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Valuation factors of multi-bagger companies compared to the market

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Abstract

Companies that have increased their value by over ten times in a fifteen-year period are considered multi-bagger companies. Martelli's (2017) article brought into question the validity of the metrics for identifying multi-bagger companies and whether the methods used for monitoring their performance are valid. The objectives of this paper were to evaluate, firstly, whether the metrics proposed by Martelli for identifying multi-bagger companies, using a value investment strategy, were valid, and secondly, whether the methods for performance monitoring of multi bagger companies were valid. These evaluations were performed by analysing whether the multi-bagger companies all had the same identifying metrics at the start of a defined period. The methodology included evaluating past data (archival research) to assess the multi-bagger companies. This study found that these selection metrics/styles for valuation of the companies were valid for one multi-bagger company and not the other nineteen in the sample. The performance measures were found to be valid in the Basic Materials, Industrial, Healthcare, and Technology industries, and not in the other industries. Implications of these findings for investors are that either multi-bagger companies may not epitomise value investment strategies, or that multi-bagger companies cannot accurately be identified using the value investment strategy.

Key Words

Investing, Multi-bagger, Valuation, Value strategy

Declaration

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

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1 Introduction

Value investing is an investment style that aims to gain abnormal returns based on the prices of stocks being lower than their intrinsic value (Truong, 2009). Value investing, also called contrarian investment strategies, is based on stocks that are neglected due to past poor performances (Kyriazis & Christou, 2013). These stocks are usually distressed stocks that then recover (Johnson, 2017). The stocks are bought at a low price and they are held onto until they have met their intrinsic value, at which time they are then sold for a profit.

All investors aim to maximise their profit; however, some investors achieve higher returns than others. An example of such an investor who has consistently gained high returns is Warren Buffet. He achieved a 21.1 percent compound annual return from 1965 until 2007, while the S&P 500 (Standard and Poor 500 is a United States market index that contains the largest 500 companies based on common stock) achieved only 10.3 percent. A frequently asked question is, “How was he able to beat the market consistently?”. Buffett stated that his ability to beat the market arose from using value investing (Truong, 2009). In other words, he achieved abnormal returns by buying stocks that were priced lower than their intrinsic value and selling them when they had achieved their intrinsic value.

Business history has shown that there are companies that have increased their share price multiple times over a length of time. In his book, Mayer (2015) describes a method for identifying companies that go on to make more than one hundred times the return on investment. Such companies were called a hundred baggers (where baggers are the stock return multiple). Similar to Buffett’s aforementioned strategy, Mayer’s book is based on value investing, which postulates that for stocks to achieve significant returns on investment, they need to be undervalued. Such stocks would epitomise the value investing strategy. This is debated, however, by Johnson (2017), who stated that this was not the case; in other words, that stocks do not need to be undervalued to gain high returns. Johnson discussed this view in an article published in the Financial Times. His article was based on work conducted by Martelli (2017). Martelli, a value investor based in Switzerland, had conducted a study of “multi-bagger stocks”. Based on the findings from that study (which will be discussed in more detail in the following section), Martelli suggested that some stocks do not possess the characteristics of value stocks. This

seemingly counterintuitive suggestion challenges several commonly held assumptions and beliefs about potential drivers of stock market returns. Given the relative novelty of such a suggestion, this paper aims to test Martelli's findings within a South African context on the Johannesburg Stock Exchange. This will be done by exploring whether the method for identifying these stocks is correct and whether the metrics for monitoring their performance are correct.

To provide context to this area of research, the next two sub-sections provide information relating to the background of the research problem, the research questions to be addressed, and the significance of the research.

1.1 Background to the research problem

An intrinsic aim of investors is to increase profits. As has been discussed in the introduction, there is no clearly defined algorithm that can be used to achieve such aims, with some companies achieving higher returns than others. The focus of this research relates to identifying companies that achieve higher returns than others. Mayer (2015) defined a bagger as a company that returned multiple times the investment amount. He looked specifically at 100-baggers i.e. companies that returned one hundred times the amount invested with the time frame only defining the compounded growth rate of the company. This can be seen in Table 1-1

Table 1-1: Compounded annual return versus the number of years to achieve for the value to multiply one hundred-fold

Compounded Annual Return	Years to 100-bagger
14%	35 years
16.6%	30 years
20%	25 years
26%	20 years
36%	15 years

Note. Source of information obtained from Mayer, 2015, p.5.

Identifying 100-bagger companies ex ante is not an easy or clearly defined task. Mayer (2015) seeks to address this by offering insights into identifying 100-baggers. In his book, Mayer emphasised a need to look past the numbers and understand how the company will add or create value in the future (Mayer, 2015). Mayer also emphasised a need for exponential growth. He stated that the growth should focus on earnings per share and

sales. In the examples he provided, the returns were higher than the market average. One such example, on page 170, referred to Akre turning $1 into $20, where the S&P 500 would only have yielded $5.59, indicating that the performance was better than that of the market.

Seeking to offer an alternative view to that proposed by Mayer, Johnson (2017) wrote an article for the Financial Times, entitled *'Multi-bagger' equities reveal counterintuitive lessons'*. This article brought into question the epistemology of how to identify multi-bagger companies (Johnson, 2017). Epistemology is "the theory of knowledge, especially regarding its methods, validity, and scope, and the distinction between justified belief and opinion" (Collins English Dictionary, 2018). Johnson's article was based on a presentation by Martelli (2017) on the topic of perspectives of value investing. In that presentation, Martelli posed four questions, all related to investing and whether similar results, akin to what Buffet had achieved, could be replicated. Martelli then provided context by first describing the difference between private equity and value investing, where both methods are used to find undervalued companies. Martelli describes private equity investing as more of a hands-on approach for the investor. Private equity investing involves investing in the company with the aim of making decisions about the management of the company's management, risks and debt. In contrast, Martelli describes value investing as a process of an investor finding a company that is undervalued and purchasing equity in the firm. In other words, an investor would buy shares in the company but then take on a passive role in that company. Martelli then reflected on Mayer's (2015) book as his inspiration for the aforementioned analysis. Martelli cites an example from Mayer's book, of how Paul Garrett was able to identify one stock that met Garrett's suggested criteria of being; "i) small, ii) relatively unknown, iii) distinguished by a unique and useful product, and iv) lead by a strong, progressive and research-minded management" (Martelli, 2017, p. 18). This stock was bought for $1 and sold seventeen years later for $125. This example raises an interesting question related to the use of such criteria for identifying stocks.

Martelli (2017) wanted to analyse how easy it was to identify stocks that met the specified criteria. Based on the aforementioned example, Martelli (2017) defined a multi-bagger stock as a company whose value has increased by more than ten times in a fifteen-year period, similar to what Phelps had done in 1972 (Johnson, 2017). Martelli wanted to establish what drives long-term performance. His presentation focused on three multi-

bagger cases using retrospective analysis: the first in Australia (the REA Group), the second in the Philippines (Philippine Seven) and the third in the USA (AutoZone). Based on these case studies of multi-bagger companies, Martelli (2017) illustrated that the epistemology assumption was not valid for the three multi-bagger stocks. In analysing the three multi-bagger companies he found that they i) occurred in a market with low growth, or ii) did not have a very high growth in revenue or iii) were not high-risk businesses or iv) did not have low starting P/E (current market price divided by the earnings per share (Piotroski, 2000)) valuations.

The business objective of this paper is to determine whether the epistemology for identifying multi-bagger stocks and the metrics that indicate that they will become multi-baggers is valid. If this epistemology is not valid, investors using these factors may buy stocks that they believe will become multi-bagger companies, but they likely will not. This could then tie up capital that could be growing at a faster rate had it been invested elsewhere. Furthermore, some companies may use the correct metrics and have identified potential multi-bagger companies, but over the investment time frame, the business might make some poor decisions. The poor decision(s) could lead to the companies not becoming multi-bagger companies (this is another business problem that can arise with the selection of multi-baggers, however, it is beyond the scope of this paper to be considered further here). The metrics that are used to monitor companies, for example, growth in revenue as described by Martelli (2017), may not be correct. If this is shown to be true, then companies may be selling their shares in multi-bagger companies and not realising their potential growth in capital. To explore this business problem, using the criteria proposed in the literature to identify multi-baggers, this paper will analyse whether the multi-bagger stocks on the Johannesburg Stock Exchange (JSE) have outperformed the market.

The aim of this research is to provide insight into whether the method used for identifying multi-bagger companies is valid. Thereafter, to evaluate which of the factors defined in the literature are driving multi-bagger companies in the different markets.

