 1969 to 1990 for American stocks. This observation was supported as the relationship between returns and beta was not observed on the JSE between 1994 and 2007 (Strugnell, Gilbert, Kruger, University of Cape Town, & University of Stellenbosch, 2011). Strugnell et al. (2011) go on to indicate that stocks on the JSE appear to have an inverse relationship between beta and return. This indicated that a high risk stock did not result in higher returns on the JSE. However, it was evident that a lower risk stock did result in higher returns. As a result, the level of risk does not provide investors with insight to predict expected returns as the CAPM suggests (Hoffman & Northwest University, 2012).

Fama & French (2006a) documented a value premium in average returns for stocks before 2000. However the value premium was left unexplained by the capital asset pricing model. Fama & French (2006a) discovered that growth stocks tend to have a larger market beta for American stocks, which they argue is the reverse of what the CAPM requires to explain value premiums. Therefore, beta did not provide any insight into the returns for value and growth stocks.

In addition to the mounting contradictions of the SLB CAPM model is the relationship between leverage and average returns (Fama & French, 1992). Bhandari (1988) proposed that beta may be an inadequate measure of risk. They identify that a natural proxy for risk may be the firms leverage ratio as it could affect expected returns for the future. However the SLB CAPM suggests that leverage risk should be captured by the market beta. However, the individual risk of the firm would be different in relation to its leverage ratio (Bhandar, 1988).

The leverage ratio could be calculated using fundamental analysis and could be described as one of the components which influence earnings (Sloan, 1996). This indicates that fundamentals provide insight on the possible risk of a firm as well as providing a relationship with average returns.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

2.7 Using Fundamental Momentum

La porta, Laknonishock, Schleifer and Vishny (1997) have found that superior returns are as a result of earnings surprises and these returns are more significant for value stocks. There have been many debates that attribute overreaction and under-reaction to the source of momentum (Daniel, Hirshleifer, & Subrahmanyam, 1998; Hong & Stein, 1999). An alternative argument is that momentum is formed due to the slow diffusion of information into the market even though all information is readily available.

There are numerous studies that have shown that when price momentum is combined with value portfolios, the returns of those portfolios have been enhanced (Bird & Casavecchia, 2007; Yu & Kim, 2009). Price momentum compliments these portfolios because it is a sentiment indicator. Therefore, price momentum appears as the market sentiment around a stock is increasing. This in turn provides large average returns as it indicates the timing of share purchases. According to Bird and Casavecchia (2007), there are three different types of value stocks. The first share type is one that starts performing immediately after it has been identified as a value stock. The second share type will only start performing at some unknown time in the future. And lastly, the third type of value stock is unlikely to perform at any point in the future.

In either of the first two cases, investors would be responding to changes in the fundamental information of that stock. Therefore, this research argues that the theory of momentum could be applied to fundamental analysis. This is because Sloan (1996) indicates that investors mainly focus on earnings and do not fully incorporate the components that make up earnings projections. Fundamental signals provide information about future earnings projections while the rate of change (momentum) of these signals may provide insight into investor reaction.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

2.8 Conclusion of Literature Review

There is an abundance of cases indicating that value investing strategies provide good returns in the long run. These studies also show evidence that value stocks outperform growth strategies (Chahine, 2009; Leivo & Pätäri, 2011). However, researchers have identified that value stocks remain cheap for an extended period of time and could benefit from an investment timing indicator (Leivo & Pätäri, 2011). It was evident that price momentum has been identified as a timing indicator for value stocks. However, the price momentum is a result of investor reaction to earnings which are a result of changes in a company's fundamentals.

Therefore, this research looked to combine the theory of momentum with fundamental analysis. Instead of using price or earnings momentum as a timing indicator, this research would seek to apply the theory of momentum to fundamental ratios. Based on the above literature, this research looked at constructing a value portfolio based on the identified valuation metrics in Appendix 1. Fundamental momentum was used to rank the Value portfolio into three sub portfolios based on the strength of the fundamental momentum indicator. These Value sub portfolios will be known as Value-Momentum portfolios as they are Value shares ranked by the strength of their fundamental momentum indicator. Each portfolio has an investment period of 36 months.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

3. RESEARCH HYPOTHESES

The above literature reviews makes a case for using fundamental momentum as a timing indicator for Value portfolios. The following hypothesis will be investigated while comparing the outcome of the performance against a benchmark.

The null hypothesis states that the Current Ratio VM portfolios produce CARs which are equal. The alternative hypothesis states that Current Ratio VM portfolios produce CARs which are not equal.

3.1 Hypothesis 1

Hypothesis 1 A: The null hypothesis states that the Current Ratio Value-Momentum portfolios produce Cumulative Average Returns (CARs) which are equal. The alternative hypothesis states that the Current Ratio Value-Momentum portfolios produce Cumulative Average Returns (CARs) which are not equal.

$H1A_0$: $\mu CAR_{High}(VM_i) = \mu CAR_{Middle}(VM_i) = \mu CAR_{Low}(VM_i)$

$H1A_A$: $\mu CAR_{High}(VM_i) \neq \mu CAR_{Middle}(VM_i) \neq \mu CAR_{Low}(VM_i)$

High, Middle and Low represent the VM portfolios based on the relative strength of the fundamental momentum indicator. Where i equals 6, 12 and 24 respectively, representing the different rebalancing periods to be tested.

Hypothesis 1 B: The null hypothesis states that the Leverage Factor Value-Momentum portfolios produce Cumulative Average Returns (CARs) which are equal. The alternative hypothesis states that the Leverage Factor Value-Momentum portfolios produce Cumulative Average Returns (CARs) which are not equal.

$H1B_0$: $\mu CAR_{High}(VM_i) = \mu CAR_{Middle}(VM_i) = \mu CAR_{Low}(VM_i)$

$H1B_A$: $\mu CAR_{High}(VM_i) \neq \mu CAR_{Middle}(VM_i) \neq \mu CAR_{Low}(VM_i)$

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

High, Middle and Low represent the VM portfolios based on the relative strength of the fundamental momentum indicator. Where i equals 6, 12 and 24 respectively, representing the different rebalancing periods to be tested.

3.2 Hypothesis 2

Hypothesis 2 A: The null hypothesis states that the Value portfolio produces CARs which are equal to any of the Current Ratio Value-Momentum portfolios (High, Middle and Low). The alternative hypothesis states that the Value portfolio produces CARs which are not equal to any of the Current Ratio Value-Momentum portfolios (High, Middle and Low).

$H2A_0$: $\mu CAR(V) = \mu CAR_{P(j)}(VM_i)$

$H2A_A$: $\mu CAR(V) \neq \mu CAR_{P(j)}(VM_i)$

Where P(j) represent portfolios based on the relative strength of the fundamental momentum indicator. Therefore P(j) represents the High, Middle and Low VM portfolios. Also i equals 6,12 and 24 respectively, representing the different rebalancing periods to be tested.

Hypothesis 2 B: The null hypothesis states that the Value portfolio produces CARs which are equal to any of the Leverage Factor Value-Momentum portfolios (High, Middle and Low). The alternative hypothesis states that the Value portfolio produces CARs which are not equal to any of the Leverage Factor Value-Momentum portfolios (High, Middle and Low).

$H2B_0$: $\mu CAR(V) = \mu CAR_{P(j)}(VM_i)$

$H2B_A$: $\mu CAR(V) \neq \mu CAR_{P(j)}(VM_i)$

Where P(j) represent portfolios based on the relative strength of the fundamental momentum indicator. Therefore P(j) represents the High, Middle and Low VM

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

portfolios. Also i equals 6,12 and 24 respectively, representing the different rebalancing periods to be tested.

3.3 Hypothesis 3

Hypothesis 3 A: The null hypothesis states that the Benchmark portfolio produces CARs which are equal to the Current Ratio Value-Momentum portfolios (High, Middle and Low). The alternative hypothesis states that the Benchmark portfolio produces CARs which are not equal to the Current Ratio Value-Momentum portfolios (High, Middle and Low).

$H3A_0$: $\mu CAR(BM) = \mu CAR_{P(j)}(VM_i)$

$H3A_A$: $\mu CAR(BM) \neq \mu CAR_{P(j)}(VM_i)$

Where P(j) represent portfolios based on the relative strength of the fundamental momentum indicator. Therefore P(j) represents the High, Middle and Low VM portfolios. Also i equals 6,12 and 24 respectively, representing the different rebalancing periods to be tested.

Hypothesis 3 B: The null hypothesis states that the Benchmark portfolio produces CARs which are equal to the Leverage Factor Value-Momentum portfolios (High, Middle and Low). The alternative hypothesis states that the Benchmark portfolio produces CARs which are not equal to the Leverage Factor Value-Momentum portfolios (High, Middle and Low).

$H3B_0$: $\mu CAR(BM) = \mu CAR_{P(j)}(VM_i)$

$H3B_A$: $\mu CAR(BM) \neq \mu CAR_{P(j)}(VM_i)$

Where P(j) represent portfolios based on the relative strength of the fundamental momentum indicator. Therefore P(j) represents the High, Middle and Low VM portfolios. Also i equals 6,12 and 24 respectively, representing the different rebalancing periods to be tested.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

4. RESEARCH METHODOLOGY

4.1 Research Design

This research followed the research methodology outlined by Leivo & Pätäri (2011). In order to determine the optimal implementation of fundamental momentum, exploratory research of secondary data was undertaken as described in the literature review, therefore completing the first objective of this research.

In order to determine whether fundamental momentum would be an effective timing indicator for a Value portfolio, this research followed a pragmatic research philosophy in the way it went about solving the research hypotheses (Saunders & Lewis, 2012).

Secondary data was required in the form of historical financial statement data and share price data which was used to calculate the valuation metrics (Saunders & Lewis, 2012). The valuation metrics were used to identify the companies that formed part of the Value portfolio. Secondary data in the form of financial ratios, obtained from financial statements, were required for the companies that formed part of the Value portfolio. These financial ratios were used as momentum indicators to further divide the Value portfolio into three Value-Momentum (VM) portfolios (Pätäri et al., 2012). The VM portfolios consisted of High, Middle and Low portfolios. The ideal momentum indicators and valuation measures are identified in the Portfolio Creation section below.

The research strategy that was utilised to test the research hypotheses followed a quantitative experimental approach (Saunders & Lewis, 2012). This approach was used to identify the causal relationship between Cumulative Average Returns (CARs) of the Value portfolio, the VM portfolios (High, Middle and Low) and the Benchmark Portfolio. The VM portfolios were created based on the strength of the fundamental momentum indicator (Pätäri et al., 2012). These hypotheses were tested over 5 different investment periods. Each investment period was 36 months long and did not overlap.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

4.2 Portfolio Creation

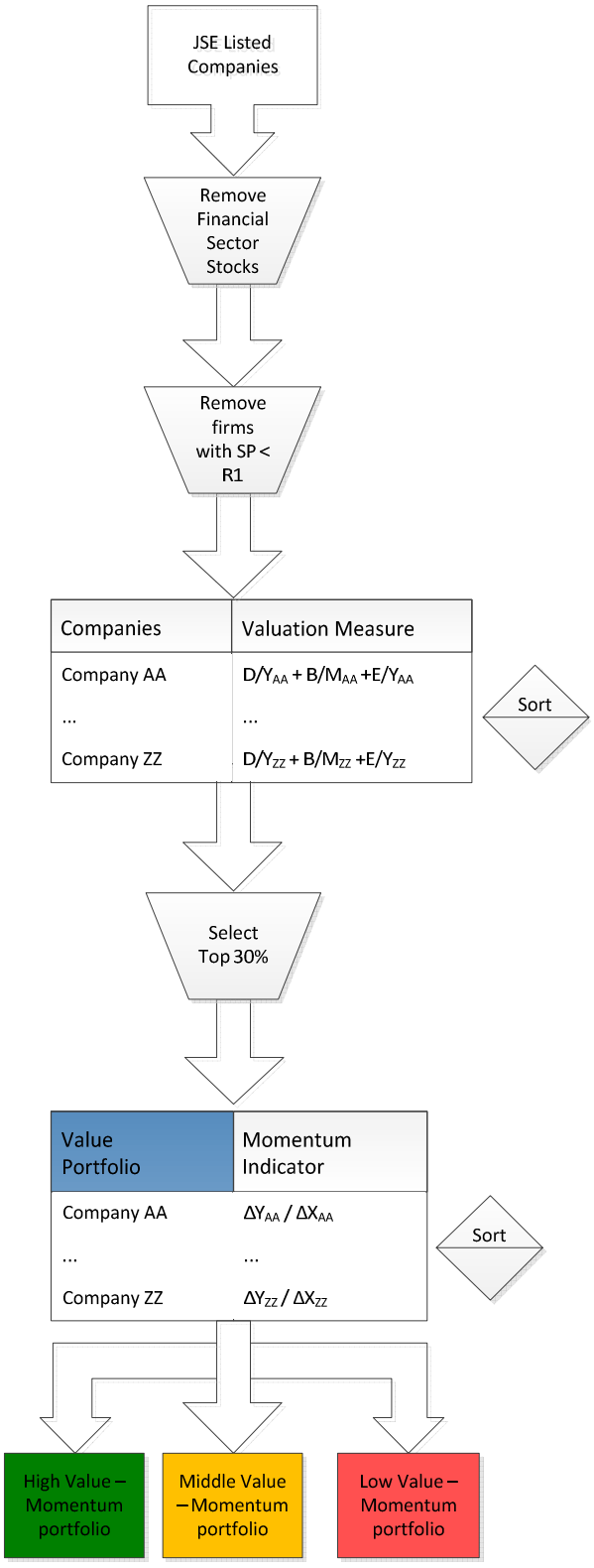
The Value portfolio was created using a composite value measure which was constructed by combining more than one valuation ratio. The composite valuation measure in this study was the combination of dividend yield (D/P), Book-to-Market (B/M) and earnings yield (E/P). This combination was selected as Pätäri et al. (2012) demonstrated that this composite resulted in high returns. All the composite value measures were obtained by first standardising each of the valuation ratios by the median of the D/P, B/M and E/P ratios. Thereafter, a simple average of the three ratios was used to get the composite valuation metric for each stock. Stocks whose average composite values were in the top 30 percent of all the stocks in the sample were considered as a value share and formed part of the Value portfolio (Leivo & Pätäri, 2011).

The stocks in the sample were ranked on the composite value measures that were calculated on every portfolio formation date. The portfolios were formed on the first trading day in the beginning of April every three years. April was chosen as Bird & Casavecchia (2007) demonstrated that it was a conservative date on which to construct portfolios based on the reporting cycles of 15 countries within Europe. The stock prices were the closing values on the day of portfolio formation and variables from the financial statements were chosen from the latest financial statements. The performance of the Value portfolio was measured over a period of 36 months where after the next Value portfolio was formed.

Next, the stocks in the Value portfolio were further divided into 3 portfolios based on the relative strength of the past 12 month's momentum indicator (Leivo & Pätäri, 2011). The resulting Value-Momentum (VM) portfolios were High, Middle and Low. A High VM portfolio indicated that the strength of the momentum indicator was in the top 33 percentile of the Value portfolio. Similarly, the Low VM portfolio indicated that the momentum indicator was in the bottom 33 percentile. The process which was followed to create the Value portfolio as well as the Value Momentum Portfolios is shown in Figure 1.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Figure 1: Fundamental Momentum Investment Methodology



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Momentum indicators are a rate of change metric which is usually used as a leading indicator for price changes (Chorafas, 2005). The rate of change formula provided is shown in Equation 1, as follows:

Equation 1: Rate of Change

$$ROC = \frac{\mathrm{CV} - CV_N}{CV_N}$$

Where ROC is the Rate of Change, CV is the closing value in the current period and CV_N is the closing value N periods ago (Money-Zine.com, 2011). Since this research used a 12 month momentum indicator the rate of change equation is shown in Equation 2, as follows:

Equation 2: Twelve Month Rate of Change

$$ROC = \frac{\mathrm{CV} - CV_{12}}{CV_{12}}$$

Due to time constraints, this research tested two fundamental ratios as momentum indicators. Sharma & Preeti (2009) argue that ΔROA, Current Ratio and leverage are good fundamental indicators at identifying and differentiating fundamentally strong and weak firms. Another metric that may be useful in determining the operating efficiency of a company is Operating Margin (OM). Operating Margin measures the success of the firm in generating profits from sales which gives a good indication of the operating efficiency of the company (Sharma & Preeti, 2009). Leverage and Current Ratio were used as fundamental momentum indicators in this research.

The fundamental momentum indicators were calculated with the financial statement data available on the date of the Value portfolio creation. If the data was not available, the share was excluded from the Value portfolio. The performance of the VM-portfolios (High, Middle and Low) was measured for rebalancing periods of 6, 12 and 24 months. The VM portfolio was rebalanced at the end of the first trading day after the respective rebalancing period had elapsed. Rebalancing is the process of re-arranging the Value portfolio into VM portfolios based on the latest fundamental momentum.

The performance evaluation of each investment strategy was based on a time-series of the Cumulative Average monthly Returns (CARs) of each portfolio (Leivo & Pätäri,

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

2011). The CARs were compared against the Value portfolio and a Benchmark. The portfolios were equally weighted. The ALSI provided a good benchmark as it represented 99% of all listed companies and gave a good indication of the opportunity cost of the market (Snyman, 2008).