1.2 Research problem

Martelli (2017) has described that for value investments that are multi-baggers, the assumption is that; i) the companies are small, ii) the companies are in a high growth market, iii) the multi-baggers have a high growth in revenue, iv) the companies are high risk and v) they have a low P/E ratio at the start of the analysis. Martelli found that these assumptions did not hold for all multi-bagger companies. Martelli provided three examples that illustrated that these assumptions did not hold for all multi-bagger companies. In this paper, the assumptions that Martelli defined will be tested on multi-bagger companies on the JSE.

The five assumptions that Martelli defined need to be tested differently. Some of the assumptions are based upon how a value multi-bagger is identified and others are based upon how the multi-bagger companies perform. This then creates two research questions:

1. Are the metrics for identifying multi-bagger companies valid?
2. Are the metrics for monitoring the performance of the multi-bagger companies effective?

To place these questions in context, the significance of this research will be discussed in the next section. Following this, a review of the literature is conducted to establish what metrics should be analysed. Such information will help to determine if valid metrics are being used by Martelli.

1.3 The significance of the research

The complexity of identifying multi-baggers has been discussed in the previous sub-sections. Criteria for identifying such companies has been mentioned, however, the efficacy of such criteria remains to be explored.

The purpose of this comparative retrospective research on multi-bagger companies to their markets aims to provide an improved understanding of whether the previously proposed metrics for identifying multi-bagger value companies are valid. Establishing such information speaks to the first question of this research. The second research question aims to establish whether the metrics that are used for monitoring the performance of the multi-bagger companies are effective indicators and drivers of multi-bagger companies. The value of such research is that if there is a better understanding of the metrics that are used to identify multi-bagger companies and the drivers of multi-bagger companies, then investors may be able to more effectively identify these companies and make improved investment choices. As far as is known, this is the first research of its kind to examine previously proposed criteria for identifying multi-bagger companies within the South African context of the JSE.

2 Literature review

A review of the existing literature related to evaluating aspects that are potentially relevant in identifying multi-bagger stock and their drivers identified several topics to consider. These topics included investment categories, the capital asset pricing model (CAPM), investment styles and value investment strategy or style. Investment categories will give an understanding of whether the investment into different categories will influence the investment return. This then follows that having an understanding of how future returns are estimated allows for further building onto different investment styles. This was done by first gaining an understanding of one of the first methods used for future valuation, the capital asset pricing model. This work then built on to by looking at different investment styles. One such investment style to be investigated in this research is the value or contrarian investment strategy. The different styles then establish the foundation for value investment style, which is the style that is used to find multi-bagger stocks.

The literature will be examined to define why market segments need to be examined and what the market segments are. This will be described in further detail in section 2.1 Investment categories.

2.1 Investment categories

Martelli presented three case studies in his presentation, from which he then drew his conclusions. To determine whether Martelli's conclusions may be relevant or if they were outliers, it is essential to examine the body of knowledge on investment categories, including low growth and high growth industries. Other methods of categorisation of stock or investor approach will be examined to determine what would be the most appropriate to include in the data analysis of the proposed study.

One method of analysing stocks is based on their industry or index membership (Jame & Tong, 2014). An industry analysis is important if the investor is operating on the "buy side" or the "sell side". Mutual funds that are offered by buy-side institutions will offer sector-orientated mutual funds whereas institutions who are on the sell side will perform and offer industry-level forecasts (Jame & Tong, 2014).

A further notable factor is whether the investor is an institutional investor or a retail investor. Jame and Tong (2014) analysed all the trades in a selected industry and found that retailers follow each other into and out of the same industries. This means that retail investors tend to pursue industries that are or were performing well, pushing the prices beyond their value based on fundamentals. This over demand will last for the subsequent week; thereafter, it will overcorrect, with the price remaining overcorrected for the next three months to a year (Jame & Tong, 2014). Using the industry for the comparison limits the effects of retail investors pursuing industries. The work carried out by Kasilingam and Ramasundaram (2011) found that the P/E values differ for different industries. If the industry factor is removed from the analysis, then there should be no difference in the P/E ratios between the industries (Kasilingam & Ramasundaram, 2011). Ward and Muller (2012), defined the market for the comparison as the market segment or market index of the ALSI.

The industry classification benchmark (ICB) classifies industries into ten indexes. Each industry index has 4 levels of classification (Johannesburg Stock Exchange, 2018). The industry classification benchmark indexes are as follows:

- Oil & Gas (ICB code 0001)
- Basic Materials (ICB code 1000)
- Industrial (ICB code 2000)
- Consumer Goods (ICB code 3000)
- Healthcare (ICB code 4000)
- Consumer Services (ICB code 5000)
- Telecommunication (ICB code 6000)
- Utilities (ICB code 7000)
- Financials (ICB code 8000)
- Technology (ICB code 9000)

The stock market industry indices on the JSE are divided into three sectors: Industrials, Resources and Financials (Johannesburg Stock Exchange, 2018). This follows the same categorisation used by l'Ons and Ward (2012). These sectors are defined on the JSE as:

- “SA Resources – JSE listed companies that belong to ICB Industries Oil & Gas (0001) and Basic Materials (1000)
- SA Financials – JSE listed companies that belong to ICB Industry Financials (8000)
- SA Industrials – All remaining companies, i.e.: JSE listed companies that do not belong to ICB Industries Financials (8000), Oil & Gas (0001) and Basic Materials (1000)” (Johannesburg Stock Exchange, 2018)

To determine if the market segment is growing faster than the market it is necessary to define what the market is. There were almost more than 400 companies listed on the JSE every year, over the 15-year period (Johannesburg Stock Exchange, 2018), with the JSE ALSI covering 99% of the market capitalisation, which comprises only ±160 shares (Johannesburg Stock Exchange, 2018). The ALSI defines the market performance (Ward & Muller, 2012).

Based on the literature review of investment categorisation for the proposed study, it was purposefully decided to use the industry categorisation of the JSE. The industry categorisation can be used to compare specific industry indexes to the JSE ALSI. This is done to determine if the industry that the multi-bagger company is in is growing at a faster rate than that of the market. Understanding how the market will be categorised and why this has been selected can facilitate an understanding of how the future value of a company is estimated.

2.2 Capital asset pricing model (CAPM)

Linked to industry categorisation is the estimation of the future value of a company and how to counteract risk and return, with investors looking to gain a return on investment. However, potential return on investment depends on uncertainties that cannot easily be captured in standard formulas. Some such uncertainties are that every investment is different, each company is different in the markets they are in, they operate in different locations, they have different management personalities and styles. These uncertainties could result in higher or lower amounts of risk to the investment. If there is a higher risk associated with the investment, the investor would want a possibility of a higher return on investment.

The higher risk associated with higher potential return was the basis of how the CAPM (Sharpe, 1964) was developed by Sharpe and Linter (Baek & Bilson, 2015). They looked at quantifying the risk and expected return on investment. Equation 1 shows the linear equation for quantifying expected return to the different risk factors.

Equation 1: CAPM expected return

$E(Re) = Rf + \beta \times E(Rp)$ (Ward & Muller, 2012)

Where;

E(Re) is the expected rate of return

Rf is the risk-free interest rate

β (or beta) is the systematic risk

E(Rp) is the expected market risk premium (MRP).

(The market risk premium considers the macroeconomic risk associated with the investment).

The CAPM (Sharpe, 1964) valued a company by using the relationship between the systematic risk and the expected return. The higher the risk, the higher the expected return. In 1968, Jensen was the first to show that this model implies a time-series

regression, with the assets alpha value of zero for each asset (Fama & French, 2004). However, in the late 1970's, early 1980's there was empirical work that challenged even the latest versions of CAPM, the Sharpe-Linter-Black model (Fama & French, 1992). The imperial work showed that relation between β and market returns diminished during the more recent work. Fama and French refer to how Banz (1981) found the relationship to be negative between size and average return.

In 1996, Fama and French proposed that the CAPM model should be expanded to include other factors that cater to anomalies (Fama & French, 1996). They explored three factors: i) the excess return on a broad market portfolio, ii) return to book stocks, and iii) the difference between the return of small stock to large stocks. They found that their three-factor model removed most of the anomalies but did not consider irrational pricing and data problems. Consequently, they noted that their theory did not explain all expected returns (Fama & French, 1996).

Following on from their earlier research, Fama and French (2004) then summarised that the following aspects of business were not as they had been predicted by the β of CAPM: i) stocks with high earnings to price ratios had higher returns than predicted by CAPM, ii) smaller companies, by market capitalisation, had higher returns than predicted, iii) higher debt to equity (book value of debt to market value of equity) achieved higher returns than predicted by their market betas, vi) book to market equity, the returns were higher than that predicted by the CAPM beta values (Fama & French, 2004). In examining this research, Baek and Bilson (2015) noted that in Fama and French's earlier work (1992 and 1993) had not included financial firms, as financial firms had a high leverage not common to most non-financial firms, nor had any of the work that built onto their models. Baek and Bilson perceived to be a limitation to the work as a significant number of firms on the US stock market are financial firms. Further to this, the model was to be used for the valuation of all firms and not limited to certain industries. However, Barber and Lynon (as cited in Baek & Bilson, 2015) conducted a similar study that included financial firms and they found that there was no significant difference if the financial firms were included. In contrast, Ward and Muller (2012) found that there was an inverse relationship to what the CAPM prescribed. They reported correlations (positive and negative) between market capitalisation, resource shares, and earnings yield but, importantly, there was no correlation with price to book ratio. Their article concluded that the CAPM was no longer appropriate (Ward & Muller, 2012).

With earlier research suggesting the inaccuracy of the CAPM, Frazzini and Pedersen explored a different model to that of the CAPM (Frazzini & Pedersen, 2014). They presented a model where investor constraints on margin and leverage over time influenced the investors required returns. The model had five central predictors, where one of the predictors was a factor that bet against the CAPM beta. They found that portfolios with a high beta had lower alphas than portfolios with a lower beta. Also, the security line was flatter than what was predicted by that of the CAPM beta. Frazzini and Pedersen (2014) concluded this to be empirically true for the US markets and 18 of the 19 other international markets. However, Baek and Bilson (2015) challenged the assumption of Frazzini and Pedersen that leverage invalidated CAPM. They looked to extend Fama and French's three-factor model to include financial institutions, by looking at only two factors: i) an interest rate factor, to explain risk-adjusted returns and ii) the size of the company. Similarly, in 2017, Fama and French proceeded to expand their 2004 three-factor model to a five-factor model by adding in the book to market ratio and profitability. They concluded that it would be worthwhile to extend the research and include momentum as a factor (Fama & French, 2017).

The CAPM has developed considerably since its formulation in 1964 to date. Over time, various researchers have suggested changes or additions to the model. From the original model that looked at how changes in share price compared to changes in the market share price, to estimated risk and future value, to look at different metrics estimating the future value of companies. One of the metrics that Fama and French (1996) used to extend the model was the size of a company. Similarly, Martelli (2017) used the size of a company as one of the valuation metrics that he proposed. Based on the literature review, and for the purpose of this study, the size of the company will be defined by the company's market equity or market capitalisation. These metrics for future valuation estimation will be explored in further detail in section 2.3 Investment styles.

2.3 Investment styles

Section 2.2 described the development of the CAPM model as it evolved into different investment styles. It is therefore important to look at the different investment styles and the factors that are relevant to value investing. This section will explore the theory on what investment styles are and how value investing requires a combination of styles.

Different styles and strategies for estimating the future valuation of companies have been developed and can be easily located (Wahal & Yavuz, 2013) (Muller & Ward, 2013) (I'Ons & Ward, 2012) (Van Rensburg, 2001). Investors and/or analysts analyse stocks that have similar or shared commonalities and group them into categories or "styles" (Jame & Tong, 2014). The research papers that have been referenced in this section have been written with the intention of finding an investment style or strategy that will achieve returns greater than that of the market. This is illustrated in the conclusion of Muller and Ward's article (2013). They tested the returns of 11 different styles and one combination style. They found that a combination of the styles was successful in beating the ALSI by 14 % per annum. Muller and Ward further described that with their style engine they were able to generate more than 30 different style strategies. Each of these strategies consisted of either individual metrics (styles) or a combination of metrics (Muller & Ward, 2013). This is not dissimilar to the findings of Van Rensburg (2001), who analysed 20 different style factors and found that three styles (earnings to price, the inverse of P/E, size (market capitalisation) and momentum (12 months), was the best cluster to use as a style-based risk of the JSE. Furthermore, Wahal and Yavuz (2013) demonstrated that style investing can have predictive power over the stock return.

Two styles based upon price to earnings ratio, namely, value investing and growth investing, were explored in research papers either independently or comparing their performance (I'Ons & Ward, 2012). These two styles, value and growth investing, occur because investors overreact to the pricing of the stocks based on past performances, in other words, value stocks pricing is lower, making them cheap, and growth stock is higher, making them expensive. This causes the growth stocks to underperform (not achieve) the expectations and the value stocks to over-perform (exceed expectations) of their respective returns (Bhana, 2014).

A review of this literature has indicated that there are different methods of defining value investment style. Some methods use the price to book value as a measure of distinguishing between growth and value shares (Bhana, 2014). Another method is using the price to earnings ratio (inverse of earnings yield), commonly known as the P/E ratio (price to earnings per share). The P/E ratio is likely to be higher than the price to book value measure as the P/E ratio is believed to catch other unnamed factors (Fama & French, 1992). The higher the P/E ratio, the more expensive the share and conversely the lower the P/E ratio, the cheaper the share (Bhana, 2014). Although there have been two methods of defining (P/E ratio and price to book value) whether a company is undervalued, this paper will use price to earnings ratio to define whether the company is undervalued or not.

Value investing was the style that was described by Martelli in his presentation for identifying multi-baggers (Martelli, 2017). Martelli described value investing as a strategy that buys shares of undervalued companies. Bhana (2014) described a value investor similarly where the investor buys an inexpensive share when comparing to fundamental measures. Different investors have different approaches to evaluating inexpensive companies. It is evident that even Warren Buffet's approach has changed over time (Martelli, 2017).

As the value investing strategy is an investment style that was used for selecting and analysing the multi-bagger companies, this is the investment style that will be considered in more detail in the next section and Value Investment Strategy / Style.

2.4 Value investment strategy / style

As described in section 2.3, an investment style can be a single style factor or a combination of style factors. This section will look at the literature for which additional style factor(s) that define value investing, other than being undervalued using low P/E ratio.

Piotroski (2000) examined whether simple accounting metrics could be applied to companies with a high book to market ratio to determine which companies are undervalued and which are financially distressed (poorly performing companies). Piotroski (2000) looks at profitability trends, cash flow adequacy, leverage, and liquidity to assess whether the firms are distressed. Piotroski (2000) described profitability trends as gross margin, net income, return on assets, asset turnover, the change in shares outstanding and the quality of earnings; cash flow was described there being adequacy as operating cash, leverage as debt to assets and liquidity as current ratio.

Gauy (2000) comments on Piotroski's work and concluded that only some of the results had been explained (Gauy, 2000). Gauy concluded the article that further research was required to understand the pricing behaviour that underpins the value company stock returns. While Gauy may be correct in that further research is required to produce a model that will better describe a pricing behaviour, Piotroski's metrics do appear to be getting closer to something that will describe the value companies' pricing behaviour.

Based on Martelli's (2017) value style findings and Piotroski's (2000) description of the style factors used for defining and monitoring value investments, the following additional styles will also be used in identifying value investments; leverage in the form of debt to assets. To compare whether the multi-bagger companies have outperformed the industry/market the growth in the company's net profit margin, operating profit margin and return on assets (ROA), style metrics will be evaluated. The style metrics described by Martelli and those found in the literature will now be used for describing the research problem in the form of hypotheses.

In summary, this literature review has explored recent and relevant literature relating to the identification of multi-bagger companies. To provide a comprehensive review, the literature review further explored this topic by examining literature regarding investment

categories, the CAPM, investment styles, and lastly, value investment strategy or style. The review of the literature has revealed that the categorisation of the market into the industry is necessary to remove industry effects on styles. Understanding how future returns are estimated allows for further building onto different investment styles. The different styles then establish the foundation the method used for value investment or contrarian investment style, which is the style that is used to find multi-bagger stocks. Having explored the relevant literature, it seems that there is a lack of clarity regarding criteria used for identifying multi-nagger companies, but there is evidence for relevant topics to be explored further.

3 Research question

Martelli's (2017) article brought into question the validity of the metrics of identifying multi-bagger companies and whether the methods used for monitoring their performance are reliable. The metrics that Martelli (2017) described for the assumption for value investments that are multi-baggers, were that; i) the companies are small, ii) the companies are in a high growth market, iii) the multi-baggers have a high growth in revenue, iv) the companies are high risk and v) they have a low P/E ratio at the start of the analysis.