4.3 Population of Relevance

The population of relevance in this research are all the shares listed on the Johannesburg Stock Exchange (JSE). The JSE was selected due to the availability and accessibility of data. Only the main board of the JSE was considered and not the Alt-X board. This was in an effort to reduce the problems associated with portfolios made up of small and illiquid stocks (Bird & Casavecchia, 2007). Stocks from the financial sector were excluded from this study as it has been argued that this sector accounts for financial data differently to other sectors. The financial sector also tends to have a high level of leverage (Foerster & Sapp, 2005).

4.4 Data Collection Process

McGregor BFA was identified as the database that would be utilised for this research as it was easily accessible through the research institution. The data collected from McGregor BFA contains historical stock market records. The variables that were collected include:

- Date
- Closing Share Price
- Book to Market
- Earnings Yield
- Dividend Yield
- Current Ratio
- Leverage Factor
- All Share Index

After the data was collected, it was cleaned to identify and remove any irregularities. Thereafter, the data was organised and used to create all the portfolios required.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

4.5 Sampling Method and Size

The shares that were considered were composed of non-financial stocks listed on the JSE between 1997 and 2012. This timeframe was chosen as it represented five investment periods with each period lasting 36 months. This period also provided up to date and reliable financial data for all companies in the McGregor BFA database. Due to time constraints, survivorship bias was not avoided. The sample did not include stocks of companies that were delisted during the observation period (Leivo & Pätäri, 2011).

To be consistent with previous studies, this research excludes any stocks of companies that belong to the financial sector, have a negative book value or are priced less than one Rand. This exclusion was made to reduce the problems associated with portfolios made up of small and illiquid stocks. Companies with low market capitalisations are at risk of thin trading where stagnant shares are not as readily tradable. Therefore, they weren't suitable in this research as it may have resulted in carrying unwanted value shares in a real world application.

This research followed a non-probability sampling technique, as the selection of the stocks followed a quota sampling method (Saunders & Lewis, 2012). This research implemented a quota sample, because the sample of the population included in this research was identified by the strength of their composite value measures. Only the shares which fell in the top 30 percent of all shares considered, formed part of the sample.

The five investment periods resulted in five sample sizes. The first investment period had 31 companies in the Value portfolio while the second investment period had 35 companies. The third investment period again, saw 35 companies form part of the Value portfolio. The fourth and fifth investment periods saw the number of companies included increase to 44 and 52, respectively. Therefore, the Value portfolio consisted of more than 30 shares for all investment periods. However, when the Value portfolio was ranked and sorted in to the VM portfolios the size of the VM portfolios were significantly less than 30. A list of all the companies that form part of the portfolios in each investment period is available in Appendix 2.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Due to the time constraints, this research study has not taken share splits, share issues, dividends, special dividends and share buy backs into consideration.

4.6 Unit of Analysis

The unit of analysis was the monthly Cumulative Average Returns (CARs) produced by the various portfolios. These included the CARs of the Value portfolio and the VM portfolios created using the fundamental momentum indicator. The monthly closing share prices of each share were used to calculate the portfolio's CARs.

4.7 Data Analysis Approach

The performance of the portfolios was evaluated quantitatively based on their CARs. The performances of the VM portfolios were compared against one another as well as against the Value portfolio and the Benchmark portfolio. Time series graphs were used to display the relative performance of each portfolio and the JSE ALSI.

The first hypotheses were tested using the Kruskal-Wallis / Wilcoxon Rank Sum for the analysis of variance (ANOVA). The first hypothesis was tested with a non-parametric test as outliers were not removed from the sample and normality was not guaranteed (Laerd, 2012). The second and third hypotheses were tested with a Wilcoxon Rank Sum paired t-test. These hypotheses were also tested with a non-parametric test as outliers were not removed from the sample and normality was not guaranteed across all portfolios (Laerd, 2012). All tests were performed using a two tailed hypothesis test, to a five percent level of significance (Saunders & Lewis, 2012).. This is consistent with other studies from the literature review.

4.8 Assumptions

This research assumed that since the VM portfolios consisted of less than 30 companies, the results would not be normally distributed. It was also assumed that since outliers were not removed from the distribution, it would reduce the likely hood of a normal distribution.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

4.9 Research Limitations

The research methodology had the following limitations:

- This research excluded the financial sector from the sample. Consequently, the sample may not be representative of the population. As a result of using non probability sampling, the results of this inquiry may not be generalised. Therefore, this sampling method produced reliability issues as it introduced biases into the sample selection (Saunders & Lewis, 2012).

- The sample period was limited by the data availability in the database. Therefore, the research was limited to a sampling period of 15 years which may not be long enough to make inferences on the results.

- The valuation measure was a composite of three valuation measures. As stated previously, the correct valuation measure depends on the country and the timing of the measure. As this is beyond the scope of this research, the selected valuation indicator may be inappropriate for the current climate in South Africa.

- Using the top 30 percent of shares resulted in a Value portfolio which was greater than 30 companies. However, when the Value portfolio was divided into the Value-Momentum portfolios, the number of companies in each sample was constantly below 30. Therefore, the sample was not big enough to represent a normal distribution.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5. RESEARCH RESULTS

5.1 Overview

The empirical analysis was based on the Cumulative Average Returns (CARs) of the various portfolios. This chapter is aimed at presenting the research findings from the analysis conducted in Chapter 4, with the aim of either accepting or rejecting the null hypotheses. The null hypotheses will either be rejected or accepted based on the CARs for each portfolio.

For each hypothesis there are three rebalancing periods namely: 36 Months, 24 Months and 12 Months. Each investment period is limited to 36 months, therefore, the 36 month rebalancing portfolio is a buy and hold strategy while the 24 month rebalancing portfolio was rebalanced only once after 24 months. The 12 month rebalancing portfolio was rebalanced every 12 months after the portfolio was created. Therefore, the 12 month rebalancing portfolio was rebalanced twice. The CARs were tested statistically over the entire period of the portfolio in line with the hypothesis tests. There were five investment periods over which the portfolios were executed. The hypothesis tests were tested against each portfolio for the same period. The Value and Benchmark portfolios were also created over these investment periods. The first investment period was for the period between 1997 and 2000, the second investment period was for the period between 2000 and 2003. The third investment period was for the period between 2003 and 2006, the fourth investment period was for the period between 2006 and 2009 and lastly, the fifth investment period was the period between 2009 and 2012. The investment years and periods are described below in Table 2:

Table 2: Investment Period Description

Investment Period	1	2	3	4	5
Investment Years	1997 – 2000	2000 - 2003	2003 - 2006	2006 - 2009	2009 - 2012

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5.2 Descriptive Results for Current Ratio Momentum Portfolios

The graphs below provide a graphical representation of the CARs of all portfolios over the investment period of 3 years. The legends for the Benchmark portfolio, Value portfolio and each of the VM portfolios are available in Figure 2 below. Table 3, Table 4 and Table 5 show the final CAR achieved for each portfolio at the investment period.

.

Figure 2: Legend for Current Ratio Portfolios

Figure 3: Current Ratio VM Portfolio CARs for the Period 1997 – 2000 (Period 1)

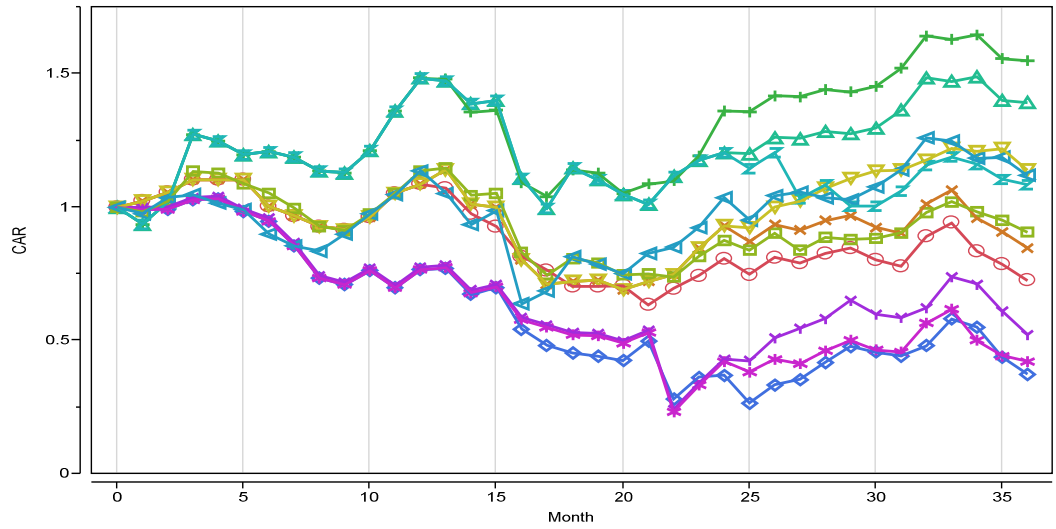
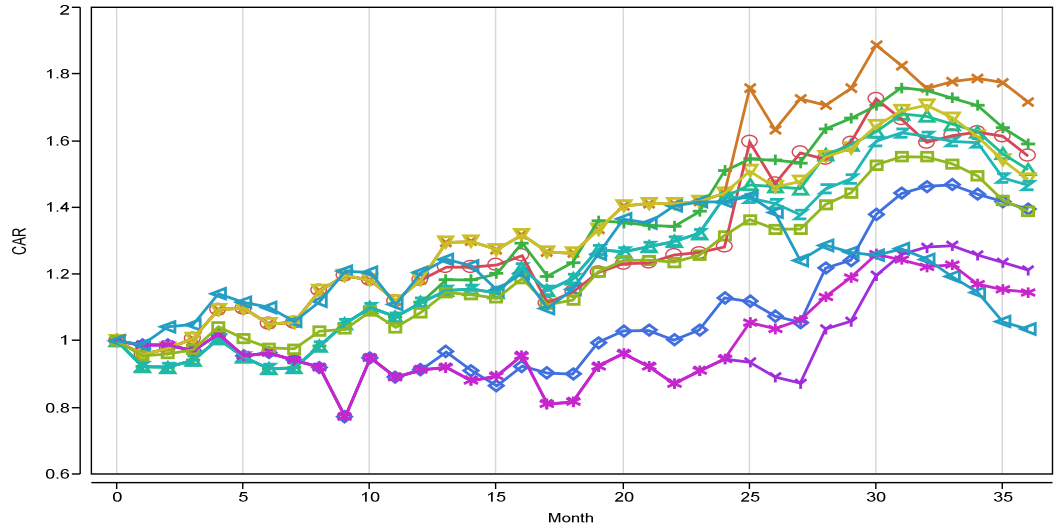


Figure 4: Current Ratio VM Portfolio CARs for the Period 2000 – 2003 (Period 2)



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Figure 5: Current Ratio VM Portfolio CARs for the Period 2003 – 2006 (Period 3)

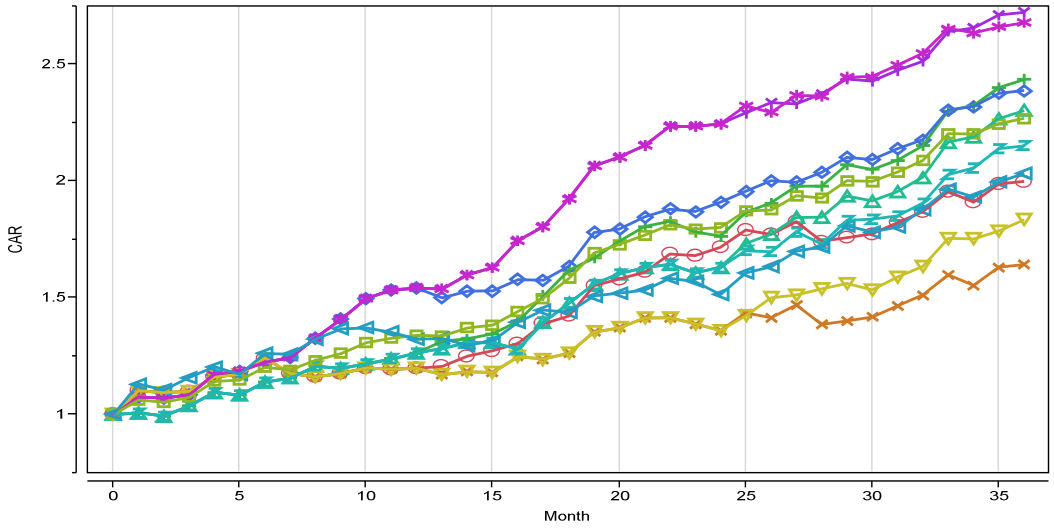


Figure 6: Current Ratio VM Portfolio CARs for the Period 2006 – 2009 (Period 4)

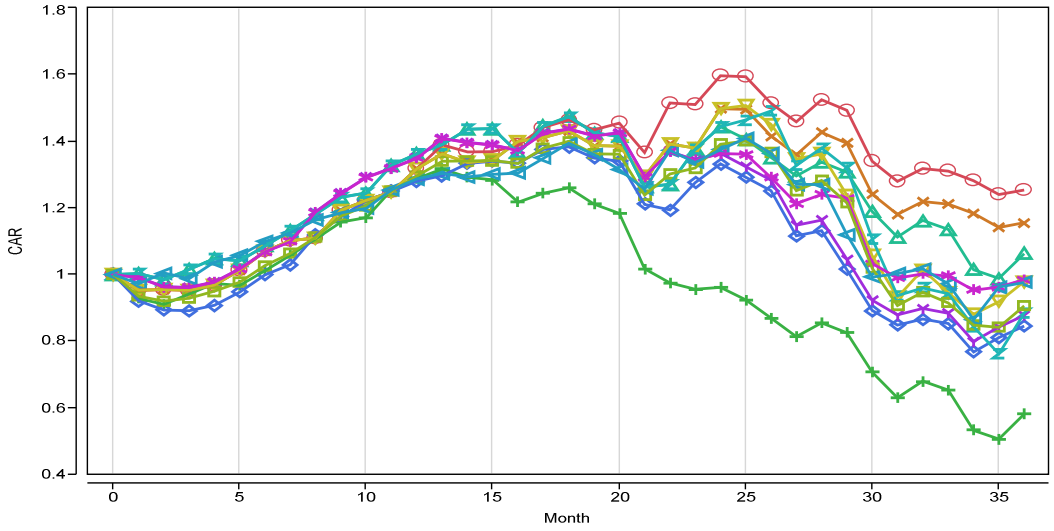
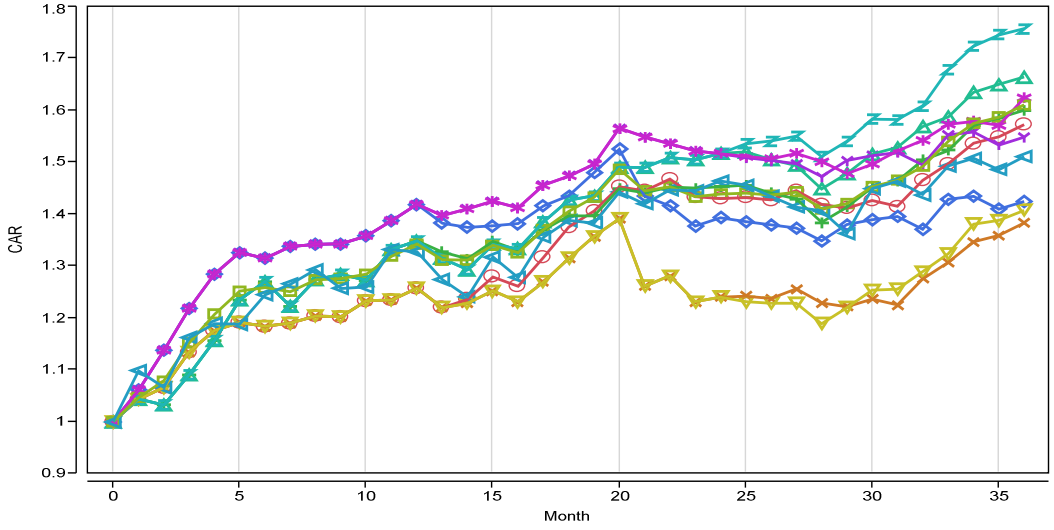


Figure 7: Current Ratio VM Portfolio CARs for the Period 2009 – 2012 (Period 5)



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Table 3: Current Ratio: Final Portfolio CARs with 36 Month Rebalancing

Period	HIGH	MIDDLE	LOW	Value	ALSI
1997 - 2000	13.9%	8.5%	-57.8%	-9.4%	11.8%
2000 - 2003	48.5%	46.8%	14.7%	39.0%	3.5%
2003 - 2006	83.6%	115.2%	168.1%	127.1%	103.5%
2006 - 2009	-2.1%	-11.5%	-1.5%	-9.3%	-2.3%
2009 - 2012	40.7%	75.8%	62.4%	61.1%	51.0%

Table 4: Current Ratio: Final Portfolio CARs with 24 Month Rebalancing

Period	HIGH	MIDDLE	LOW	Value	ALSI
1997 - 2000	-15.3%	39.2%	-47.7%	-9.4%	11.8%
2000 - 2003	71.7%	51.5%	21.3%	39.0%	3.5%
2003 - 2006	64.3%	130.3%	172.5%	127.1%	103.5%
2006 - 2009	15.6%	6.3%	-12.3%	-9.3%	-2.3%
2009 - 2012	38.3%	66.5%	54.8%	61.1%	51.0%

Table 5: Current Ratio: Final Portfolio CARs with 12 Month Rebalancing

Period	HIGH	MIDDLE	LOW	Value	ALSI
1997 - 2000	-27.5%	54.9%	-62.6%	-9.4%	11.8%
2000 - 2003	55.6%	59.3%	39.6%	39.0%	3.5%
2003 - 2006	100.0%	143.6%	138.9%	127.1%	103.5%
2006 - 2009	25.4%	-41.8%	-15.4%	-9.3%	-2.3%
2009 - 2012	57.3%	60.0%	42.5%	61.1%	51.0%

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5.3 Descriptive Results for Leverage Factor Momentum Portfolios

The graphs below provide a graphical representation of the CARs of all portfolios over the portfolio period of 3 years. The legends for the Benchmark portfolio, Value portfolio and each of the VM portfolios are available in Figure 8 below. Table 6, Table 7 and Table 8 show the final CAR for each portfolio over the investment period.