A literature review was performed to identify whether these were the most reliable metrics for the identification of multi-bagger value investment. The literature review revealed that the metrics used for the identification of multi-bagger value investments were a i) a low P/E ratio, ii) the companies were small (by market capitalisation, iii) were high risk (measured by leverage or current ratio) and in high growth industries. The method used for the monitoring of the performance of the multi-bagger companies was profitability, return on assets or return on equity. Martelli's article provided the basis for the business question, and from the information gained from the literature review, the following hypotheses were developed.

3.1 Hypotheses

In this paper, multi-baggers were identified ex-post. If they did not possess all the same characteristics, then those characteristics could not be used to identify potential multi-baggers. The metrics that were used to identify multi-baggers were: the companies were undervalued (low P/E ratio), small (low market capitalisation), high risk (high leverage), and in a higher growth industry than that of the market. Martelli's value style findings and the Piotroski description of the style factors were used in identifying value investments. The combination of these metrics will then be used for testing the first hypothesis.

The first hypothesis is as follows: the null hypothesis is that all multi-bagger (MB) companies meet these style metrics and the alternate hypothesis is that they do not all meet these style metrics.

H_{A0}: $P/E_{MB} < P/E_{\text{Industry Average}}$ & $\text{Market Capitalisation}_{MB} < \text{Market Capitalisation}_{\text{Industry Average}}$ & $\text{Leverage}_{MB} > \text{Leverage}_{\text{Industry Average}}$ & $\text{Growth}_{\text{Market}} < \text{Growth}_{\text{Industry Average}}$

H_{A1}: $P/E_{MB} \geq P/E_{\text{Industry Average}}$ OR $\text{Market Capitalisation}_{MB} \geq \text{Market Capitalisation}_{\text{Industry Average}}$ OR $\text{Leverage}_{MB} \leq \text{Leverage}_{\text{Industry Average}}$ OR $\text{Growth}_{\text{Market}} \geq \text{Growth}_{\text{Industry Average}}$

The second hypothesis is as follows: the null hypothesis is that the multi-bagger has a greater; i) net profit margin, ii) operating profit, iii) return on assets than that of the industry average and iv) the growth rate in the industry is greater than that of the market. The alternate hypothesis is that the multi-bagger did not have a greater; i) net profit margin, ii) operating profit, iii) return on assets than that of the industry average and iv) the growth rate in the industry was not greater than that of the market.

H_{B0}: $\text{Operating Profit Margin}_{MB} > \text{Operating Profit Margin}_{\text{Industry Average}}$ OR $\text{Net Profit Margin}_{MB} > \text{Net Profit Margin}_{\text{Market Average}}$ OR $ROA_{MB} > ROA_{\text{Industry Average}}$ OR $\text{Growth}_{\text{Industry}} > \text{Growth}_{\text{Market}}$

H_{B1}: $\text{Operating Profit Margin}_{MB} \leq \text{Operating Profit Margin}_{\text{Industry Average}}$ & $\text{Net Profit Margin}_{MB} \leq \text{Net Profit Margin}_{\text{Industry Average}}$ & $ROA_{MB} \leq ROA_{\text{Industry Average}}$ & $\text{Growth}_{\text{Industry}} \leq \text{Growth}_{\text{Market}}$

4 Research methodology and design

The aim of the research was to provide insight into whether the styles for identifying multi-bagger companies are valid and which of these styles are driving multi-bagger companies in the different markets.

This was done by comparing factors that are defined in the literature as affecting the value of a company. The factors (revenue, profit margin and return on assets) are specific to companies and not to the market, industry or index. The results from the analysis are graphically represented over time, which illustrates the performance of the multi-bagger companies against the market average over the time frame. The comparison shows whether the multi-bagger had outperformed the market and if there was any consistency in the performance of the multi-bagger compared to the market. The difference between the trends provided an indication of how much the multi-bagger has or has not outperformed the market.

4.1 Research methodology

This study will be based on historical data for the purposes of comparing whether the multi-baggers that have been identified meet the epistemology assumptions for how to identify a multi-bagger company. The aim is to test the epistemology that multi-bagger companies outperform the market. Furthermore, to evaluate whether to get extraordinary returns you need to be in a market segment that has a high growth.

4.1.1 Philosophy

The research followed a positivism philosophy (Saunders & Lewis, 2012, p. 104), whereby the study evaluated observable and measurable conditions within companies. These measurable conditions were then used to compare and test the hypotheses.

4.1.2 Approach

The approach was deductive in nature as the hypothesis testing was carried out using defined financial measures (Saunders & Lewis, 2012, p. 108). The first hypothesis was a comparison of whether the multi-bagger companies met the financial metrics to identify multi-bagger companies. The financial metric that was used to define market growth was

index price. To test if the industry index was growing faster than the market, a normalised comparison was done in the change in index price between the industry (Oil & Gas, Basic Materials, Industrials Consumer Goods, Healthcare, Consumer Services, Telecommunication, Utilities, Financials, and Technology) to that of the JSE ALSI. Of note, when the comparison of whether the multi-bagger was in an industry of high growth, the multi-bagger was not excluded from the market segment or the ALSI.

The testing of growth in the second hypothesis required using a longitudinal comparison of financial metrics to assess whether the multi-bagger had outperformed the industry. This was done using a similar method of displaying the comparison graphically over time as that which was used by Muller and Ward (2013). The index price will be divided by the index starting price. This was done to normalise the data, to ensure that all the indexes to have the same starting point. The normalised data for the industries and ALSI was then plotted against time. At the end of the period, the observer was able to deduce, by visually inspecting the trend displayed, and comparing the end values if the industry outperformed the market. From the trend, we were able to establish how the multi-bagger has performed against the industry and gain insight from this.

4.1.3 Methodological choices

The methodology used univariate or mono-variate analysis (Fama & French, 1996) to generate the factors that affect the value of a company. The univariate metrics that were used are i) price to earnings ratio (P/E ratio), ii) company size (market capitalisation), iii) leverage in the form of debt to assets, iv) operating profit margin, v) net profit margin and vi) return on assets. The change in the factors over time (Muller & Ward, 2013) for the market and the multi-bagger companies were then analysed and represented graphically for ease of comparison.

4.1.4 Purpose of research design

The research used an evaluative purpose (Saunders, Lewis, & Thornhill, 2009) as it aimed to evaluate whether the criteria for identifying multi-bagger companies was valid. In addition to this evaluation, the research also evaluated whether the multi-bagger companies had outperformed the market. This was done using a similar method of displaying the comparison graphically over time as that which was used by Muller and Ward (2013).

4.1.5 Strategy

The data that will be looked at for testing the hypotheses is historical secondary data. An archival strategy makes use of historical data for research (Saunders & Lewis, 2012, p. 121). The research question is in the form of a hypothesis. The hypothesis is tested by evaluating historical data (Bhana, 2014) (De Kock, 2016) (Muller & Ward, 2013). To be able to collect and analyse the data, an archival strategy was used to carry out this research

4.1.6 Time horizon

The analysis was cross-sectional and longitudinal (Saunders, Lewis, & Thornhill, 2009) in nature. A cross-sectional analysis was required to test whether the multi-bagger company meets the requirements for identifying a multi-bagger. A cross-sectional analysis was also carried out at each time interval. The results from the cross-sectional analysis were then combined into a time series. The time series was then used for carrying out the longitudinal analysis of the changes in the metrics over time (Muller & Ward, 2013).

The time interval used for the collection of data for the style's P/E ratio, size (market capitalisation), leverage, net profit margin operating profit margin and return on assets (ROA) was defined as one (calendar) year, using the published financial data. This may have created limitations to the data, refer to the section 4.2.7. Limitations, for further details. The reasoning for this is that some companies listed on the JSE report quarterly results. However, all companies on the JSE are required to report their interim or mid-year results and the final results. The results need to be published on the SENS within three months of the mid-year and year-end (Johannesburg Stock Exchange, 2018). If multiple data points are to be collected in each year, each of the companies may not have reported their results.

The time interval used for the collection of data for the comparison of growth, using the index prices, was daily. Although the index prices are reported in a higher frequency, the error in the use of the daily prices would be sufficiently small not to affect the outcome of the comparison.

4.1.7 Techniques and procedures

The data collection process used the McGregor BFA database (Bhana, 2014) to gather the secondary data from the Johannesburg Stock Exchange (JSE). Data for analysing the financial metrics, market capitalisation and share price was collected yearly, with the data that was available on the 31st of December each year. The sample frame from which data was extracted covered a fifteen-year period (2003 – 2017) in line with the definition of a multi-bagger by Martelli (2017). The data was extracted into Excel for analysis (De Kock, 2016).

The year prior to the multi-bagger period (2002) was used for the analysis of financial metrics in hypothesis one. To analyses whether the industry growth was higher than the market growth prior to the multi-bagger period, data of the Johannesburg All Share Index (ALSI) and the industry sectors were collected from the year 2000, i.e. three years prior to the end of the multi-bagger defined period.

The industry indices (Oil and gas, Basic Materials, Industrials, Consumer goods, Healthcare, Consumer services, Telecommunication, Utilities, Financial, and Technology Industries) offer a method to compare the industry or market sector that the multi-bagger company was in, with that of the market. The comparison was used to show if the industry or market sector was growing at a faster rate than that of the market. If investors are chasing an industry, then changes in investment in that industry will be relevant to all the companies in that industry. If other industries were included in the comparison, this would skew the results. When comparing the multi-bagger growth to the industry, or segment of the market, was also be shown to compare the industry growth to the market. The market was represented by the ALSI (Bhana, 2014). The industry is represented by the industry industrial index.

There are almost than 400 companies listed on the Johannesburg Stock Exchange each year over this period (Johannesburg Stock Exchange, 2018). The ALSI covers 99% of the market capitalisation (Johannesburg Stock Exchange, 2018). Akin to the work of Muller and Ward (2012), in this study the ALSI will be used to represent the market.

4.2 Research design

4.2.1 Population

The population used for this research included all publicly listed companies. The sample frame included the companies listed on the JSE. The JSE was selected as it is a South African Stock Exchange and the author was interested in whether Martelli's observations apply to this stock exchange. It was noted that the South African stock exchange is heavily skewed as the top 40 (approximately one percent of the number of companies listed on the JSE) represents over 80% of the market capitalisation of all the shares listed on the JSE (SAShares, 2018).

4.2.2 Units of analysis

For the testing of the first hypothesis, the units of analysis were performed using a comparison of financial metrics. For the metric of growth, the change in the price of the index was used to show the growth in the market or the industry. The second hypothesis was tested by comparing the cumulative change in the financial evaluation factors that affect the value of a company. The results of the analysis of growth and hypothesis 2 are graphically represented for ease of analysis (Muller & Ward, 2013). This was done by comparing each of the multi-bagger companies to that of the industry portfolio.

4.2.3 Sampling method and size

The sampling was done using a non-probability judgemental sampling method (Saunders & Lewis, 2012, p. 138). The sample was selected purposefully from the sample frame (all companies on the JSE). The companies that did not meet the following criteria were removed from the sample: i) must exist over the whole period being examined (a qualification on what the period being examined is defined in the following paragraph), and ii) must have a complete data set over the period being evaluated (Bhana, 2014). Companies that did not exist over the whole period being examined refers to companies that are listed during the period or companies that delisted due to merger events, bankruptcy or suspension of trading by the regulatory authorities (Kyriazis & Christou, 2013). When conducting the longitudinal analysis, the companies that were classified as multi-bagger companies were not excluded from the industry portfolios. The period examined for hypothesis 1 was the year 2002, with growth being examined from the start of the year 2000 to the end of the year 2002. The period examined for hypothesis 2 was from the start of 2003 to the end of 2017 (multi-bagger period).

Multi-baggers were identified from the sample based on the definition of a multi-bagger in the Introduction section. If multi-bagger companies were found but did not meet the criteria specified in the previous paragraph they were removed from the sample.

4.2.4 Measurement instrument

This research was carried out using historical secondary data which was transferred to Excel for analysis; thus, the research instrument or tool that was used to analyse the data was Excel (De Kock, 2016). However, a research instrument is only valuable if the information that is supplied to it is valid and reliable. In the two sections below each of the principal factors that could negatively affect the validity and reliability of the research findings and conclusions will be discussed.

4.2.4.1 Data validity

The research strategy determines whether there is validity in the data and whether the findings are relevant to what was being analysed. The factors that Saunders and Lewis (2012) believe are the principal factors affecting data validity are shown in Table 4-1, and their relevance to this research are described.

Table 4-1: Principle factors that negatively affect the validity

Factor affecting validity	Description of relevance to this research
Subject selection	Selection biases can arise when selecting the sample. This can cause the sample to be unrepresentative of the population. In this study, only 104 of 816 companies that existed during the period were included.
History	This is not relevant to this research as the events have already happened and cannot be affected by events between samples.
Testing	This is not relevant as the information is not given to a person. The archival strategy is being used.
Mortality	Removing companies that were not listed on the JSE for the whole period could skew the sample which could affect the results. Refer to section 4.2.7 Limitations for further information on the effect of this factor on the results.
Ambiguity about causal direction	This will be negated by the fact that the factors that were used are defined by the literature. These factors will have been tested to ensure that the causal direction is correct.

Note. Source of information obtained from Saunders & Lewis, 2012, p. 127

4.2.4.2 Data reliability

The data collection method will define whether the data is reliable. The factors that Saunders and Lewis (2012) believe are the principal factors affecting data validity are shown in Table 2, and their relevance to this research are described.

Table 4-2: The principal factors that negatively the reliability of research findings and conclusions

Factor affecting reliability	Description of relevance to this research
Subject error	This is not relevant as an archival strategy is being used.
Subject bias	Data presented to the JSE may not be factually correct as the companies may attempt to present a better performance. The financial statements are audited, and all companies need to ascribe to the King Code as per section 8.63 of the JSE listing requirements, therefore largely eliminating subject bias.
Observer error	This is not relevant as the observer is not asking questions. The observer is looking at the financial information. This error is removed when using an archival strategy.
Observer bias	Potential ambiguity in the data collection method is removed by the accounting and auditing standards that need to be adhered to be listed on the JSE.

Note. Source of information obtained from Saunders & Lewis, 2012, p. 128

4.2.5 Data gathering process

The data collection process used the IRESS database (formerly the McGregor BFA database) (Bhana, 2014) to gather the historical closing price (secondary) data from the JSE (I'Ons & Ward, 2012). Data for the financial metrics were collected from the start of 2002 to the end of 2017. The data for the industry index used to measure the growth were collected from the start of 2000 to the end of 2017.

4.2.6 Analysis approach

The historical secondary data were collected from the IRESS database (formerly the McGregor BFA database) and transferred into an Excel spreadsheet for analysis. The companies that did not meet the criteria specified in the section 4.3.2 Sampling method and size, were then removed from the analysis. The companies that met the multi-bagger criteria were then identified, based on Martelli's definition of the share price of the company has increased by more than ten times in the fifteen-year period. These companies were then tested for the criteria specified in the first hypothesis. The financial styles used in the first hypothesis (P/E, size and leverage) were analysed prior to the multi-bagger period i.e. for the year 2002. This was done by ranking, in ascending order, the companies in the sample. The rank of the multi-bagger was then divided by the number of companies in the sample (converted into a percentage) and classified. The classification was based on whether the multi-bagger company percentage classification was greater or smaller than 50%. See Table 4-3 for the multi-bagger classification. The metrics that meet hypothesis 1 are greyed out in Table 4-3.

Table 4-3: Classification of company financial metrics

	Metrics validating hypothesis 1	Metrics failing hypothesis 1
Ranking %	<50%	≥50%
P/E ratio	Value	Growth
Ratio	Small	Large
Size	Low	High

For analysing whether the industry index grew at a faster rate than that of the ALSI, the data are presented graphically. The index share price was normalised and plotted over time. Normalisation was done by dividing the day's index price by that of the starting index price. At the end of the period, each of the indexes can be compared to each other as to how much each of them has grown compared to the starting price.

To compare the growth in the market to that of the industry, the time frame needed to be defined. A time frame for defining this period was defined based on the effect that momentum had on the market. Muller and Ward (2013) looked at different time frames (1, 3, 6, 9, 12, 15, and 18 months) for the measurement of momentum. They found that the optimal timeframe was 12 months with a three-month holding period (Muller & Ward, 2013). This meant that the momentum effects could still be noted after fifteen months. It was for this reason that the time frame was then extended beyond the 15 months to

ensure that momentum was taken into consideration. Piotroski (2000) looked at a three-year investment window before seeing positive returns. For the comparison of market growth to industry growth, data of the Johannesburg ALSI and the industry sectors were collected from the year 2000, in other words, three years prior to the end of the multi-bagger defined period. This was then used to establish if the industry growth affected the selection of the multi-bagger companies. To ensure that the growth of the industry and the market (ALSI) is comparable, the data was normalised at the start of the evaluation period. Normalisation was done by dividing the day's index price by that of the starting index price. At the end of the period, each of the indexes can be compared to each other as to how much each of them has grown compared to the starting price.