Figure 8: Legend for Leverage Factor Portfolios

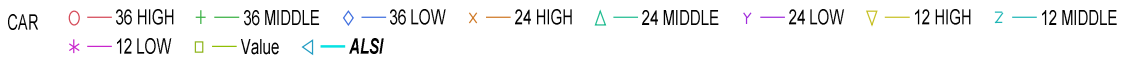


Figure 9: Leverage VM Portfolio CARs for the Period 1997 – 2000 (Period 1)

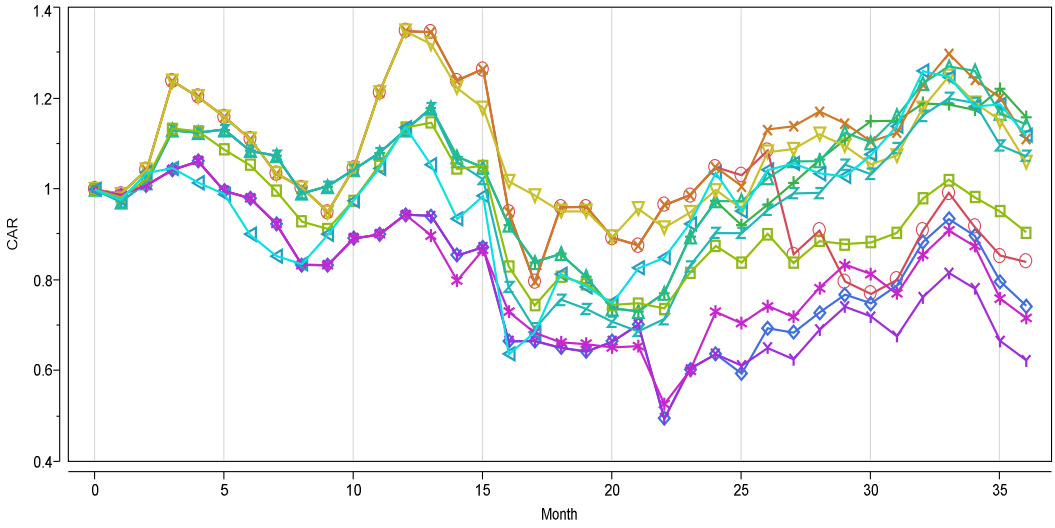
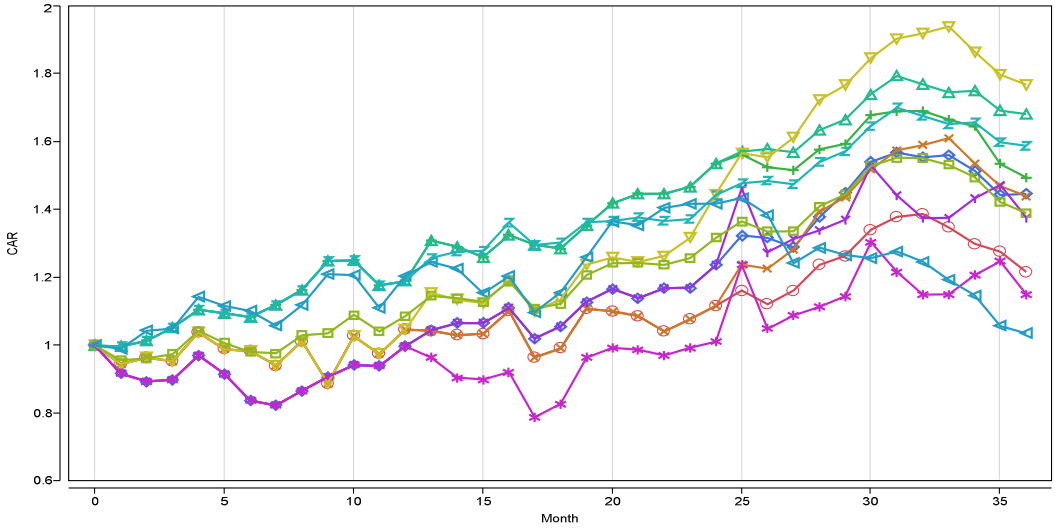


Figure 10: Leverage VM Portfolio CARs for the Period 2000 – 2003 (Period 2)



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Figure 11: Leverage VM Portfolio CARs for the Period 2003 – 2006 (Period 3)

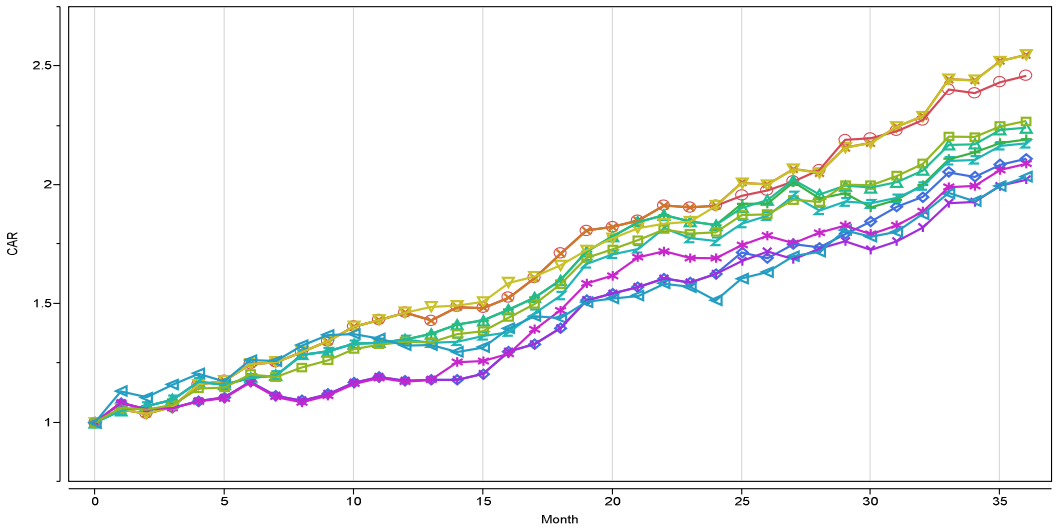


Figure 12: Leverage VM Portfolio CARs for the Period 2006 – 2009 (Period 4)

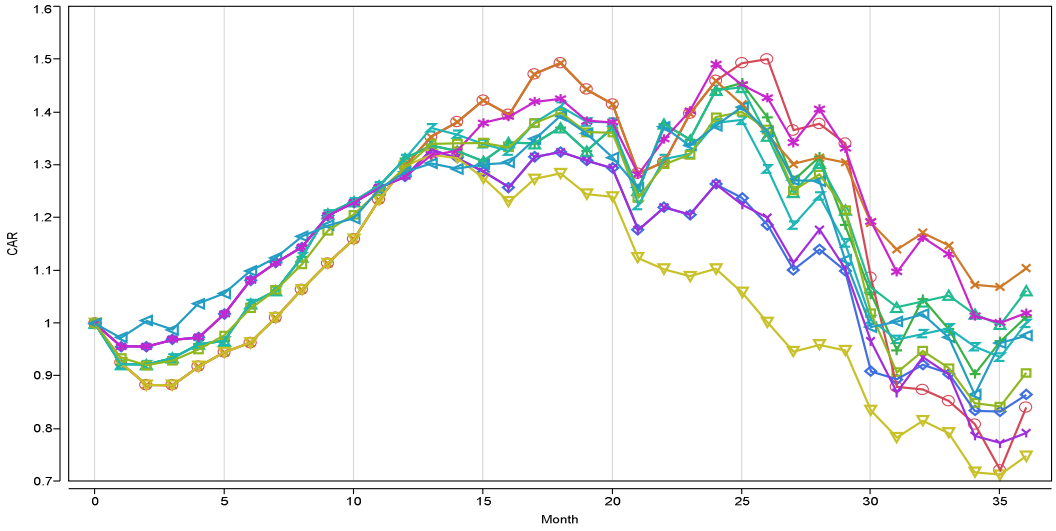
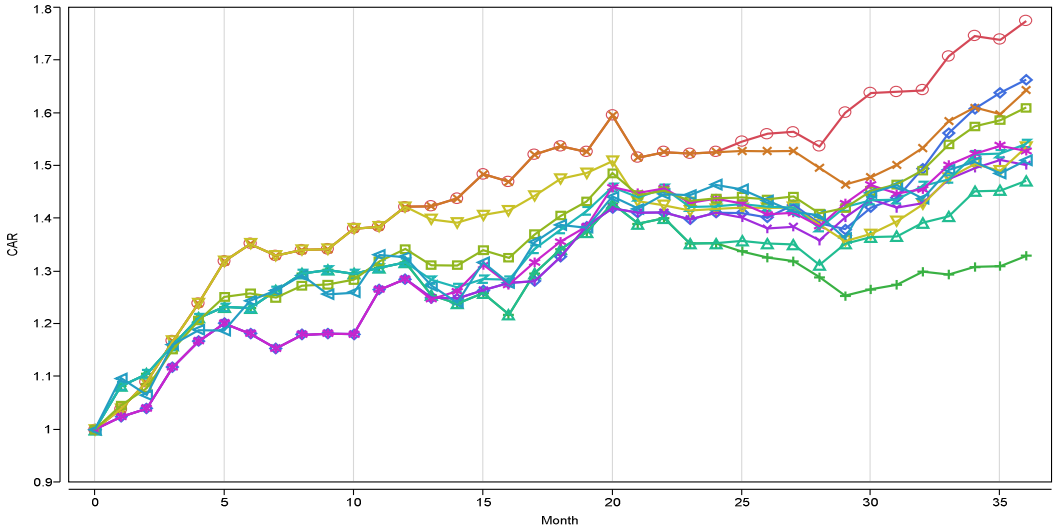


Figure 13: Leverage VM Portfolio CARs for the Period 2009 – 2012 (Period 5)



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Table 6: Leverage Factor: Final Portfolio CARs with 36 Month Rebalancing

Period	HIGH	MIDDLE	LOW	Value	ALSI
1997 - 2000	-15.9%	15.9%	-25.6%	-9.4%	11.8%
2000 - 2003	21.6%	49.5%	44.7%	39.0%	3.5%
2003 - 2006	146.1%	119.3%	111.2%	127.1%	103.5%
2006 - 2009	-15.9%	1.3%	-13.5%	-9.3%	-2.3%
2009 - 2012	77.5%	32.9%	66.4%	61.1%	51.0%

Table 7: Leverage Factor: Final Portfolio CARs with 24 Month Rebalancing

Period	HIGH	MIDDLE	LOW	Value	ALSI
1997 - 2000	11.0%	14.3%	-37.6%	-9.4%	11.8%
2000 - 2003	44.0%	68.2%	37.7%	39.0%	3.5%
2003 - 2006	155.0%	124.2%	102.3%	127.1%	103.5%
2006 - 2009	10.4%	6.3%	-20.8%	-9.3%	-2.3%
2009 - 2012	64.3%	47.2%	50.1%	61.1%	51.0%

Table 8: Leverage Factor: Final Portfolio CARs with 12 Month Rebalancing

Period	HIGH	MIDDLE	LOW	Value	ALSI
1997 - 2000	6.0%	7.3%	-28.3%	-9.4%	11.8%
2000 - 2003	76.9%	58.9%	15.1%	39.0%	3.5%
2003 - 2006	154.9%	117.6%	109.0%	127.1%	103.5%
2006 - 2009	-25.2%	0.1%	2.0%	-9.3%	-2.3%
2009 - 2012	53.6%	54.2%	52.8%	61.1%	51.0%

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5.4 Hypothesis 1

An ANOVA was run to determine if the Cumulative Average Returns (CARs) of the Value-Momentum (VM) portfolios were equal. The ANOVA was performed for each VM portfolio with the same rebalancing period. If the VM portfolios are determined to be unequal then the VM portfolios may provide information on selecting value winners versus losers. Outliers were not removed from the CAR distribution as this defeats the objective of detecting portfolios which may perform above or below the market. A non-parametric ANOVA was utilised as normality was not assumed. The Wilcoxon Kruskal Wallis non-parametric ANOVA test was used as it does not rely on a normal distribution. All of the information pertaining to Hypothesis 1 can be viewed in Table 9.

5.4.1 Hypothesis 1 A: Current Ratio VM Returns

The null hypothesis states that the Current Ratio VM portfolios produce CARs which are equal, while the alternative hypothesis states that Current Ratio VM portfolios produce CARs which are not equal.

5.4.1.1 Current Ratio VM Portfolios with 36 Month Rebalancing

Statistically, there was no significant difference in the following comparison:

- Between the CARs of the High, Middle and Low VM portfolios in the fourth investment period ($p = 0.75$).

Therefore, the null hypothesis was not rejected in this instance.

This was not observed in the other investment periods. Statistically, there was a significant difference between the CARs of the High, Middle and Low VM portfolios for the four remaining investment periods. The null hypothesis was rejected for the following investment periods:

- The first ($p < 0.001$)
- The second ($p < 0.001$)
- The third ($p < 0.001$)
- The fifth ($p < 0001$)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5.4.1.2 Current Ratio VM Portfolios with 24 Month Rebalancing

Statistically, there was no significant difference in the following comparison:

- Between the CARs of the High, Middle and Low VM portfolios in the fourth investment period ($p = 0.24$).

Therefore, the null hypothesis was not rejected in this investment period.

Statistically, there was a significant difference between the CARs of the High, Middle and Low VM portfolios for the four remaining investment periods. Therefore, the null hypothesis was rejected for the following investment periods:

- The first ($p < 0.001$)
- The second ($p < 0.001$)
- The third ($p < 0.001$)
- The fifth ($p < 0001$)

5.4.1.3 Current Ratio VM Portfolios with 12 Month Rebalancing

The 12 month rebalancing resulted in CARs that were not statistically significant in two investment periods. The null hypothesis was not rejected in the following investment periods:

- The third ($p = 0.097$)
- The fifth ($p = 0.69$)

Statistically, there was a significant difference between the CARs of the High, Middle and Low VM portfolios for the three remaining investment periods. Therefore, the null hypothesis was rejected in the following investment periods:

- The first ($p < 0.001$)
- The second ($p < 0.001$)
- The fourth ($p < 0001$).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5.4.2 Hypothesis 1 B: Leverage Factor VM Returns

The null hypothesis states that the Leverage Factor VM portfolios produce CARs which are equal, while the alternative hypothesis states that the Leverage Factor VM portfolios produce CARs which are not equal.