To test the second hypothesis, the sample was selected using the method described in the section 4.2.3 Sampling method and size. From the sample selection method, the number of companies in the industry was then determined and the number of companies in each portfolio defined. This was done to be able to compare the multi-bagger company with the portfolio. Fama and French (2004) reported a size (market capitalisation) effect on the expected return. When the companies were grouped by size, the smaller companies had a higher return than predicted by the CAPM and the bigger companies had a lower return predicted by CAPM. The style factor was averaged (with a size weighting) for the portfolio for comparison to the multi-bagger.

At each time interval, the style of the multi-bagger was compared to the style of the industry portfolio. The number of times that the multi-bagger had a higher value than that of the industry portfolio was then summed and divided by the number of years (15) in the interval. This faction was then converted into a percentage. If the number was greater than 50% (the of times that the multi-bagger was greater than the industry portfolio was more than 50% of the time), then the multi-bagger was classified as being greater than that of the portfolio for the period.

Each of the style metrics within the hypothesis followed the same approach as described above to test if the multi-bagger had outperformed the market.

4.2.7 Limitations

The limitation section of the research will examine how the selected method has limited the results of the paper. The potential limitations that could have been created due to the sampling method and technique will be assessed. This will be followed by the potential limitations of the data for validity and reliability. Each of these potential limitations of the work presented is discussed below.

Using a convenience judgemental sampling technique could potentially result in a sample selection bias. Conducting convenience judgmental sampling has created a sample selection bias (Saunders & Lewis, 2012, p. 128). One of the sample selection biases that has been created is a survivorship bias. By excluding companies that have not survived over the period a survivorship bias has been created (Bhana, 2014). This bias skews the results to show that the market has better results than there were, as it does not consider the retraction in growth due to companies falling out of the market.

Another potential limitation created by the sampling method was data dredging. Data dredging occurred as a result of retrospective analysis where the focus was to determine if the metrics for the ‘’winners’’ were valid. To overcome this potential skew, the same metrics used to define the ‘’winners’’ could be applied to all companies in the sample; the comparison between the total sample and the ‘’winner’’ sample should indicate the validity of this method in defining the winners. Another aspect to data dredging is the time frame that was selected. The results of the study are accurate based on the methods described above; however, if a different period had been selected, in other words, if the multi-bagger period had not been selected from the start of 2003 to the end of 2017, different results may have been seen. This provides an opportunity for additional research to be done using the same method, however selecting a different multi-bagger period.

A potential limitation to the data validity on the market capitalisation was created by selecting a yearly interval for the data collection. The market capitalisation of the companies changes daily, with changes in the share price. Selecting a point has caused the data validity to decrease as the data could have been collected when there was a spike up or down in the share price. Another factor that could have affected the data validity was the removal of companies that did not survive or were started over the period.

In Hypothesis 2, the method used for confirming if the multi-bagger company met the criteria was if more than 50% of the multi-bagger data points were greater than that of the industry portfolio, as described in section 4 Research methodology and design. Using this method of analysis may have caused a type I or a type II statistical error. A better method would have been to use the significance (P-value) from a paired two-sample t-test. This would mean that the null hypothesis would not have been rejected or accepted when the difference in the means was not significant. The result that would have negated this error would have been to fail to reject the null hypothesis as significance was less than the 95% confidence level.

5 Results

Data were collected from IRESS as described in section 4 Research methodology and design and analysed. The sample frame contained a total of 816 companies. The industry index financial ratio data were used to define the sample frame. This allowed for the establishment of the number of companies delisted due to merger events, bankruptcy or suspension of trading by the regulatory authorities (Kyriazis & Christou, 2013) and companies that had listed over the multi-bagger period (2003 to 2017). Of these companies, 665 were removed as they did not survive over the whole period or they started after the start of the multi-bagger analysis period. Of the 151 companies remaining, 47 of them were removed from the sample frame as they did not have a complete data set. Of the 47 companies removed for having incomplete data, ten of these were multi-bagger companies. This left 104 companies in the sample for analysis. Below is a description of each of the industries and how the sample was made up.

Table 5-1 shows the summary of the number of companies at the start of each sample frame and the number of companies remaining after each of the sample selection steps was taken. For the companies that were removed from the sample frame refer to section 9.2 Appendix 2 – Companies removed from the sample frame.

Table 5-1: Summary of the results of the sample selection method used for the different industries

Industrial index	Number of companies			Number of multi-baggers		
	in the index	existing over the period	with a complete data set	in the index	removed	in sample
Oil & gas	15	1	0	-	-	-
Basic Materials	162	28	20	1	0	1
Industrial	126	34	25	4	1	3
Consumer goods	68	12	10	0	0	0
Healthcare	27	2	2	1	0	1
Consumer services	126	26	24	8	1	7
Telecommunications	10	2	1	0	0	0
Utilities	2	0	-	-	-	-
Financials	216	36	11	11	8	3
Technology	64	10	10	5	0	5
Totals	816	151	104	30	10	20

The following sections present the results as explored in relation to hypothesis 1 and hypothesis 2.

5.1 Hypothesis 1

Hypothesis 1 proposed a null hypothesis that all multi-bagger (MB) companies would meet the defined style metrics, and the alternate hypothesis was that they would not all meet the style metrics.

5.1.1 Oil and Gas industry (ICB code 0001)

Within the sample frame for the Oil and Gas industry, no multi-bagger company was found.

5.1.1.1 P/E ratio, size and leverage

There were no companies in the Oil and Gas industry sample frame and no multi-bagger company to evaluate for P/E ratio, size and leverage over the period.

5.1.1.2 Growth

The analysis of whether the Oil and Gas industry index had grown at a faster rate than that of the JSE ALSI is presented graphically in Figure 1. The index share price was normalised and plotted over time. The data collected from IRESS showed that from the start of the growth evaluation period (start of the year 2000 to the end of the year 2012), until the 14th of January 2012, the growth for the Oil and Gas index remained constant.

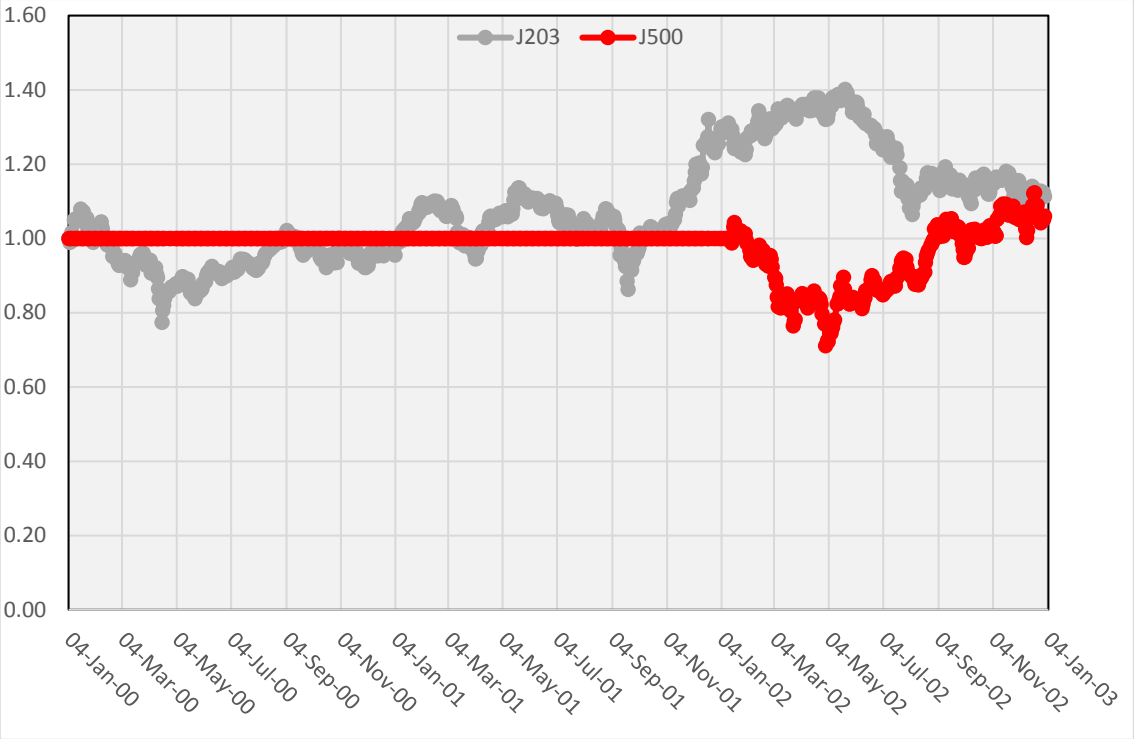

Figure 1: Oil and Gas industry index (J500) growth versus the ALSI (J203) growth over the period 4 January 2000 to 31 December 2002

Figure 1 shows that over the evaluation period, the growth in the Oil and Gas industry did not exceed that of the ALSI. At the end of the period, the ALSI was found to have increased to 1.11 times the value at the start of the period, while the Oil and Gas industry index had increased by 1.06 times. It was concluded that the Oil and Gas industry index had not grown at a faster rate than that of the ALSI over that period.