5.4.2.1 Leverage Factor VM Portfolios with 36 Month Rebalancing

Statistically, there was no significant difference in the following comparison:

- Between the CARs of the High, Middle and Low VM portfolios in the fourth investment period ($p = 0.19$)

Therefore, the null hypothesis was rejected for this investment period

Statistically, there was a significant difference between the CARs of the High, Middle and Low VM portfolios for the four remaining investment periods. The null hypothesis was rejected in the following investment periods:

- The first ($p < 0.01$)
- The second ($p < 0.01$)
- The third ($p < 0.01$)
- The fifth ($p < 0.01$)

5.4.2.2 Leverage Factor VM Portfolios with 24 Month Rebalancing

Statistically, there was no significant difference in the following comparison:

- Between the CARs of the High, Middle and Low VM portfolios in the third investment period ($p = 0.28$)
- Between the CARs of the High, Middle and Low VM portfolios in the fifth investment period ($p = 0.31$)

Therefore, the null hypothesis was not rejected for this investment period

There was a statistically significant difference between the CARs of the High, Middle and Low VM portfolios for the remaining three investment periods. Therefore, the null

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

hypothesis was rejected in favour of the alternative hypothesis in the following investment periods:

- The first ($p < 0.01$)
- The second ($p < 0.01$)
- The fourth ($p < 0.01$)

5.4.2.3 Leverage Factor VM Portfolios with 12 Month Rebalancing

Statistically, there was no significant difference in the following comparison:

- Between the CARs of the High, Middle and Low VM portfolios in the third investment period ($p = 0.1785$)
- Between the CARs of the High, Middle and Low VM portfolios in the fourth investment period ($p= 0.16$)

Therefore, the null hypothesis was not rejected for this investment period

There was a statistically significant difference between the CARs of the High, Middle and Low VM portfolios for the remaining periods. Therefore, the null hypothesis was rejected in favour of the alternative hypothesis in the following investment periods:

- The first ($p < 0.001$)
- The second ($p = 0.028$)
- The fifth ($p = 0.02$)

5.4.3 Summary of Results

Both Leverage Factor momentum and Current Ratio momentum provide the means to differentiate the shares within the Value portfolio. The majority of the portfolios rejected the null hypothesis. An interesting observation was that the portfolios which did not reject the null hypothesis were not located in the same investment periods for the Current Ratio momentum and the Leverage Factor momentum. Therefore, the two momentum indicators provide different information when used to create a VM portfolio.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Table 9: Value-Momentum Analysis of Variance Results for Cumulative Average Returns

		Current Ratio Momentum						Leverage Ratio Momentum					
		36 Month Rebalancing		24 Month Rebalancing		12 Month Rebalancing		36 Month Rebalancing		24 Month Rebalancing		12 Month Rebalancing	
Year	**Level**	**Score Mean**	**P Value**	**Score Mean**	**P Value**	**Score Mean**	**P Value**	**Score Mean**	**P Value**	**Score Mean**	**P Value**	**Score Mean**	**P Value**
1997 - 2000	High	60.4	<.0001*	52.3	<.0001*	50.62	<.0001*	65.1622	<.0001*	88.7297	<.0001	91.6216	<.0001
	Middle	84.1		90.24		91.22		71.6757		54.0811		48.6486	
	Low	23.5		25.46		26.16		31.1622		25.1892		27.7297	
2000 - 2003	High	74.9	<.0001*	76.03	<.0001*	67.11	<.0001*	42.1892	<.0001	76.0000	<.0001	66.4324	0.0276
	Middle	63.3		63.03		64.73		77.0541		56.8919		55.1351	
	Low	29.9		28.95		36.16		48.7568		35.1081		46.4324	
2003 - 2006	High	42.1	0.0001*	40.19	<.0001*	47.81	0.0969	63.9189	<.0001	56.8108	0.284	55.9459	0.1785
	Middle	52.7		54.41		56.22		58.0811		61.4865		62.9730	
	Low	73.2		73.41		63.97		46.0000		49.7027		49.0811	
2006 - 2009	High	53.1	0.7507	58.31	0.2402	76.17	<.0001*	59.6486	0.1902	72.2432	0.0002*	48.5676	0.1637
	Middle	57.7		57.89		36.36		60.2162		54.0270		56.6757	
	Low	52.7		47.31		50.97		48.1351		41.7297		62.7568	
2009 - 2012	High	31.4	<.0001*	31.19	<.0001*	52.97	0.6935	77.1622	<.0001	59.3514	0.3119	58.9459	0.0221
	Middle	65.5		64.3		59.35		40.2432		59.2432		64.5405	
	Low	71.2		72.51		55.68		50.5946		49.4054		44.5135	

*Reject the null hypothesis at a five percent level of significance

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5.5 Hypothesis 2

A Wilcoxon Signed Rank paired t -test was used to determine if there were any differences in Cumulative Average Returns (CARs) between the VM portfolios and the Value portfolio. Outliers were not removed as it would not allow the portfolio to incorporate abnormal average returns. As a result, normality could not be assumed and a non-parametric test was utilised. The Value portfolio was measured over the same rebalancing period as the VM portfolios and was matched for testing purposes. All of the information pertaining to Hypothesis 2 can be viewed in Table 10.

5.5.1 Hypothesis 2 A: Current Ratio VM Returns vs. Value

The null hypothesis states that the Value portfolio produces CARs which are equal to any of the Current Ratio VM portfolios (High, Middle and Low). The alternative hypothesis states that the Value portfolio produces CARs which are not equal to any of the VM portfolios (High, Middle and Low). The VM portfolios with 36, 24 and 12 month rebalancing periods are compared against the Value portfolio.

A single paired t-test was performed for each of the High, Middle and Low VM portfolios against the Value portfolio for each investment period. This was replicated for each of the rebalancing periods, where rebalancing was to provide insight into investment timing.

5.5.1.1 Current Ratio VM (36) vs. Value

The hypothesis was tested using Current Ratio VM portfolios which were bought and held for the duration of the investment period. Statistically, there was a significant difference in the following:

- Between the CARs of the Value portfolio and the CARs of the High, Middle and Low VM portfolios for all of the investment periods.

Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for all investment periods. The hypotheses were rejected to 5 percent level of significance.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5.5.1.2 Current Ratio VM (24) vs. Value

The VM portfolios were rebalanced 24 months after the portfolios were created and then held for the duration of the investment period. Statistically, there were no significant differences in the following comparisons:

- Between the CARs of the Value portfolio and the High VM portfolio in the first investment period ($p = 0.64$).
- Between the CARs of the Value portfolio and the Low VM portfolio in the fourth investment period ($p = 0.4$).

Therefore, the null hypotheses were not rejected for these portfolios.

There was a statistically significant difference between the CARs of the Value portfolio and the CARs of the remaining VM portfolios (High, Middle and Low). Therefore, the null hypothesis was rejected in favour of the alternative hypothesis.

5.5.1.3 Current Ratio VM (12) vs. Value

The VM portfolios were rebalanced every 12 months until the end of the investment period. Statistically, there was no significant difference in the following comparisons:

- Between the CARs of the Value portfolio and the Middle VM portfolio in the third investment period ($p = 0.85$).
- Between the CARs of the Value portfolio and the Low VM portfolio for the fifth investment period ($p = 0.79$).

Therefore, the null hypotheses were not rejected for these two VM portfolios.

There was a statistically significant difference between the CARs of the Value portfolio and the CARs of the remaining VM portfolios in all investment periods. Therefore, the null hypotheses were rejected in favour of the alternative hypotheses for these portfolios.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5.5.2 Hypothesis 2 B: Leverage Factor VM Returns vs. Value

The null hypothesis states that the Value portfolio produces CARs which are equal to the Leverage Factor VM portfolios (High, Middle and Low). The alternative hypothesis states that the Value portfolio produces CARs which are not equal to any of the VM portfolios (High, Middle and Low). The VM portfolios with 36, 24 and 12 month rebalancing periods were compared against the Value portfolio.

A single paired t-test was performed for each of the High, Middle and Low VM portfolios against the Value portfolio for each investment period. This was replicated for each of the rebalancing periods, where rebalancing was to provide insight into investment timing.

5.5.2.1 Leverage Factor VM (36) vs. Value

The hypothesis was tested using the Value portfolio and the Leverage Factor VM portfolios. These portfolios were bought and held for the duration of the investment period. Statistically, there were no significant differences in the following comparisons:

- Between the CARs of the Value portfolio and the CARs of the Middle VM portfolio in the third investment period ($p = 0.435$).
- Between the CARs of the Value portfolio and that of the Low VM portfolio in the fourth investment period ($p = 0.22$).

Therefore, the null hypothesis was not rejected for these two VM portfolios.

There was a statistically significant difference between the CARs of the Value portfolio and the CARs of all other VM portfolios (High, Middle and Low) in each investment period. Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for these portfolios.

5.5.2.2 Leverage Factor VM (24) vs. Value

The VM portfolios were rebalanced 24 months after the portfolios were created and then held for the duration of the investment period. There was a statistically significant difference between the CARs of the Value portfolio and the CARs of the High, Middle

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

and Low VM portfolios for all investment periods. Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for these portfolios.

5.5.2.3 Leverage Factor VM (12) vs. Value

The VM portfolios were rebalanced every 12 months until the end of the investment period. Statistically, there were no significant differences in the following comparisons:

- Between the CARs of the Value portfolio and that of the Middle VM portfolio in the fourth investment period ($p = 0.135$).
- Between the CARs of the Value portfolio and the High VM portfolio in the fifth investment period ($p = 0.205$).

Therefore, the null hypothesis was not rejected for these two VM portfolios.

There was a statistically significant difference between the CARs of the Value portfolio and the CARs of all other VM portfolios (High, Middle and Low). Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for these portfolios.

5.5.3 Summary of Results

The majority of the VM portfolios rejected the null hypothesis in favour of the alternative hypothesis. The alternative hypothesis indicates that the VM portfolios are not equal to the Value portfolio. These results indicate that both the Leverage Factor and Current Ratio VM portfolios separate the stocks within the Value portfolio. This is done in such a way that the CARs of these portfolios do not perform similarly to the Value portfolio. This indicates that the VM portfolios could be used to separate value winners and losers if the returns are consistent across all investment periods.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Table 10: Matched Pair T-Tests for the Value Portfolio against the Value-Momentum Portfolios

		Current Ratio						Leverage Ratio					
		12 Month Rebalancing		24 Month Rebalancing		36 month Rebalancing		12 Month Rebalancing		24 Month Rebalancing		36 month Rebalancing	
Year	**Level**	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|
1997 - 2000	High	0.06	<.0001*	0.00	0.64	-0.05	0.0055*	-0.1423	<.0001*	-0.157	<.0001*	-0.0721	0.0001*
	Middle	-0.35	<.0001*	-0.30	<.0001*	-0.22	<.0001*	-0.0509	0.0005*	-0.094	<.0001*	-0.0865	<.0001*
	Low	0.33	<.0001*	0.26	<.0001*	0.30	<.0001*	0.11802	<.0001*	0.15002	<.0001*	0.12581	<.0001*
2000 - 2003	High	-0.08	<.0001*	-0.17	<.0001*	-0.12	<.0001*	-0.1015	0.0007*	0.05703	<.0001*	0.11459	<.0001*
	Middle	-0.09	<.0001*	-0.05	<.0001*	-0.03	0.0006*	-0.1282	<.0001*	-0.1688	<.0001*	-0.1413	<.0001*
	Low	0.14	<.0001*	0.22	<.0001*	0.21	<.0001*	0.20806	<.0001*	0.0767	<.0001*	0.05995	<.0001*
2003 - 2006	High	0.12	<.0001*	0.29	<.0001*	0.25	<.0001*	-0.1058	<.0001*	-0.1115	<.0001*	-0.1011	<.0001*
	Middle	0.00	0.85	0.08	<.0001*	0.11	<.0001*	0.0249	0.0010*	-0.0193	0.0005*	-0.0065	0.435
	Low	-0.09	<.0001*	-0.28	<.0001*	-0.28	<.0001*	0.11963	<.0001*	0.16232	<.0001*	0.13761	<.0001*
2006 - 2009	High	-0.14	<.0001*	-0.09	<.0001*	-0.04	<.0001*	0.12269	<.0001*	-0.0529	0.0014*	-0.0138	0.223
	Middle	0.18	<.0001*	-0.08	<.0001*	-0.05	<.0001*	-0.01	0.1349	-0.0288	0.0033*	-0.0208	0.0026*
	Low	0.05	<.0001*	-0.01	0.40	-0.04	<.0001*	-0.0664	<.0001*	0.04137	0.0003*	0.03926	0.0008*
2009 - 2012	High	0.04	<.0001*	0.13	<.0001*	0.12	<.0001*	-0.0128	0.205	-0.0712	<.0001*	-0.1037	<.0001*
	Middle	0.01	0.0366*	-0.02	0.0011*	-0.04	0.0002*	0.01686	0.0004*	0.05444	<.0001*	0.08209	<.0001*
	Low	0.00	0.79	-0.06	<.0001*	-0.06	<.0001*	0.03969	<.0001*	0.0566	<.0001*	0.03926	<.0001*

* Reject the null hypothesis at a five percent level of significance

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

5.6 Hypothesis 3

A Wilcoxon Signed Rank paired t -test was run to determine if there were differences in Cumulative Average Returns (CARs) between the VM portfolios and the Benchmark portfolio. The Benchmark portfolio is the All Share Index (ALSI) as it provides the forgone opportunity cost. The ALSI is also considered to represent the market. The Benchmark portfolio is measured over the same investment periods as the VM portfolios. All of the information pertaining to Hypothesis 3 can be viewed in Table 11.

5.6.1 Hypothesis 3 A: Current Ratio VM Returns vs. Benchmark

The null hypothesis states that the Benchmark portfolio produces CARs which are equal to the Current Ratio VM portfolios (High, Middle and Low). The alternative hypothesis states that the Benchmark portfolio produces CARs which are not equal to the VM portfolios (High, Middle and Low). The VM portfolios with 36, 24 and 12 month rebalancing are compared against the Benchmark portfolio.

A test was conducted for each of the VM portfolios (High, Middle and Low) against the Benchmark portfolio for each investment period. This was replicated for each of the rebalancing periods to allow this research to determine if rebalancing provides any insight into investment timing.

5.6.1.1 Current Ratio VM (36) vs. Benchmark

The hypothesis was tested using the Benchmark portfolio and the Current Ratio VM portfolios which were bought and held for the duration of the investment period. Statistically, there was no significant difference in the following comparisons:

- Between the CARs of the Benchmark portfolio and the High VM portfolio in the first investment period ($p = 0.37$).
- Between the CARs of the Benchmark portfolio and the Middle VM portfolio in the second investment period ($p = 0.23$).
- Between the CARs of the Benchmark portfolio and the Middle VM portfolio in the third investment period ($p = 0.64$).

Therefore, the null hypothesis was not rejected for these three VM portfolios.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

There was a statistically significant difference between the CARs of the Benchmark portfolio and the CARs of all remaining VM portfolios (High, Middle and Low). Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for these portfolios.

5.6.1.2 Current Ratio VM (24) vs. Benchmark

The VM portfolios were rebalanced 24 months after the portfolios were created and then held for the duration of the investment period. Statistically, there were no significant differences in the following comparisons:

- Between the CARs of the Benchmark portfolio and the Middle VM portfolio in the second investment period ($p = 0.11$).
- Between the CARs of the Benchmark portfolio and the Middle VM portfolio in the third investment period ($p = 0.23$).
- Between the CARs of the Benchmark portfolio and the Low VM portfolio in the fourth investment period ($p = 0.42$).

Therefore, the null hypothesis was not rejected for these three VM portfolios.

Statistically, there was a significant difference between the CARs of the Benchmark portfolio and the CARs of the remaining VM portfolios (High, Middle and Low). Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for these portfolios.

5.6.1.3 Current Ratio VM (12) vs. Benchmark

The VM portfolios were rebalanced every 12 months until the end of the investment period. Statistically, there were no significant differences in the following comparisons:

- Between the CARs of the Benchmark portfolio and the High VM portfolio in the third investment period ($p = 0.41$).
- Between the CARs of the Benchmark portfolio and the Low VM portfolio in the fifth investment period ($p = 0.13$).

Therefore the null hypothesis was not rejected for these VM portfolios.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Statistically, there was a significant difference between the CARs of the Benchmark portfolio and the CARs of the remaining VM portfolios (High, Middle and Low). Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for these portfolios.

5.6.2 Hypothesis 3 B: Leverage Factor VM Returns vs. Benchmark

The null hypothesis states that the Benchmark portfolios produce CARs which are equal to the Leverage Factor VM portfolios (High, Middle and Low). The alternative hypothesis states that the Benchmark portfolio produced CARs which were not equal to the VM portfolios (High, Middle and Low). The VM portfolios with 36, 24 and 12 month rebalancing periods were compared against the Value portfolio.

Due to the large number of tests, the test statistics will be shown in Table 11. There is a test for each of the VM portfolios (High, Middle and Low) against the Benchmark portfolio in each investment period. This was replicated for each of the rebalancing periods to allow this research to determine if rebalancing provides any insight into investment timing.

5.6.2.1 Leverage Factor VM (36) vs. Benchmark

The hypothesis was tested using the Benchmark portfolio and the Leverage Factor VM portfolios which were bought and held for the duration of the investment period. Statistically, there were no significant differences in the following comparisons:

- Between the CARs of the Benchmark portfolio and the High VM portfolio in the first investment period ($p = 0.39$).
- Between the CARs of the Benchmark portfolio and the Low VM portfolio in the second investment period ($p = 0.18$).
- Between the CARs of the Benchmark portfolio and the Low VM portfolio in the third investment period ($p = 0.06$).
- Between the CARs of the Benchmark portfolio and the High ($p = 0.78$) and Middle ($p = 0.81$) VM portfolios in the fourth investment period.
- Between the CARs of the Benchmark portfolio and the Low VM portfolio in the fifth investment period ($p = 0.094$).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Therefore, the null hypothesis was not rejected for these portfolios.

Statistically, there was a significant difference between the CARs of the Benchmark portfolio and the CARs of the remaining VM portfolios (High, Middle and Low). Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for these portfolios.

5.6.2.2 Leverage Factor VM (24) vs. Benchmark

The VM portfolios were rebalanced 24 months after the portfolios were created and then held for the duration of the investment period. Statistically, there were no significant differences in the following comparisons:

- Between the CARs of the Benchmark portfolio and the High VM portfolio in the second investment period ($p = 0.23$).
- Between the CARs of the Benchmark portfolio and the High VM portfolio in the fourth investment period ($p = 0.0502$).
- Between the CARs of the Benchmark portfolio and the Middle VM portfolio in the fourth investment period ($p = 0.28$).

Therefore, the null hypothesis was not rejected for these VM portfolios.

Statistically, there was a significant difference between the CARs of the Benchmark portfolio and the CARs of the remaining VM portfolios (High, Middle and Low). Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for these portfolios.

5.6.2.3 Leverage Factor VM (12) vs. Benchmark

The VM portfolios were rebalanced every 12 months until the end of the investment period. Statistically, there were no significant differences in the following comparisons:

- Between the CARs of the Benchmark portfolio and the Middle VM portfolio in the first investment period ($p = 0.62$).
- Between the CARs of the Benchmark portfolio and the Low VM portfolio in the third investment period ($p = 0.44$).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- Between the CARs of the Benchmark portfolio and the Middle VM portfolio in the fourth investment period (p = 0.27).
- Between the CARs of the Benchmark portfolio and the Middle VM portfolio in the fifth investment period.

Therefore the null hypothesis was not rejected for these portfolios.