5.1.2 Basic Materials industry (ICB code 1000)

In the Basic Materials industry index (ICB 1000 or J510), one multi-bagger company was found. The multi-bagger was found to be ASSORE. The multi-bagger company is highlighted in Table 5-2.

5.1.2.1 P/E ratio

The P/E ratios of the companies in the Basic Materials industry index sample for the year 2002 were ranked in ascending order and are shown in Table 5-2. Table 5-2 shows that Assore was ranked 7 out of 20, thus classifying the company as a value company.

Table 5-2: P/E ratios ranking for the Basic Materials industry index (J510) sample

Company name	P/E ratio	Rank	Description
AECI	7.47	9	
AFROX	10.5	12	
ARM	20.99	15	
AMPLATS	12.18	13	
ANGLO	100.06	17	
ARCMITTAL	25.47	16	
ASSORE	7.2	7	Ranked 7 of 20 – Value
BHPBILL	171.53	20	
EXXARO	13.14	14	
HWANGE	0.05	2	
IMPLATS	8.38	10	
LONMIN	118.34	18	
MERAFE	-69.44	1	
NORTHAM	10.29	11	
OMNIA	3.46	3	
SAPPI	123.88	19	
SASOL	7.11	6	
SPANJAARD	4.22	4	
TRNSHEX	7.2	7	
UNICORN	4.72	5	

5.1.2.2 Size

The market capitalisation of the companies in the Basic Materials industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-3.

Table 5-3 shows that ASSORE was ranked 7 out of 20, thus classifying the company as a small market capitalisation company within the Basic Materials industry.

Table 5-3: Market capitalisation ranking for the Basic Materials industry index (J510) sample

Company name	Market capitalisation	Rank	Description
AECI	2 658 660 804	8	
AFROX	4 789 361 716	11	
ARM	4 429 397 556	9	
AMPLATS	67 904 205 732	17	
ANGLO	185 817 049 093	20	
ARCMITTAL	9 472 232 805	12	
ASSORE	2 240 000 000	7	Ranked 7 of 20 – Small Market Capitalisation
BHPBILL	111 190 022 440	19	
DELTA	9 666 139 172	13	
EXXARO	10 133 395	2	
HWANGE	36 277 421 965	16	
IMPLATS	16 916 130 600	14	
LONMIN	964 209 263	5	
MERAFE	4 445 107 200	10	
NORTHAM	733 004 550	4	
OMNIA	27 373 731 634	15	
SAPPI	70 164 782 625	18	
SASOL	8 550 000	1	
TRNSHEX	1 691 943 838	6	
UNICORN	67 959 430	3	

5.1.2.3 Leverage

The leverage of the companies in the Basic Materials industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-4. Table 5-4 shows that ASSORE is ranked 3 out of 20, thus classifying the company as a company with low leverage within the Basic Materials industry.

Table 5-4: Leverage ranking for the Basic Materials industry index (J510) sample

Company name	Leverage	Rank	Description
AECI	0.58	18	
AFROX	0.43	14	
ARM	0.41	13	
AMPLATS	0.27	6	
ANGLO	0.39	11	
ARCMITTAL	0.30	7	
ASSORE	0.23	3	Ranked 3 of 20 – Low leverage
BHPBILL	0.40	12	
DELTA	0.33	8	
EXXARO	0.63	19	
HWANGE	0.26	5	
IMPLATS	0.24	4	
LONMIN	0.51	16	
MERAFE	0.06	1	
NORTHAM	0.48	15	
OMNIA	0.51	16	
SAPPI	0.36	10	
SASOL	0.64	20	
TRNSHEX	0.22	2	
UNICORN	0.34	9	

5.1.2.4 Growth

The results of comparing the growth of the Basic Materials industry index to the ALSI over the period 4 January 2000 to 31 December 2002 are presented graphically in Figure 2. Figure 2 shows that the Basic Materials industry index grew at a faster rate than that of the ALSI. At the end of the period, the ALSI was found to have increased to 1.11 times the value at the start of the period while the Basic Materials industry index had increased by 1.97 times. Thus, the Basic Materials industry index had grown at a faster rate than that of the ALSI over that period.

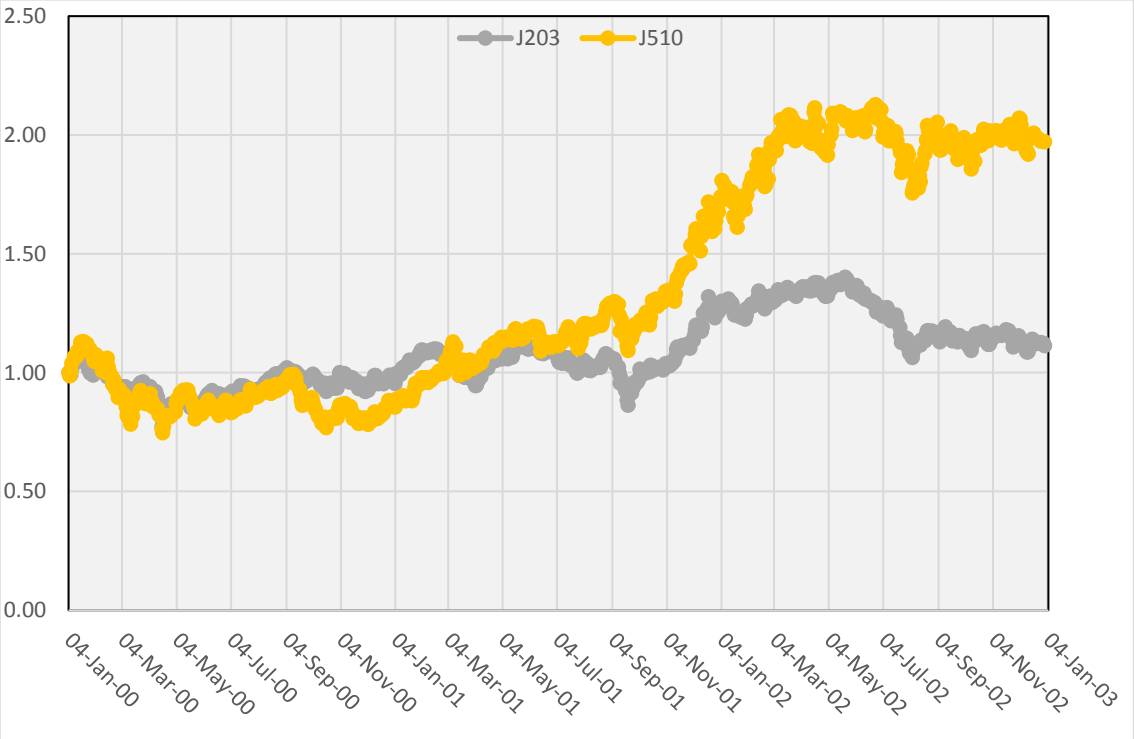

Figure 2: Basic Materials industry index (J510) growth versus the ALSI (J203) growth over the period 4 January 2000 to 31 December 2002

5.1.3 Industrial industry (ICB code 2000)

In the Industrial industry index (ICB 2000 or J520), four multi-bagger companies were found. The one multi-bagger company (MICROMEGA) was removed from the list of multi-baggers as it did not have a complete data set. The remaining multi-bagger companies were HOWDEN, METROFILE and ONCELOGIX. The multi-bagger companies are highlighted in Table 5-5.

5.1.3.1 P/E ratio

The P/E ratios of the companies in the Industrials industry index sample for the year 2002 were ranked in ascending order and are shown in Table 5-5. Table 5-5 shows that the three multi-bagger companies are ranked 12, 22 and 25 out of 25 companies. From the ranking of the multi-bagger companies, it can be seen in Table 5-5 that two of the companies (HOWDEN and ONELOGIX) are classified as growth companies. Whereas the multi-bagger company METROFILE is classified as a value company.