Statistically, there was a significant difference between the CARs of the Benchmark portfolio and the CARs of the remaining VM portfolios (High, Middle and Low). Therefore, the null hypothesis was rejected in favour of the alternative hypothesis for these portfolios.

5.6.3 Summary of Results

The majority of the VM portfolios reject the null hypothesis in favour of the alternative hypothesis. The alternative hypothesis states that the VM portfolios are not equal to the Benchmark portfolio. These results indicate that both the Leverage Factor and Current Ratio VM portfolios separate the stocks within the Benchmark portfolio in such a way that the CARs of these portfolios do not perform similarly to the Benchmark portfolio. Since they are not similar to the Benchmark, the final CARs of the portfolios could be used to determine if any portfolio consistently outperforms the Benchmark. If a trend exists, the VM portfolio would be able to separate value portfolios which could consistently outperform the market.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Table 11: Matched Pair T-Tests for the Benchmark Portfolio against the Value-Momentum Portfolios

		Current Ratio						Leverage Ratio					
		12 Month Rebalancing		24 Month Rebalancing		36 month Rebalancing		12 Month Rebalancing		24 Month Rebalancing		36 month Rebalancing	
Year	**Level**	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|	Mean Difference	Prob > |t|
1997 - 2000	High	0.10	0.0009*	0.05	0.0226*	-0.01	0.37	-0.0992	<.0001*	-0.1139	<.0001*	-0.0291	0.3905
	Middle	-0.31	<.0001*	-0.25	<.0001*	-0.17	<.0001*	-0.0078	0.6242	-0.0509	0.0007*	-0.0435	0.0058*
	Low	0.37	<.0001*	0.30	<.0001*	0.35	<.0001*	0.16111	<.0001*	0.19312	<.0001*	0.16891	<.0001*
2000 - 2003	High	-0.09	0.0108*	-0.19	<.0001*	-0.13	0.0001*	-0.1123	0.0438*	0.04624	0.2265	0.1038	0.0002*
	Middle	-0.10	0.0149*	-0.06	0.11	-0.04	0.23	-0.139	<.0001*	-0.1796	<.0001*	-0.1521	<.0001*
	Low	0.13	0.0011*	0.21	<.0001*	0.20	<.0001*	0.19727	<.0001*	0.06592	0.0412*	0.04917	0.1794
2003 - 2006	High	0.01	0.41	0.19	<.0001*	0.14	<.0001*	-0.2107	<.0001*	-0.2163	<.0001*	-0.206	<.0001*
	Middle	-0.11	0.0015*	-0.03	0.23	0.01	0.64	-0.08	<.0001*	-0.1241	<.0001*	-0.1114	<.0001*
	Low	-0.20	<.0001*	-0.38	<.0001*	-0.38	<.0001*	0.01477	0.4452	0.05746	0.0002*	0.03275	0.0626
2006 - 2009	High	-0.12	<.0001*	-0.07	0.0001*	-0.02	0.0182*	0.14169	<.0001*	-0.0339	0.0502	0.00516	0.7753
	Middle	0.20	<.0001*	-0.06	<.0001*	-0.03	0.0114*	0.00899	0.2652	-0.0098	0.2756	-0.0018	0.8099
	Low	0.07	<.0001*	0.01	0.42	-0.02	0.0208*	-0.0474	0.0002*	0.06036	<.0001*	0.05826	<.0001*
2009 - 2012	High	0.01	0.0402*	0.10	<.0001*	0.10	<.0001*	-0.0348	0.0020*	-0.0932	<.0001*	-0.1257	<.0001*
	Middle	-0.02	0.0211*	-0.04	<.0001*	-0.07	<.0001*	-0.0051	0.231	0.03245	<.0001*	0.06009	<.0001*
	Low	-0.02	0.13	-0.08	<.0001*	-0.09	<.0001*	0.01769	0.0122*	0.0346	<.0001*	0.01726	0.0938

* Reject the null hypothesis at a five percent level of significance

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

6. DISCUSSION OF RESULTS

6.1 Hypothesis 1

The rejection of the null hypotheses indicates that the CARs of the VM portfolios (High, Middle and Low) are statistically different from one another. If it was found that there was a significant difference between the CARs, this research would identify if any of these portfolios could consistently perform better than the others.

As a result of unequal returns across all sub hypotheses, the momentum indicator could be used to separate value winners from losers. This corresponds with the findings of Bird & Casavecchia (2007) who demonstrate that momentum was found as a good method for differentiating between good and bad value stocks. Bird & Casavecchia (2007) also identified that stocks with the highest price momentum were expected to be portfolio winners and the stocks with the lowest price momentum were expected to be portfolio losers.

6.1.1 Hypothesis 1 A: Current Ratio VM Returns

$H1A_0$: The Current Ratio VM portfolios produce CARs which are equal.
$H1A_a$: The Current Ratio VM portfolios produce CARs which are unequal.

6.1.1.1 Current Ratio VM portfolios with 36 Month Rebalancing

Statistically, this research yielded significant results that indicate that the CARs of the VM portfolios (High, Middle and Low) are not equal in four out of the five investment periods.

The results indicated support for the alternative hypothesis in most cases. Therefore, the momentum indicator was sufficient at separating value winners from losers. The fourth investment period was not able to produce significantly different results. However, the final return of the High, Middle and Low VM portfolios indicated that some portfolios performed better than others.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

In order to determine if this research could consistently separate value winners from losers, the final CARs were analysed and are discussed below:

- The High VM portfolio obtained the highest CARs in the first investment period.
- The second highest return was observed in the Middle VM portfolio, while the worst was observed by the Low VM portfolio. This trend was seen again in the second investment period but not in the third, fourth and fifth.
- The third investment period saw the highest return from the Low VM portfolio and the lowest return from the High VM portfolio.
- The Middle VM portfolio performed the worst in the fourth investment period, while it produced the highest returns in the fifth investment period
- The High VM portfolio produced the lowest return in the fifth investment period.

The High and Low VM portfolios each had the highest and the lowest returns on two occasions. The Middle VM portfolio had neither the best nor the worst returns on three occasions. The Middle VM portfolio performed the worst in one investment period and performed the best in another. Therefore, when Current Ratio momentum with 36 month rebalancing was applied to value stocks, it did not provide an early indication of sustained improvement as seen by Bird & Casavecchia (2007) when using price momentum.

6.1.1.2 Current Ratio VM Portfolios with 24 Month Rebalanced Portfolios.

This research yielded significant results that indicate that the CARs of the High, Middle and Low VM portfolios are unequal. This was observed in four out of the five investment periods.

The results indicated support against the null hypothesis in most cases. As a result of CARs which are not equal, the VM portfolios could be used to identify winners and losers. Again, the fourth investment period did not produce statistically significant CARs in the VM portfolios; however, the final returns indicate that the High and Middle VM portfolios performed better than the Low VM portfolios.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

In order to determine if this research could consistently separate value winners from losers, the final CARs were analysed and are discussed below:

- The High VM portfolios produced the highest returns twice, while only producing the lowest return once.
- The Middle VM portfolio obtained the highest return twice and three intermediate returns.
- The Middle VM portfolio did not produce the lowest return at any point in the five investment periods.
- The Low VM portfolio obtained the lowest return in four investment periods, while producing the highest return in a single period.

Therefore, the High and Middle VM portfolios were capable of producing results which together outperform the Low VM portfolios. The Current Ratio momentum appears to be able to separate the winners from losers; however, it cannot effectively separate the High and Middle VM portfolio winners in a continuous manner. This research agrees with the findings by Bird & Casavecchia (2007) which finds that momentum is able to separate value winners from losers, although this research only offers limited separation for 24 month rebalancing.

6.1.1.3 Current Ratio VM portfolios with 12 month rebalanced portfolios.

This research yielded statistically significant results that indicate that the CARs of the High, Middle and Low VM portfolios are not equal for three out of the five investment periods.

The results indicated support against the null hypothesis in most cases. In order to determine if this research could consistently separate value winners from losers, the final CARs were analysed and are discussed below:

- The Middle VM portfolio obtained the highest returns in the first, second, third and fifth investment periods.
- The Middle VM portfolio performed the worst in the fourth investment period.
- The High VM portfolios received the second highest returns on average
- The Low VM portfolio appeared to have the majority of portfolios which performed the worst.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

A trend was indentified across the first, second, third and fifth investment periods. It appears that the 12 month rebalancing produced the highest return for the Middle VM portfolio over these periods. This research agrees with the findings by Bird & Casavecchia (2007) which indicate that momentum was able to separate value winners from losers in most cases. However, the highest momentum indicator produced returns which were second to that of the middle momentum indicator.

6.1.2 Hypothesis 1 B: Leverage Factor VM Returns

$H1B_0$: The Leverage Factor VM portfolios produce CARs which are equal.
$H1B_a$: The Leverage Factor VM portfolios produce CARs which are unequal.

6.1.2.1 Leverage Factor VM Portfolios with 36 Month Rebalancing

This research yielded statistically significant results that indicate that the CARs of the VM portfolios (High, Middle and Low) were not equal in four out of the five investment periods.

The results indicated support against the null hypothesis in most cases. Therefore, the momentum indicator was sufficient at separating value winners from losers. The fourth investment period was not able to produce significantly different CARs. However, the final return of the High, Middle and Low VM portfolios indicated that some portfolios performed better than others.

In order to determine if this research could consistently separate value winners from losers, the final CARs were analysed and are discussed below:

- The Middle VM portfolio obtained the highest CARs in the first investment period and was the only portfolio to obtain positive returns in this period.
- The lowest final CAR was seen by the Low VM portfolio in the first investment period.
- The Middle VM portfolio outperformed the other VM portfolios in the second and fourth investment periods.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- The High VM portfolio outperformed the other two VM portfolios in the second and fifth investment periods.
- The Low VM portfolio was never the highest performing portfolio.
- It appears that when the High and Middle VM portfolios were combined they contained the best performing portfolios, but they also included the worst performing portfolios on three separate occasions.

The High VM portfolio had the highest as well as the lowest returns twice. The Middle VM portfolio obtained the highest CARs at the end of three investment periods while obtaining the lowest return in one period. The Low VM portfolio had the second highest CARs at the end of three investment periods as well as the lowest CARs in another two periods. Therefore, when Leverage Factor momentum combined with 36 month rebalancing is applied to value stocks, it does not provide an early indication of sustained improvement as seen by Bird & Casavecchia (2007) when using price momentum.

6.1.2.2 Leverage Factor VM Portfolios with 24 Month Rebalancing.

This research yielded statistically significant results that indicate that the CARs of the VM portfolios (High, Middle and Low) were not equal in three out of the five investment periods.

The results indicated support against the null hypothesis in most cases. As a result of unequal returns, the VM portfolios could be used to identify value winners from losers. Statistically, investment periods three and five may not have produced significantly varying results, but the final return indicated that the High VM portfolio performed better than the Low VM portfolio.

In order to determine if this research could consistently separate value winners from losers, the final CARs were analysed and are discussed below:

- The High VM portfolios produced the highest CARs on three occasions and produced the second highest CARs twice.
- The Middle VM portfolios obtained the highest returns twice and only produced the lowest returns once.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- The High VM portfolios did not produce the lowest returns at any point in the five investment periods.
- The Low VM portfolios obtained the lowest returns in four investment periods, while producing the second highest return in only one period.

Therefore, the High and Middle VM portfolios were able to produce combined results which consistently outperformed the Low VM portfolios. Therefore, Leverage Factor momentum was able to separate the value winners from losers. However, it could not effectively separate the value winners in a continuous manner. These findings support the findings of Bird & Casavecchia (2007) who indicated that momentum was able to separate value winners from losers. This study only offers limited separation between winners and losers.

6.1.2.3 Leverage Factor VM Portfolios with 12 Month Rebalancing.

This research found statistically significant results that indicate that the CARs of the VM portfolios (High, Middle and Low) were not equal for three out of the five investment periods.

The results indicate support against the null hypothesis in most cases. Investment period three and four did not produce significantly different results. However, on closer inspection, it was found that the final returns of some portfolios performed better than others.

In order to determine if this research could consistently separate value winners from losers, the final CARs were analysed and are discussed below:

- The rebalancing resulted in the High VM portfolio obtaining higher returns in investment period three, four and five.
- The High VM portfolio obtained the second highest returns in period one and two.
- The Low VM portfolio performed the worst out of the three VM portfolios in four consecutive investment periods.
- The Middle VM portfolios outperformed the other portfolios in the first two investment periods.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- The fifth period saw the Middle VM portfolio underperform against the other portfolios while receiving intermediate CARs in the third and fourth investment periods.

The High and Middle VM portfolios combined had the highest returns for four out of the five investment periods. Only the fourth investment period saw the High VM portfolio obtain the lowest performing final CAR. The fourth investment period occurs during the financial recession of 2008. The 12 month rebalancing results in the Middle VM portfolio outperforming the others in all five investment periods. The Middle VM portfolio did not produce a final CAR which was negative at any point. The Low VM portfolio underperformed in four out of the five investment periods except for the period over the financial crisis. Again, this research agrees with the findings by Bird & Casavecchia (2007) which indicate that momentum is able to separate value winners and losers. However, the highest momentum indicator produced returns which were second to that of the middle momentum indicator. This research only offers limited separation between value winners and losers as it cannot successfully differentiate between the middle and highest performing portfolios.

6.1.3 Summary of Results

The majority of the portfolio periods resulted in the rejection of the null hypothesis. In the instances where the null hypothesis was not rejected, there appeared to be a difference in the final CARs between portfolios.

6.1.3.1 Current Ratio Momentum

It was initially expected that the higher the momentum indicator the better the results, especially when using Current Ratio as the momentum indicator. Current ratio is defined as a liquidity ratio which indicates the ability of a company to pay back short term debts. Therefore, an increase in this value is expected to signal a healthier balance sheet.

The High VM portfolio did not appear to consistently outperform the other portfolios as expected. However, the 24 month rebalancing saw the High and Middle VM outperform the low VM portfolio. This gave an indication that there is some separation of winners

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

from losers. The 12 month rebalanced Current Ratio VM portfolios saw the Middle VM portfolio outperform the others in four of the five investment periods. Therefore, this investment style has the potential to separate winners from losers, but it does not conform to the notion that the higher the momentum indicator the better (Chan et al., 1996). This may be a result of the highest momentum indicators coming off a small base, however; this would need to be investigated.

6.1.3.2 Leverage Factor Momentum

In the case of Leverage Factor momentum, it was expected that the lower the momentum indicator, the higher the CARs. This is because Leverage is a proxy for the amount of risk within an organisation (Bhandar, 1988). The alternative view was that it provides the proportion of debt-to-equity in the company and therefore, provides a mechanism to identify how aggressively a company is financing its growth through debt (Investopedia, 2012). This could be viewed as a risk or as a mechanism for growth.

The High VM portfolios did not consistently outperform the other portfolios. However, the Low VM portfolios appeared to consistently underperform. When the High and Middle VM portfolios were combined, it was evident that they had the portfolios which continuously performed the best for all rebalancing periods. It could then be argued that Leverage could be a proxy for expected growth rather than the level of risk.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

6.2 Hypothesis 2

The rejection of the null hypothesis indicates that the CARs of the VM portfolios (High, Middle and Low) were statistically different from the CARs of the Value portfolio. If it were found that there was a significant difference between the CARs and the Value portfolio, this research would try and identify which of these portfolios perform consistently better than the Value portfolio.

There are three kinds of value shares as explained by Bird & Casavecchia (2007):

1. Those which start performing immediately
2. Those which start performing some unknown time in the future
3. Those which are unlikely to ever perform

This research tried to identify if the VM portfolios could consistently outperform the Value portfolio. In doing so, this research would be able to identify those value shares which are likely to start performing immediately. If shares were identified which would perform immediately then this research would have found a successful timing indicator for value shares.

This research focused on using two fundamental factors. These factors were used in isolation to determine if the value shares are likely to start performing in the near future. However, Piotroski (2000) argued that a single fundamental factor was not able to provide enough information regarding the financial health of a firm. He argued that many variables make up the attributes which contribute to the earnings performance of a firm and an investor cannot rely solely on a single variable as was done in this research.

6.2.1 Hypothesis 2 A: Current Ratio VM Returns vs. Value

$H2A_0$: The Current Ratio VM portfolios produce CARs which are equal to the Value portfolio.
$H2A_a$: The Current Ratio VM portfolios produce CARs which are not equal to the Value portfolio.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

6.2.1.1 Current Ratio VM (36) vs. Value

This research yielded results that indicated that all of the VM portfolios produced CARs which were not equal to the Value portfolio. Therefore, all of the portfolios could be used to identify if patterns existed between the VM portfolios and the Value portfolio.

The following observations were made:

- The first and second investment period saw the High and Middle VM portfolios outperform the Value portfolio.
- The third investment period resulted in only the Low VM portfolio outperforming the Value portfolio.
- The fourth investment period resulted in the High and Low VM portfolios outperforming the Value portfolio.
- The Middle and Low VM portfolios outperformed the Value portfolio in the fifth period. `

These results indicated that none of the specific VM portfolios could be used to identify value winners. As a result, not one VM portfolio could consistently outperform the Value portfolio. Current Ratio momentum with 36 month rebalancing found that:

- It was unable to identify the value shares which would start performing in the near future
- This research supports previous findings that there is not enough information provided by a single fundamental factor (Piotroski, 2000).

6.2.1.2 Current Ratio VM (24) vs. Value

This research yielded results that indicated that 13 out of the 15 VM portfolios produced CARs which were not equal to the Value portfolio. Therefore, the majority of the portfolios could be used to identify if patterns existed between the VM portfolios and the Value portfolio.

The following observations were made:

- The results indicated that the Middle VM portfolio produced returns which were greater than the Value portfolio in the all the investment periods.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- The High VM portfolio only outperformed the Value portfolio in the second and fourth investment periods.
- The only Low VM portfolio to produce a final CAR which outperformed the Value portfolio was in the third investment period.
- The Middle VM portfolio with 24 month rebalancing consistently outperformed the Value portfolio in all five investment periods.
- The High and Low VM portfolios did not provide any consistent trends.

Therefore, it appeared that the Current Ratio Middle VM portfolio was able to separate value winners from value losers. It has achieved this by being able to consistently identify the value shares that will start performing within the investment period. Current Ratio momentum with 24 month rebalancing found that:

- The 24 month rebalanced Middle VM portfolios were capable of identifying value shares which are likely to perform in the near future (Bird & Casavecchia, 2007).
- The High and Low VM portfolios found support for multiple criteria when determining company performance (Piotroski & So, 2012).
- The Middle VM portfolio found support against the use of multiple criteria when determining company performance (Piotroski & So, 2012).

6.2.1.3 Current Ratio VM (12) vs. Value

This research yielded results that demonstrated that 13 out of the 15 VM portfolios produced CARs which were not equal to the Value portfolio. Therefore, the majority of the portfolios could be used to identify if patterns existed between the VM portfolios and the Value portfolio.

The following observations were made:

- The final CAR of the Middle VM portfolio produced returns which are greater than the Value portfolio in the first investment period.
- All three VM portfolios produced CARs which outperformed the Value portfolio in the second investment period.
- The Middle and Low VM portfolios obtained CARs which performed better than the Value portfolio in the third investment period.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- The fourth investment period resulted in only the High VM portfolio outperforming the Value portfolio
- The fifth investment period resulted in not one VM portfolio outperforming the Value portfolio.
- There was no VM portfolio which consistently outperformed the Value portfolio in all five investment periods.

The results indicated that the Current Ratio VM portfolio, with 12 month rebalancing, could not be used identify value winners. Current Ratio momentum with 36 month rebalancing found that:

- This research supports previous findings that there is not enough information provided by a single fundamental factor (Piotroski, 2000).
- These VM portfolios were unable to identify which value shares will start to perform in the near future (Bird & Casavecchia, 2007).

6.2.2 Hypothesis 2 B: Leverage Factor VM Returns vs. Value

$H2B_0$: The Leverage Factor VM portfolios produce CARs which are equal to the Value portfolio.
$H2B_a$: The Leverage Factor VM portfolios produce CARs which are not equal to the Value portfolio.

6.2.2.1 Leverage Factor VM (36) vs. Value.

This research yielded results that indicated that 13 out of the 15 VM portfolios produced CARs which were not equal to the Value portfolio. Therefore, the majority of the portfolios could be used to identify if patterns existed between the VM portfolios and the Value portfolio.

The following observations were made:

- The Middle VM portfolio obtained a final CAR which was higher than the Value portfolio in the first investment period.
- The second investment period saw the Middle and Low VM portfolios outperforming the Value portfolio.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- In the third period, only the High VM portfolio beat the Value portfolio.
- The fourth investment period resulted in the Middle VM portfolio outperforming the Value portfolio.
- The fifth investment period saw the High and Low VM portfolios outperform the Value portfolio.
- None of the VM portfolios could consistently outperform the Value portfolio.

These results indicated that the Current Ratio VM portfolios, with 36 month rebalancing, could not be used identify value winners. Leverage Factor momentum with 36 month rebalancing found that:

- This research supports previous findings that investors do not respond to the change of a single fundamental variable (Piotroski, 2000).
- These VM portfolios were unable to identify which value shares will start to perform in the near future (Bird & Casavecchia, 2007).

6.2.2.2 Leverage Factor VM (24) vs. Value.

This research yielded results that indicated that all 15 VM portfolios produced CARs which were not equal to the Value portfolio. Therefore, the portfolios could be used to identify if patterns existed between the CARs of the VM portfolios and the Value portfolio.

The following observations were made:

- The results indicated that the High and Middle VM portfolios produced average returns which were greater than the Value portfolio in the first and second investment periods.
- The High VM portfolio was the only portfolio to obtain a CAR above the Value portfolio in the third investment period.
- The High and Middle VM portfolio outperformed the Value portfolio in the fourth investment period
- The High VM portfolio outperformed the Value portfolio in the fifth investment period.
- The High VM portfolio with 24 month rebalancing consistently outperformed the Value portfolio in the five investment periods.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- The Middle VM portfolios only outperformed the Value portfolio in the first, second and fourth investment period.
- The Middle VM portfolio did not outperform the Value portfolio in the periods that experienced the highest CAR growth in the Value portfolio, as shown in Table 4.

The Low VM portfolio consistently produced CARs below the CARs of the Value portfolio. It therefore appeared that the Leverage Factor VM portfolio was not only able to separate value winners, but it could also identify which portfolios would outperform the others. Leverage Factor Momentum with 24 month rebalancing found that

- This research was able to separate shares which start performing immediately from shares which may never perform (Bird & Casavecchia, 2007).
- These findings indicate that a single fundamental factor could be used to separate value winners from value losers which contradicts the findings of Piotroski (2000).

6.2.2.3 Leverage Factor VM (12) vs. Value.

This research yielded results that indicated that 13 out of the 15 VM portfolios produced CARs which were not equal to the Value portfolio. Therefore, the majority of the portfolios could be used to identify if patterns existed between the VM portfolios and the Value portfolio.

The following observations were made:

- The CARs of the High and Middle VM portfolios produced returns which were greater than the Value portfolio in the first and second investment periods.
- Only the High VM portfolio outperformed the Value portfolio in the third investment period.
- The Middle and Low VM portfolios obtained CARs which performed better than the Value portfolio in the fourth investment period.
- The fifth period resulted in none of the VM portfolios outperforming the Value portfolio.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

It initially appeared that the High VM portfolio could identify portfolios that would outperform the Value portfolio. However, in the end none of the VM portfolios could consistently separate value winners from value losers. Leverage Factor momentum with 12 month rebalancing found that:

- This research supports previous findings that investors do not respond to the change of a single fundamental variable (Piotroski, 2000).
- These VM portfolios were unable to identify which value shares would start to perform in the near future (Bird & Casavecchia, 2007).

6.2.3 Summary of Results

The majority of the portfolio periods resulted in the rejection of the null hypothesis. In instances where the null hypothesis was not rejected, there still appeared to be a difference in the final CARs between portfolios.

6.2.3.1 Current Ratio Momentum

Current ratio is defined as a liquidity ratio which indicates the ability of a company to pay back short term debts. Therefore, an increase in this value is expected to signal a healthier balance sheet. It was initially expected that the High VM portfolios would outperform the Value portfolio more consistently than the Middle or Low VM portfolios. This was not seen for any of the rebalanced periods.

However, the Middle VM portfolio with 24 month rebalancing consistently outperformed the Value portfolio for all investment periods. This indicated that it could be used to separate value winners from value losers. It would also have the benefit of excluding value shares which may not perform in the near future. It indicated that the highest momentum indicator does not necessarily provide consistent performance.

6.2.3.2 Leverage Factor Momentum

In the case of Leverage Factor momentum, it was expected that the lower the momentum indicator the higher the CARs as it is a proxy for the amount of risk within

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

an organisation (Bhandar, 1988). An alternative view was that it provided the proportion of debt-to-equity in the company and therefore, provides a mechanism to identify how aggressively a company is financing its growth through debt (Investopedia, 2012). Therefore, it could either be viewed as a risk or as a mechanism for growth.

In the case of Leverage Factor momentum, the High VM portfolio with 24 month rebalancing consistently outperformed the Value portfolio. The CARs of this portfolio did not have the highest returns for all investment periods, but it did provide a mechanism to consistently outperform the Value portfolio. In doing so, it could be used as a consistent way of separating value winners from value losers.

Since the High momentum indicator resulted in portfolios which outperformed the Value portfolio, it could be argued that Leverage momentum was viewed as a mechanism for growth rather than risk.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

6.3 Hypothesis 3

The rejection of the null hypotheses indicates that the CARs of the VM portfolios (High, Middle and Low) were significantly different from that of the Benchmark portfolio. The benchmark is the All Share Index (ALSI) which represents the opportunity cost of the market. If it was found that there was a significant difference between the VM portfolios and the Benchmark, this research would try and identify which of these, if any, perform consistently better than the market.

Fama & French (1998) demonstrated that value shares have a value premium. The value premium refers to greater risk adjusted returns obtained by value shares over growth shares (Fama & French, 1998). This research tried to identify if the VM portfolios could outperform the Benchmark portfolio. In doing so, this research would be able to identify the value shares which are likely to have a value premium. If the shares identified consistently outperform the Benchmark, then this research would have found a successful timing indicator for shares that outperform the market.

Cubbin et al. (2006) found that value shares outperform the market for holding periods longer than 12 months. However, according to Swedroe (2012), obtaining value shares which consistently outperform the market over an extended period is difficult. He demonstrated that the value premium is lost during times of recession but swells during times of economic expansion.

Leivo & Pätäri (2011) identified that when momentum was combined with value shares the returns outperform the market. This research tries to identify whether value portfolios will outperform the market when combined with fundamental momentum.

6.3.1 Hypothesis 3 A: Current Ratio VM Returns vs. Benchmark

$H3A_0$: The Current Ratio VM portfolios produce CARs which are equal to the Benchmark portfolio.
$H3A_a$: The Current Ratio VM portfolios produce CARs which are not equal to the Benchmark portfolio.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

6.3.1.1 Current Ratio VM (36) vs. Benchmark

This research yielded results that indicated that 12 out of the 15 VM portfolios produced CARs which were not equal to the Benchmark portfolio. Therefore, the majority of the portfolios could be used to identify if VM portfolios produced consistent patterns when compared against the Benchmark portfolio.

The following observations were made:

- The first investment period saw the High VM portfolio outperform the Benchmark portfolio.
- In the second investment period, all the VM portfolios outperformed the market at the end of the period.
- The third and fifth investment periods saw both the Middle and Low VM portfolios outperforming the Benchmark portfolio.
- The fourth investment period resulted in the High and Low VM portfolios obtaining returns which were greater than the Benchmark.
- The Low VM portfolio outperformed the benchmark in four out of the five investment periods.
- The High and Middle VM portfolios only performed better than the market in three investment periods.

It could be argued that the Low VM portfolio could be used to identify those shares which beat the market. However, this was not consistent for all periods. It was then observed that the Benchmark outperformed the Value portfolio in only two periods. These were the first and fourth investment periods which fall over periods of recession in the South African economy. Current Ratio momentum with 36 month rebalancing found:

- Support for the value premium as there more VM portfolios which outperformed the Benchmark compared to the number of portfolios which outperformed the Value portfolio
- That the value premium was lost during periods of recession
- Support for the argument that Value outperforms the market for holding periods longer than 12 months in the periods where economic expansion was observed (Cubbin et al., 2006)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

6.3.1.2 Current Ratio VM (24) vs. Benchmark

This research identified that only 3 out of the 15 VM portfolios produced CARs which could not be considered statistically different from the Benchmark portfolio. Therefore, the majority of the portfolios could be used to identify if patterns existed between the VM portfolios and the Benchmark portfolio.

The following observations were made:

- The CARs of the Middle VM portfolio were greater than the Benchmark portfolio in the first investment period.
- All VM portfolios (High, Middle and Low) outperformed the Benchmark in the second investment period.
- The Middle and Low VM portfolios produced CARs which performed better than the Benchmark in the third investment period.
- The fourth investment period resulted in the High and Middle VM portfolios outperforming the Benchmark portfolio.
- The Middle and Low VM portfolios performed better than the Benchmark in the fifth investment period.
- The Middle VM portfolio outperformed the Benchmark in all five investment periods, while the Middle and Low VM portfolios inconsistently outperformed the Benchmark.

The Middle VM portfolio could be used to identify shares that would consistently outperform the market. The Middle VM was not the highest performing portfolio in all investment periods but it did provide a method to outperform the market consistently. Current Ratio momentum with 24 month rebalancing found:

- Support for the value premium, as there was at least one VM portfolio which outperformed the Benchmark in any investment period (Fama & French, 2006b).
- Fundamental momentum when combined with value stocks can be used to create portfolios which consistently outperform the Benchmark and therefore, the market (Leivo & Pätäri, 2011).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

6.3.1.3 Current Ratio VM (12) vs. Benchmark

This research yielded results that indicated only 2 out of the 15 VM portfolios produced CARs which were not considered statistically different from the Benchmark portfolio. Therefore, the majority of the portfolios could be used to identify if patterns existed between the VM portfolios and the Benchmark portfolio.

The following observations were made:

- The first investment period resulted in the Middle VM portfolio outperforming the Benchmark portfolio.
- All the VM portfolios performed better than the Benchmark in the second investment period.
- The Middle and Low VM portfolios obtained CARs which were greater than that of the Benchmark at the end of the third investment period.
- Only the High VM portfolio performed better than the Benchmark in the fourth investment period
- The High and Middle VM portfolios outperformed the Benchmark in the fifth investment period.

The Middle VM portfolio outperformed the market in four out of the five periods. This indicated that it was a reasonable predictor of above market returns. However, the Middle VM portfolio performed poorly during the period of the financial recession of 2008. The Middle and High VM portfolios did perform in a manner which would provide some investment insight into obtaining higher than market returns, however, not consistently. Therefore, Current Ratio momentum with 12 month rebalancing found:

- Support for previous research which found that the value premium disappears during periods of recession (Swedroe, 2012).
- That fundamental momentum with 12 month rebalancing, when combined with value stocks, does not create a portfolio which could consistently outperform the market (Leivo & Pätäri, 2011).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

6.3.2 Hypothesis 3 B: Leverage Factor VM Returns vs. Benchmark

$H3B_0$: The Leverage Factor VM portfolios produce CARs which are equal to the Benchmark portfolio.
$H3B_a$: The Leverage Factor VM portfolios produce CARs which are not equal to the Benchmark portfolio.

6.3.2.1 Leverage Factor VM (36) vs. Benchmark.

This research yielded results which indicated that 9 out of the 15 VM portfolios produced CARs which could not be considered equal to the Benchmark portfolio. Therefore, the majority of the portfolios could be used to identify if VM portfolios produced consistent patterns when compared against the Benchmark portfolio.

The following observations were made:

- The CARs of the Middle VM portfolio were greater than the Benchmark portfolio in the first investment period.
- The High, Middle and Low VM portfolios outperformed the Benchmark in the second and third investment period.
- The Middle VM portfolio obtained a final CAR which outperformed the Benchmark in the fourth investment period.
- The High and Low VM portfolios performed better than the Benchmark in the fifth investment period.
- The Middle VM portfolio performed better than the market in the first four investment periods. However, it could not maintain this trend in the fifth investment period.

The Middle VM portfolio produced CARs which were greater than the Benchmark in the majority of investment periods. In each investment period there was at least one VM portfolio which outperformed the market. The High and Low VM portfolios outperformed the Benchmark in the second, third and fourth investment period. The periods where they did not outperform the Benchmark was plagued by a down turn in the market. Cubbin et al. (2006) argues that the higher the Leverage the greater the risk and therefore, the returns. This was not observed over the majority of the periods. Therefore, Leverage Factor momentum with 36 month rebalancing found:

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- Support for the existence of a value premium (Fama & French, 2006b).
- These findings do not support those of Cubbin et al. (2006) who suggested that Leverage and risks are linearly related.

6.3.2.2 Leverage Factor VM (24) vs. Benchmark.

This research yielded results which indicated that only 3 out of the 15 VM portfolios produced CARs which could not be considered statistically different from the Benchmark portfolio. Therefore, the majority of the portfolios could be used to identify if patterns existed between the VM portfolios and the Benchmark portfolio.

The following observations were made:

- In the first investment period, the final return of the Middle VM portfolio was greater than that obtained by the Benchmark portfolio.
- All VM portfolios produced CARs which outperformed the Benchmark in the second investment period.
- The High and Middle VM portfolios obtained CARs which performed better than the Benchmark in the third investment period.
- The fourth investment period resulted in the High and Middle VM portfolios outperforming the Benchmark portfolio.
- In the fifth investment period, the High VM portfolio was the only portfolio to outperform the Benchmark portfolio.
- The High and Middle VM portfolios outperformed the Benchmark in four out of the five investment periods.
- The Middle VM portfolios outperformed the Benchmark in the first four investment periods
- The High VM portfolios outperformed the Benchmark in the last four investment periods.
- The High and Middle VM portfolios performed better than the Low VM portfolio in almost all periods.

Therefore, Leverage Factor momentum with 24 month rebalancing found:

- That the portfolio returns tend to agree with the relationship between higher risk and returns as defined by Cubbin et al. (2006). However, the increased

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

performance may come as a result of increased investment for future growth as explained earlier.

- Support for the existence of a value premium (Fama & French, 2006b).
- That fundamental momentum with 24 month rebalancing, when combined with value stocks, does not create a portfolio which could consistently outperform the market (Leivo & Pätäri, 2011).

6.3.2.3 Leverage Factor VM (12) vs. Benchmark.

This research yielded results which indicated that 11 out of the 15 VM portfolios produced CARs which could not be considered as equal to the Benchmark portfolio. The majority of the portfolios could be used to identify if VM portfolios produced consistent patterns when compared against the Benchmark portfolio.

The following observations were made:

- The VM portfolios in the first investment period did not obtain CARs which were greater than the Benchmark.
- The second, third and fifth investment periods resulted in all VM portfolios performing better than the Benchmark. The High VM portfolio outperformed the Middle VM portfolio, while Middle VM portfolio outperformed the Low VM portfolios in these investment periods.
- The fourth investment period resulted in the Middle and Low VM portfolios producing CARs which were greater than the Benchmark.
- The High VM portfolio obtained the highest returns in some periods, however; it did not outperform the market consistently.
- The High VM portfolio also performed the worst during periods where there was an economic downturn.

The Low and Middle VM portfolios did not obtain the high returns as was seen by the High VM portfolio. However, they were not as adversely affected by a market downturn. Therefore, Leverage Factor momentum with 12 month rebalancing found:

- Support for the existence of a value premium (Fama & French, 2006b).
- Support was not found for the previous research which found that the value premium disappears during periods of recession (Swedroe, 2012).

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

- That fundamental momentum with 24 month rebalancing, when combined with value stocks, does not create a portfolio which could consistently outperform the market (Leivo & Pätäri, 2011).

6.3.3 Summary of Results

The majority of the portfolios resulted in the rejection of the null hypothesis. In the instances where the null hypothesis could not be rejected, there still appeared to be a difference in the final CARs between portfolios.

6.3.3.1 Current Ratio Momentum

The Middle Current Ratio momentum indicator could produce a portfolio which consistently outperformed the market when used with 24 month rebalancing. The 12 and 36 month rebalanced portfolios could not provide a consistent method to beat the Benchmark. It was also found that value shares tend to outperform the market during times of economic expansions, but tend underperform during times of recession (Swedroe, 2012).

Since the 24 month rebalancing resulted in the Middle VM portfolio outperforming the market, it could be argued that this portfolio could be used as a timing indicator for stock selection.

6.3.3.2 Leverage Factor Momentum

The Leverage Factor momentum indicator could not produce a portfolio which consistently outperformed the market for all investment periods. However, the 24 month rebalanced Middle and High VM portfolios could consistently outperform the Low VM portfolio. This indicated that the High and Middle VM portfolios combined could separate portfolios which would consistently beat the market. All the Leverage Factor Middle VM portfolios outperformed the market in four out of the five investment periods. This indicated that the markets did not respond favourably to excessive changes in Leverage Factor momentum.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

The 12 month rebalancing saw the Low VM portfolios outperform the market in four out of the five investment periods. The 24 month rebalancing saw the High VM portfolio outperform the market in four out of the five investment periods. Also, the 24 month rebalancing increased the final CARs in the High VM portfolios. Therefore, it could be argued that the 24 month rebalanced High VM portfolio could be used as a timing indicator. However, the results were not consistent over all time periods.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

7. CONCLUSION

7.1 Findings

Investing in equity shares has been an investment method used by investors in an attempt to earn average returns which are above that achieved by the market. This research has shown that value stocks could outperform the market even when markets tend to be volatile, impulsive and sometimes erratic. This achievement disagrees with the efficient market hypothesis, as the hypothesis suggests that there should be a large degree of consensus in the market. If there was a large degree of consensus, then the returns obtained should not be significantly different from that obtained by the market. Therefore, the best outcome, in the case of market efficiency, would be to match the market's performance. However, this research has demonstrated that value shares are capable of consistently outperforming the market and this provides a stark contradiction to the efficient market hypothesis.

Value investing was the mechanism used to determine whether shares were undervalued. In nearly all investment periods there was at least one portfolio which demonstrated a value premium. Therefore, these findings provide support for value investing as a method of buying shares which are undervalued. This research also indicated that value shares may remain undervalued for an extended period of time, especially during periods of recession. In addition, it appeared that uncertainty exacerbates the negative performance of out of favour value stocks. This confirmed the findings of previous studies.

The period for which a value share will remain out of favour with investors is uncertain and therefore, the value share may remain undervalued for an extended period of time. This research supports previous findings that suggest a timing indicator would be beneficial in identifying those shares which are due to perform in the near future. This research found that fundamental momentum, when used as an investment timing indicator, could separate value winners from value losers. It was found that Middle Current Ratio Momentum could identify value shares that outperform the Value portfolio in all investment periods. It was also found that High Leverage Factor Momentum could be used to separate value winners and value losers in all investment periods. Both of these VM portfolios used 24 month rebalancing which indicates that

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

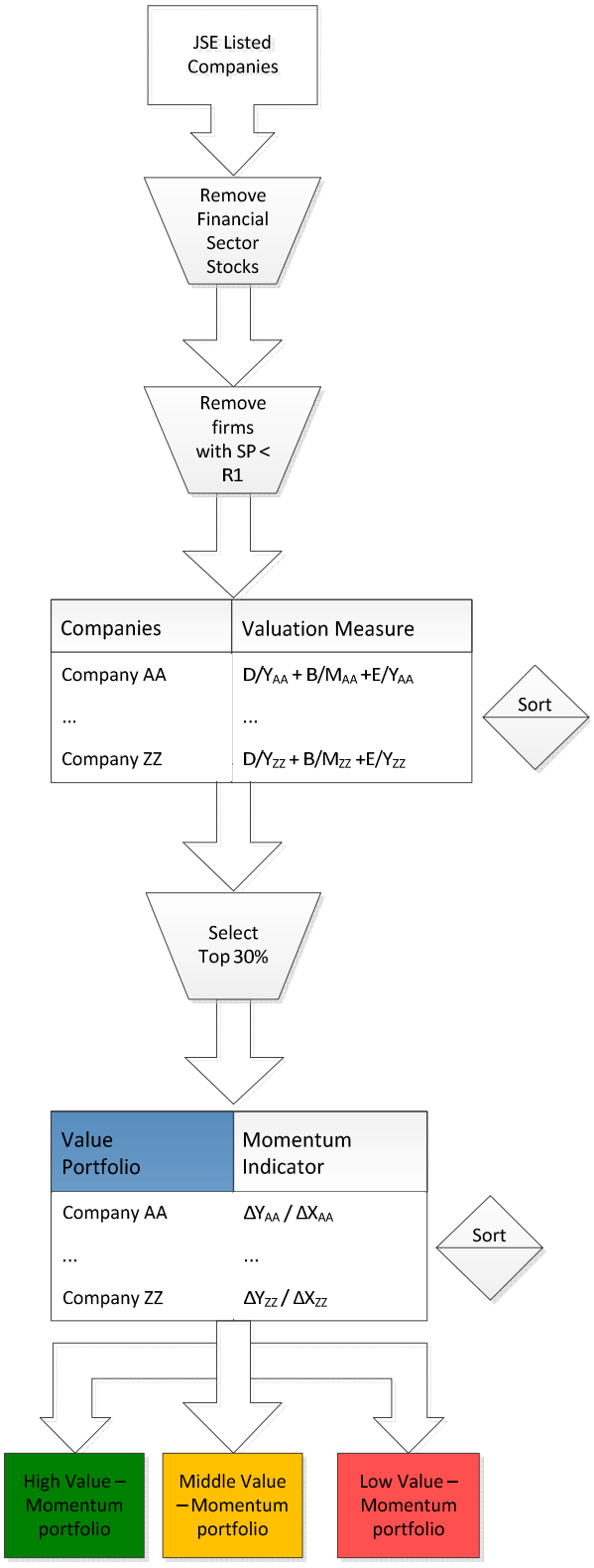
the diffusion of information may be at its most valuable within two years. Thereafter, the information may have no additional value.

Previous studies have shown that when price momentum is combined with value shares, together, they tend to outperform the market (Pätäri et al., 2012). However, this research focused on using a novel method to try and ensure that value stocks are not bought too early. The methodology used to successfully identify those shares which are expected to outperform the market is shown again in Figure 14. This research identified that when fundamental momentum was combined with value stocks, they outperformed the market. However, this was only evident when the Current Ratio momentum was combined with value shares and as a result the Middle VM portfolio consistently beat the market. Leverage Factor Momentum, when combined with value shares, only outperformed the market in four out of the five investment periods.

These findings provide evidence that fundamental ratios give predictive power of future stock returns. The results indicate that fundamental ratios could be used as a timing indicator and could yield improved stock performance.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Figure 14: Fundamental Momentum Investment Methodology



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

7.2 Recommendations

Identifying that fundamental momentum can be applied to investment decision making has introduced a variety of possibilities. There are new opportunities for industry as well as for further academic research.

Fundamental momentum is a new and mainly unexplored area in investment finance, especially when used as a mechanism to separate value winners from value losers. Therefore, there is a need to better understand how fundamental momentum could affect portfolio performance. For researchers, this may provide a means to determine what effect momentum in fundamentals has on investor sentiment and reaction. There are a multitude of fundamentals which could be tested in isolation or collectively.

Investors are continuously trying to identify investment styles which will allow them to outperform the market. This research has identified one such method which has outperformed the market from 1997 to 2012. Therefore, this investment philosophy provides a new form of value investing which may be useful to future investment decision making.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

7.3 Research Limitations

This research had the following limitations:

- This research excluded the financial sector from the sample and therefore, the sample was not representative of the population. As a result of using non probability sampling, the results of this inquiry may not be generalised. Therefore, this sampling method may have reliability issues as it introduces biases into the sample selection (Saunders & Lewis, 2012).

- This research was limited to a sampling period of 15 years which may not be long enough to make inferences on the results.

- Not all fundamental momentum signals were researched. As a result, this research was not all encompassing. This research was limited to Leverage Factor and Current Ratio variables only.

- The valuation measure was a composite of three valuation measures. As stated previously, the correct valuation measure depends on the country and the timing of the measure. As this is beyond the scope of this research, the selected valuation indicator may not have been the most appropriate for the South African market.

- This research did not consider dividends which may have resulted in more shares obtaining returns above the market. It also did not take share splits into consideration which could drastically affect the value of those shares.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

7.4 Future Research Ideas

7.4.1 The Use of Other Fundamental Variables

This research focused on using Leverage Factor and Current Ratio Momentum. It may be valuable to perform further research in the field of fundamental momentum with additional variables. One particular variable which may provide interesting results, is the Return on Equity (ROE) variable. ROE incorporates profitability, operating efficiency and financial leverage into a singular variable.

7.4.2 The Affect of Longer Investment Periods

Short investment periods, such as those used in this research, may have an effect on the outcome of the portfolio. Investment periods of five to ten years may provide different results for value portfolios and may amplify the results of the Value Momentum portfolios.

7.4.3 Composite Fundamental Variables

The F-Score provides a grading of the financial situation of a company using more than one fundamental variable as a health indicator. It may be more valuable to look at the momentum of a composite indicator made up of many fundamental variables, as it would provide a more holistic picture of the company. It may also reflect investor sentiment to a greater extent as investors do not focus on a single variable in isolation.

7.4.4 Considering the Base Effect When Using Fundamental Momentum

This research used fundamental momentum as a method of segmenting value portfolios. However, this research did not consider the size of the momentum relative to its underlying value. Shares which had low fundamental values could have had a large fundamental momentum indicator, but the growth of the underlying variable may not have been as large as others. This is a result of the fundamental variable starting off a

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

low base. It may be prudent to consider the magnitude of the change rather in relation to the rate of change.

7.5 Conclusion

This study has contributed to the body of knowledge regarding momentum when used in combination with value shares. It is believed that this study has identified a new avenue in which fundamental momentum could be used to enhance value portfolios. In summary, Current Ratio Momentum in combination with a Value portfolio has been able to separate portfolio winners and losers. Not only has it been able to separate value shares, but it has also provided an investment methodology which consistently outperformed the market over all the investment periods.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

8. REFERENCES

Barberis, N., Shleifer, A., & Vishny, R. (1998). A model of investor sentiment. Journal of Financial Economics, 49(3), 307-343. doi: 10.1016/S0304-405X(98)00027-0

Bhandar, L. C. (1988). Debt/Equity ratio and expected common stock returns: Empirical evidence. *Journal of Finance, 43*(2), 507-528.

Bird, R., & Casavecchia, L. (2007). Sentiment and financial health indicators for value and growth stocks: The european experience. *European Journal of Finance, 13*(8), 769-793. doi: 10.1080/13518470701705777

Bodie, Z., Kane, A., & Marcus, A. J. (2011). Chapter 4: Mutual funds and other investment companies. *Investments and portfolio management* (9th Edition ed.,) McGraw-Hill Irwin.

Brown, S., Yan Du, D., Rhee, S. G., & Zhang, L. (2008). The returns to value and momentum in asian markets. *Emerging Markets Review, 9*(2), 79-88. doi: 10.1016/j.ememar.2008.02.001

Chahine, S. (2009). Value versus growth stocks and earnings growth in style investing strategies in euro-markets. *Journal of Asset Management, 9*(5), 347-358. doi: 10.1057/jam.2008.31

Chan, L. K. C., Jegadeesh, N., & Lakonishok, J. (1996). Momentum strategies. *The Journal of Finance, 51*(5), pp. 1681-1713.

Chorafas, D. N. (2005). 6 - technical and fundamental analysis. *The management of equity investments* (pp. 131-155). Oxford: Butterworth-Heinemann. doi: 10.1016/B978-075066456-1.50008-4

Chordia, T., & Shivakumar, L. (2006). Earnings and price momentum. *Journal of Financial Economics, 80*(3), 627-656. doi: 10.1016/j.jfineco.2005.05.005

Cooper, M. J., Gutierrez, R. C., & Hameed, A. (2004). Market states and momentum. *The Journal of Finance, 59*(3), 1345-1365. doi: 10.1111/j.1540-6261.2004.00665.x

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Cubbin, E., Eidne, M., & Firer, C.,. (2006). *Mean reversion on the JSE*

Daniel, K., Hirshleifer, D., & Subrahmanyam, A. (1998). Investor psychology and security market under- and overreactions. *Journal of Finance, 53*(6), 1839-1885.

Fama, E. F. (1965). Random walks in stock market prices. *Financial Analysts Journal, 21*(5), 55-59.

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *Journal of Finance, 47*(2), 427-465.

Fama, E. F., & French, K. R. (1998). Value versus growth: The international evidence. *Journal of Finance, 53*(6), 1975-1999.

Fama, E. F., & French, K. R. (2006a). Profitability, investment and average returns. *Journal of Financial Economics, 82*(3), 491-518. doi: 10.1016/j.jfineco.2005.09.009

Fama, E. F., & French, K. R. (2006b). The value premium and the CAPM. *The Journal of Finance, 61*(5), 2163-2185. doi: 10.1111/j.1540-6261.2006.01054.x

Foerster, S. R., & Sapp, S. G. (2005). Valuation of financial versus non-financial firms: A global perspective. *Journal of International Financial Markets, Institutions and Money, 15*(1), 1-20. doi: 10.1016/j.intfin.2004.01.003

Graham, M., & Winfield, J. (2010). *Understanding financial statements* (Second ed.) Cape Business Seminars.

Han, B., Hong, D., & Warachka, M. (2009). Forecast accuracy uncertainty and momentum. *Management Science, 55*(6), 1035-1046.

Hoffman, A. J., & Northwest University. (2012). Stock return anomalies : Evidence from the johannesburg stock exchange. *Investment Analysts Journal, Issue 75,* , 21-41.

Hong, H., & Stein, J. C. (1999). A unified theory of underreaction, momentum trading, and overreaction in asset markets. *Journal of Finance, 54*(6), 2143-2184.

Investopedia. (2012). *Momentum.* Retrieved August 26, 2012, from http://www.investopedia.com/terms/m/momentum.asp

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Laerd. (2012). *Kruskal-wallis H test using SPSS.* Retrieved 11/4, 2012, from https://statistics.laerd.com/spss-tutorials/kruskal-wallis-h-test-using-spss-statistics.php

Leivo, T. H., & Pätäri, E. J. (2011). Enhancement of value portfolio performance using momentum and the long-short strategy: The finnish evidence. *Journal of Asset Management, 11*(6), 401-416. doi: 10.1057/jam.2009.38

Money-Zine.com. (2011). *Understanding price momentum.* Retrieved May, 16, 2012, from http://www.money-zine.com/Investing/Stocks/Understanding-Price-Momentum/

Muller, C., & Ward, M. (2012). *Style-based effects on the JSE: A graphical time-series approach.* (Unpublished Gordon Institute on Business Science, DRAFT.

Myers, J. N., Myers, L. A., & Skinner, D. J. (2007). Earnings momentum and earnings management. *Journal of Accounting, Auditing & Finance, 22*(2), 249-284.

Pätäri, E., Leivo, T., & Honkapuro, S. (2012). Enhancement of equity portfolio performance using data envelopment analysis. *European Journal of Operational Research,* (0) doi: 10.1016/j.ejor.2012.02.006

Peel, D. A., Peel, M. J., & Venetis, I. A. (2004). Further empirical analysis of the time series properties of financial ratios based on a panel data approach. *Applied Financial Economics, 14*(3), 155-163. doi: 10.1080/0960310042000187342

Piotroski, J. D. (2000). Value investing: The use of historical financial statement information to separate winners from losers. *Journal of Accounting Research, 38*(3), 1-41.

Piotroski, J. D., & So, E. C. (2012). Identifying expectation errors in Value/Glamour strategies: A fundamental analysis approach. *Review of Financial Studies, 25*(9), 2841-2875.

Reddy, T. L., Thomson, R., & University of the Witwatersrand. (2011). The capital-asset pricing model : The case of south africa : Refereed paper. *South African Actuarial Journal, 11*, 43-84.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Richardson, S., Tuna, İ., & Wysocki, P. (2010). Accounting anomalies and fundamental analysis: A review of recent research advances. *Journal of Accounting and Economics, 50*(2–3), 410-454. doi: 10.1016/j.jacceco.2010.09.008

Saunders, M., & Lewis, P. (2012). *Doing research in business & management: An essential guide to planning your project* Pearson Education Limited.

Sharma, M., & Preeti. (2009). Prediction of stock returns for growth firms-a fundamental analysis. *Vision (09722629), 13*(3), 31-40.

Shiller, R. (2003). From efficient markets theory to behavioral finance.*17*(1), Journal of Economic Perspectives.

Sloan, R. G. (1996). Do stock prices fully reflect information in accruals and cash flows about future earnings? *Accounting Review, 71*(3), 289-315.

Snyman, Z. (2008). What the benchmark tells investors: Finance. *Without Prejudice: South Africa's Corporate Legal Magazine, 8*(4), 4-5.

Strugnell, D., Gilbert, E., Kruger, R., University of Cape Town, & University of Stellenbosch. (2011). Beta, size and value effects on the JSE, 1994-2007. *Investment Analysts Journal,* (74), 1-17.

Swedroe, L. (2012). *When do the risks of value stocks appear?* Retrieved 10/09, 2012, from http://www.cbsnews.com/8301-505123_162-57460720/when-do-the-risks-of-value-stocks-appear/

Timmermann, A., & Granger, C. W. J. (2004). Efficient market hypothesis and forecasting. *International Journal of Forecasting, 20*(1), 15-27. doi: 10.1016/S0169-2070(03)00012-8

Xue, Y., & Zhang, M. H. (2011). Fundamental analysis, institutional investment, and limits to arbitrage. *Journal of Business Finance & Accounting, 38*(9-10), 1156-1183. doi: 10.1111/j.1468-5957.2011.02265.x

Yan, Z., & Zhao, Y. (2010). New evidence on value investing in emerging equity markets. *Applied Financial Economics, 20*(24), 1839-1849. doi: 10.1080/09603107.2010.526576

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Yee, K. K. (2008). Deep-value investing, fundamental risks, and the margin of safety. (cover story). *Journal of Investing, 17*(3), 35-46.

Yu, S., & Kim, S. (2009). Analysis of business week hot-growth stocks: Momentum and fundamental investment approaches. *Journal of Asset Management, 10*(3), 192-204. doi: 10.1057/jam.2009.3

Zunino, L., Zanin, M., Tabak, B. M., Pérez, D. G., & Rosso, O. A. (2009). Forbidden patterns, permutation entropy and stock market inefficiency. *Physica A: Statistical Mechanics and its Applications, 388*(14), 2854-2864. doi: 10.1016/j.physa.2009.03.042

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

9. APPENDIX 1: FUNDAMENTAL RATIOS

Name	Description	Used by
Profitability		
ROE	Return on Equity	(Bird & Casavecchia, 2007)
ΔROE	Percentage change in ROE	(Bird & Casavecchia, 2007)
ΔProfit Margin	Percentage change in profit margin	(Xue & Zhang, 2011) (Bird & Casavecchia, 2007) (Piotroski, 2000)
ROA	Return on assets	(Xue & Zhang, 2011) (Bird & Casavecchia, 2007) (Piotroski, 2000)
ΔROA	Percentage change in ROA	(Xue & Zhang, 2011) (Bird & Casavecchia, 2007) (Piotroski, 2000)
CFO	Cash Flow from Operation	(Bird & Casavecchia, 2007) (Piotroski, 2000)
ΔCFO	Percentage change in cash flow from operations	(Bird & Casavecchia, 2007; Piotroski, 2000)
ΔCash Flow-to-Assets	Percentage change in operating cash flows scaled by fiscal-year-beginning total assets	(Xue & Zhang, 2011)
SG	Sales Growth	(Bird & Casavecchia, 2007; Piotroski, 2000)
Operating Accruals	Total operating accruals	(Xue & Zhang, 2011) (Bird & Casavecchia, 2007)
Operating efficiency		

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

ΔAccounts Receivable Turnover	Percentage change in account receivable turnover ratio	(Xue & Zhang, 2011) (Bird & Casavecchia, 2007)
ΔInventory Turnover	Percentage change in inventory turnover ratio.	(Xue & Zhang, 2011) (Bird & Casavecchia, 2007)
ΔAsset Turnover	Percentage change in asset turnover ratio	(Xue & Zhang, 2011) (Bird & Casavecchia, 2007)
OM	Operating Margin	(Bird & Casavecchia, 2007)
Liquidity		(Piotroski, 2000)
CR	Current ratio	(Bird & Casavecchia, 2007)
ΔCR	Percentage change in current ratio	(Xue & Zhang, 2011) (Bird & Casavecchia, 2007)
ΔQuick Ratio	Percentage change in quick ratio	(Xue & Zhang, 2011)
ΔWorking Capital	Percentage change in net working capital	(Xue & Zhang, 2011)
LEV	Leverage	(Bird & Casavecchia, 2007; Piotroski, 2000; Sharma & Preeti, 2009)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

10. APPENDIX 2: COMPANY INFORMATION

Short Code	Company Name	JSE Sector
Period 1997 - 2000		
SER	Seardel Investment Corporation Limited	Clothing & Footware
AOO	African And Overseas Enterprises Limited	Retailers - Soft Goods (5371)
RTO	Rex Trueform Clothing Company Limited	Retailers - Soft Good
HWA	Hwange Colliery Company Limited	Coal
KAP	Kap International Hldgs	Diversified Industrials
CRG	Cargo Carriers Limited	Rail, Road & Freight
PAM	Palabora Mining Company Limited	Nonferrous Metals
ANG	Anglogold Ashanti Limited	Gold Mining
MAS	Masonite (africa) Limited	Building & Construction Materials
JDG	Jd Group Limited	Retailers - Hardlines
CMH	Combined Motor Hldgs Ltd	Vehicle Distributors
CKS	Crookes Brothers Limited	Farming & Fishing
MTA	Metair Investments Ord	Auto Parts
ART	Argent Industrial Limited	Steel
ALT	Allied Technologies Limited	Wireless Telecom Services
PET	Petmin Ltd	Metals & Minerals
SAP	Sappi Limited	Paper
ACL	Arcelormittal Sa Ltd	Steel
OCE	Oceana Group Limited	Farming & Fishing
ATN	Allied Electronics Corporation Limited	Electrical Equipment
WBO	Wilson Bayly Holmes-ovcon Limited	Construction
OMN	Omnia Holdings Limited	Chemicals - Speciality
JSC	Jasco Electronics Holdings Limited	Electrical Equipment
NCS	Nictus Beperk	Retailers - Multi Department
AFE	A E C I Limited	Chemicals - Speciality
SUI	Sun International Ltd	Gaming
ELR	Elb Group Ltd	Industrial Suppliers
SPA	Spanjaard Limited	Chemicals - Speciality
ASR	Assore Ltd	Metals & Minerals
DLV	Dorbyl Limited	Auto Parts
CRM	Ceramic Industries Limited	Building & Construction Materials
Period 2000 - 2003		
NHM	Northam Platinum Limited	Platinum
CLH	City Lodge Hotels Limited	Hotels
OCE	Oceana Group Limited	Farming & Fishing

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

DLV	Dorbyl Limited	Auto Parts
CKS	Crookes Brothers Limited	Farming & Fishing
FBR	Famous Brands Ltd	Restaurants and Pubs
ILV	Illovo Sugar Limited	Food Processors
WBO	Wilson Bayly Holmes-ovcon Limited	Construction
ATN	Allied Electronics Corporation Limited	Electrical Equipment
SER	Seardel Investment Corporation Limited	Clothing & Footware
GRF	Group Five Limited	Other Construction
AFE	A E C I Limited	Chemicals - Speciality
ART	Argent Industrial Limited	Steel
CVI	Capevin Investments Ltd	Beverages - Distillers & Vintners
TON	Tongaat Hulett Ltd	Food Processors
DST	Distell	Beverages - Distillers & Vintners
AVI	Avi Ltd	Food Processors
HWN	Howden Africa Holdings Limited	Engineering
ELR	Elb Group Ltd	Industrial Suppliers
TPC	Transpaco Limited	Containers & Packaging
IVT	Invicta Holdings Limited	Engineering
TSX	Trans Hex Group Limited	Diamond
MUR	Murray And Roberts Holdings Limited	Other Construction
BSR	Basil Read Holdings Limited	Other Construction
CRG	Cargo Carriers Limited	Rail, Road & Freight
AOO	African And Overseas Enterprises Limited	Retailers - Soft Goods (5371)
RTO	Rex Trueform Clothing Company Limited	Retailers - Soft Good
CMH	Combined Motor Hldgs Ltd	Vehicle Distributors
MAS	Masonite (africa) Limited	Building & Construction Materials
AFR	Afgri Limited	Farming & Fishing
NAI	New Africa Investment Limited	Publishing & Printing
AME	African Media Entertainment Limited	Broadcasting Contractors
CNL	Control Instruments Group Limited	Electronic Equipment
PAM	Palabora Mining Company Limited	Nonferrous Metals
OMN	Omnia Holdings Limited	Chemicals - Speciality
Period 2003-2006		
SER	Seardel Investment Corporation Limited	Clothing & Footware
AOO	African And Overseas Enterprises Limited	Retailers - Soft Goods (5371)
RTO	Rex Trueform Clothing Company Limited	Retailers - Soft Good
NHM	Northam Platinum Limited	Platinum
CRG	Cargo Carriers Limited	Rail, Road & Freight

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

GND	Grindrod Limited	Marine Transportation
ACL	Arcelormittal Sa Ltd	Steel
CAC	Cafca Ltd	Electrical Equipment
EHS	Evraz Highveld Steel & Van	Steel
MTA	Metair Investments Ord	Auto Parts
NCS	Nictus Beperk	Retailers - Multi Department
ATN	Allied Electronics Corporation Limited	Electrical Equipment
IMP	Impala Platinum Holdings Limited	Platinum
CKS	Crookes Brothers Limited	Farming & Fishing
SOV	Sovereign Food Investments Limited	Farming & Fishing
RBW	Rainbow Chicken Limited	Farming & Fishing
DLV	Dorbyl Limited	Auto Parts
TSH	Tsogo Sun Holdings Limited	Gaming
OMN	Omnia Holdings Limited	Chemicals - Speciality
JSC	Jasco Electronics Holdings Limited	Electrical Equipment
SAP	Sappi Limited	Paper
CMH	Combined Motor Hldgs Ltd	Vehicle Distributors
YRK	York Timber Holdings Limited	Forestry
ART	Argent Industrial Limited	Steel
LON	Lonmin Plc	Platinum
ALT	Allied Technologies Limited	Wireless Telecom Services
MPC	Mr Price Group Limited	Retailers - Soft Goods
KAP	Kap International Hldgs	Diversified Industrials
ARI	African Rainbow Minerals	Metals & Minerals
AFE	A E C I Limited	Chemicals - Speciality
CVI	Capevin Investments Ltd	Beverages - Distillers & Vintners
GRF	Group Five Limited	Other Construction
TON	Tongaat Hulett Ltd	Food Processors
GGM	Goliath Gold Mining Ltd	Metals & Minerals
MAS	Masonite (africa) Limited	Building & Construction Materials
Period 2006 - 2009		
NAI	New Africa Investment Limited	Publishing & Printing
HWA	Hwange Colliery Company Limited	Coal
AOO	African And Overseas Enterprises Limited	Retailers - Soft Goods (5371)
SER	Seardel Investment Corporation Limited	Clothing & Footware
RTO	Rex Trueform Clothing Company Limited	Retailers - Soft Good
EHS	Evraz Highveld Steel & Van	Steel
MOB	Mobile Industries Ord	Shipping & Ports
MAS	Masonite (africa) Limited	Building & Construction Materials
ACL	Arcelormittal Sa Ltd	Steel

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

WNH	Winhold Limited	Industrial Suppliers
JDG	Jd Group Limited	Retailers - Hardlines
CRG	Cargo Carriers Limited	Rail, Road & Freight
DTA	Delta Emd Ltd	Chemicals - Speciality
TPC	Transpaco Limited	Containers & Packaging
MST	Mustek Limited	Computer Hardware
ATN	Allied Electronics Corporation Limited	Electrical Equipment
ELR	Elb Group Ltd	Industrial Suppliers
COM	Comair Limited	Airlines & Airports
ASR	Assore Ltd	Metals & Minerals
RBW	Rainbow Chicken Limited	Farming & Fishing
MTA	Metair Investments Ord	Auto Parts
GND	Grindrod Limited	Marine Transportation
NHM	Northam Platinum Limited	Platinum
BCX	Business Connexion Group Limited	Computer Services
OCE	Oceana Group Limited	Farming & Fishing
TSX	Trans Hex Group Limited	Diamond
CVI	Capevin Investments Ltd	Beverages - Distillers & Vintners
NWL	Nu-world Holdings Limited	Household Appliances & Housewares
IVT	Invicta Holdings Limited	Engineering
REM	Remgro Limited	Diversified Industrials
SPG	Super Group Ltd	Business Support Services
OMN	Omnia Holdings Limited	Chemicals - Speciality
DCT	Datacentrix Holdings Limited	Computer Services
KGM	Kagiso Media Limited	Broadcasting Contractors
JSC	Jasco Electronics Holdings Limited	Electrical Equipment
NPK	Nampak	Containers & Packaging
AVI	Avi Ltd	Food Processors
DST	Distell	Beverages - Distillers & Vintners
ADR	Adcorp Holdings Limited	Education,Bus Training & Employment
HDC	Hudaco Industries Limited	Engineering - General
PNC	Pinnacle Technology Holdings Limited	Computer Hardware
ARL	Astral Foods	Farming & Fishing
BAW	Barloworld Limited	Diversified Industrials
AFE	A E C I Limited	Chemicals - Speciality
Period 2009 - 2012		
HWA	Hwange Colliery Company Limited	Coal
AOO	African And Overseas Enterprises Limited	Retailers - Soft Goods (5371)
RTO	Rex Trueform Clothing Company Limited	Retailers - Soft Good

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

EHS	Evraz Highveld Steel & Van	Steel
MOB	Mobile Industries Ord	Shipping & Ports
MAS	Masonite (africa) Limited	Building & Construction Materials
ACL	Arcelormittal Sa Ltd	Steel
CRG	Cargo Carriers Limited	Rail, Road & Freight
JDG	Jd Group Limited	Retailers - Hardlines
DTA	Delta Emd Ltd	Chemicals - Speciality
TPC	Transpaco Limited	Containers & Packaging
MST	Mustek Limited	Computer Hardware
ELR	Elb Group Ltd	Industrial Suppliers
ATN	Allied Electronics Corporation Limited	Electrical Equipment
ASR	Assore Ltd	Metals & Minerals
COM	Comair Limited	Airlines & Airports
RBW	Rainbow Chicken Limited	Farming & Fishing
MTA	Metair Investments Ord	Auto Parts
NHM	Northam Platinum Limited	Platinum
GND	Grindrod Limited	Marine Transportation
BCX	Business Connexion Group Limited	Computer Services
OCE	Oceana Group Limited	Farming & Fishing
TSX	Trans Hex Group Limited	Diamond
CVI	Capevin Investments Ltd	Beverages - Distillers & Vintners
NWL	Nu-world Holdings Limited	Household Appliances & Housewares
IVT	Invicta Holdings Limited	Engineering
REM	Remgro Limited	Diversified Industrials
SPG	Super Group Ltd	Business Support Services
OMN	Omnia Holdings Limited	Chemicals - Speciality
DCT	Datacentrix Holdings Limited	Computer Services
JSC	Jasco Electronics Holdings Limited	Electrical Equipment
KGM	Kagiso Media Limited	Broadcasting Contractors
NPK	Nampak	Containers & Packaging
AVI	Avi Ltd	Food Processors
DST	Distell	Beverages - Distillers & Vintners
ADR	Adcorp Holdings Limited	Education,Bus Training & Employment
PNC	Pinnacle Technology Holdings Limited	Computer Hardware
HDC	Hudaco Industries Limited	Engineering - General
GBG	Great Basin Gold Ltd	Gold Mining
ARL	Astral Foods	Farming & Fishing
BAW	Barloworld Limited	Diversified Industrials
DLV	Dorbyl Limited	Auto Parts
AFE	A E C I Limited	Chemicals - Speciality
CAT	Caxton & Ctp Publishers & Printers	Publishing & Printing

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

	Limited	
SOV	Sovereign Food Investments Limited	Farming & Fishing
AFR	Afgri Limited	Farming & Fishing
SPA	Spanjaard Limited	Chemicals - Speciality
ART	Argent Industrial Limited	Steel
TON	Tongaat Hulett Ltd	Food Processors
KAP	Kap International Hldgs	Diversified Industrials
DGC	Digicore Holdings Limited	Electronic Equipment
VLE	Value Group Limited	Shipping & Ports
BAW	Barloworld Limited	Diversified Industrials
AFE	A E C I Limited	Chemicals - Speciality