Table 5-5: P/E ratios ranking for the Industrial industry index (J520) sample

Company name	P/E ratio	Rank	Description
ARGENT	3.16	3	
AVENG	7.34	14	
BARWORLD	9.44	20	
BELL	7.20	13	
CARGO	2.56	2	
DAWN	5.59	10	
ELBGROUP	13.14	24	
GRINDROD	3.99	5	
GROUP 5	3.43	4	
HOWDEN	10.38	22	Ranked 22 of 25 – Growth
HUDACO	5.26	8	
IMPERIAL	8.93	18	
INVICTA	4.98	6	
LABAT	1.93	1	
METROFILE	6.29	12	Ranked 12 of 25 – Value
M&R HLD	5.94	11	
NAMPAK	9.77	21	
ONELOGIX	36.67	25	Ranked 25 of 25 – Growth
PPC	9.41	19	
REMGRO	7.55	15	
REUNERT	8.37	17	
SUPRGRP	8.19	16	
BIDVEST	11.39	23	
VALUE	5.38	9	
WBHO	5.10	7	

5.1.3.2 Size

The market capitalisation of the companies in the Industrial index sample for the year 2002 ranked in ascending order and is shown in Table 5-6. Table 5-6 shows that the multi-bagger companies were ranked 1, 3 and 9 out of 25, thus classifying each company as a small market capitalisation company within the industrial industry.

Table 5-6: Market capitalisation ranking for the Industrial industry index (J520) sample

Company name	Market capitalisation	Rank	Description
ARGENT	173 762 895	8	
AVENG	3 961 459 080	17	
BARWORLD	13 030 014 438	23	
BELL	899 701 680	15	
CARGO	48 000 000	2	
DAWN	105 830 864	6	
ELBGROUP	101 508 000	4	
GRINDROD	291 543 728	10	
GROUP 5	555 476 323	13	
HOWDEN	53 897 869	3	Ranked 3 of 25 – Small Market Capitalisation
HUDACO	532 171 027	12	
IMPERIAL	11 906 233 350	22	
INVICTA	393 352 221	11	
LABAT	101 696 731	5	
METROFILE	214 824 497	9	Ranked 9 of 25 – Small Market Capitalisation
M&R HLD	4 215 036 261	19	
NAMPAK	9 063 404 496	21	
ONELOGIX	16 474 324	1	Ranked 1 of 25 – Small Market Capitalisation
PPC	5 471 092 270	20	
REMGRO	30 113 956 935	25	
REUNERT	4 048 470 814	18	
SUPRGRP	2 096 758 254	16	
BIDVEST	14 066 457 030	24	
VALUE	107 951 500	7	
WBHO	566 003 100	14	

5.1.3.3 Leverage

The leverage of the companies in the Industrial industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-7. Table 5-7 shows that the multi-bagger companies were ranked 11, 23 and 25 out of 25. HOWDEN, with a rank of 11 out of 27, had a low leverage compared to the industrial industry. Whereas, METROFILE and ONELOGIX that were ranked 23 and 25 out of 25, had a high leverage compared to that of the industrial industry.

Table 5-7: Leverage ranking for Industrial industry index (J520) sample

Company name	Leverage	Rank	Description
ARGENT	0.49	6	
AVENG	0.75	22	
BARWORLD	0.57	15	
BELL	0.46	4	
CARGO	0.45	3	
DAWN	0.56	13	
ELBGROUP	0.54	9	
GRINDROD	0.69	19	
GROUP 5	0.83	24	
HOWDEN	0.55	11	Ranked 11 of 25 – Low leverage
HUDACO	0.50	7	
IMPERIAL	0.54	9	
INVICTA	0.55	11	
LABAT	0.47	5	
METROFILE	0.93	25	Ranked 25 of 25 – High leverage
M&R HLD	0.53	8	
NAMPAK	0.64	18	
ONELOGIX	0.80	23	Ranked 23 of 25 – High leverage
PPC	0.28	2	
REMGRO	0.05	1	
REUNERT	0.71	20	
SUPRGRP	0.61	17	
BIDVEST	0.57	15	
VALUE	0.56	13	
WBHO	0.73	21	

5.1.3.4 Growth

The results of comparing whether the Industrial industry index had grown at a faster rate than that of the ALSI over the period 4 January 2000 to 31 December 2002 are presented graphically in Figure 3. Figure 3 shows that over that period the Industrial industry index had not grown at a faster rate than that of the ALSI, but it had tracked the ALSI. At the end of that period, the ALSI was found to have increased to 1.11 times the value at the start of the period while the Industrials index had increased by 1.26 times. Thus, the Industrial industry index had grown at a faster rate than that of the ALSI over that period.

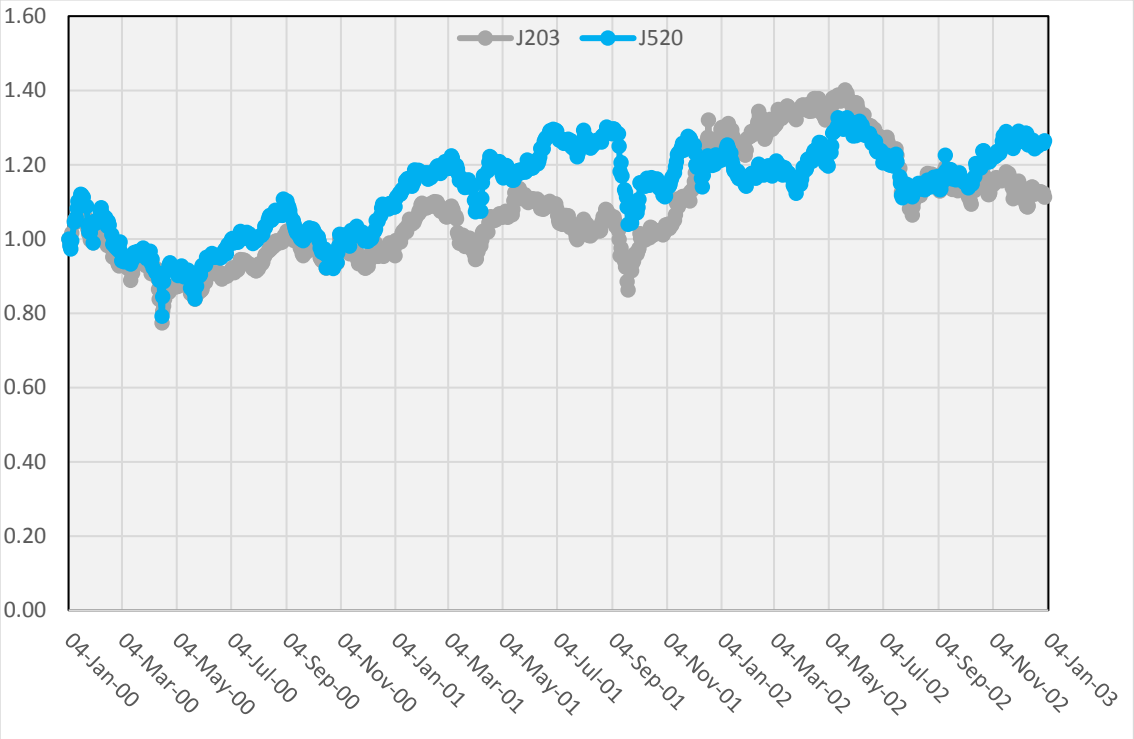

Figure 3: Industrial industry index (J520) growth versus the ALSI (J203) growth over the period 4 January 2000 to 31 December 2002

5.1.4 Consumer Goods industry (ICB code 3000)

In the Consumer Goods industry index (ICB 3000 or J530), no multi-bagger was found in the sample.

5.1.4.1 P/E ratio, size and leverage

There were no multi-bagger companies found in the Consumer Goods industry sample. Thus, there were no multi-bagger companies to evaluate for their P/E ratio, size and leverage over the period.

5.1.4.2 Growth

The results of comparing whether the Consumer Goods industry index had grown at a faster rate than that of the ALSI over the period 4 January 2000 to 31 December 2002 are presented graphically in Figure 4. Figure 4 shows that over that period the Consumer Goods industry index was higher than that of the ALSI for most of the period. However, in the last eight months of that period, the Consumer Goods index contracted and ended the period with growth lower than that of the ALSI.

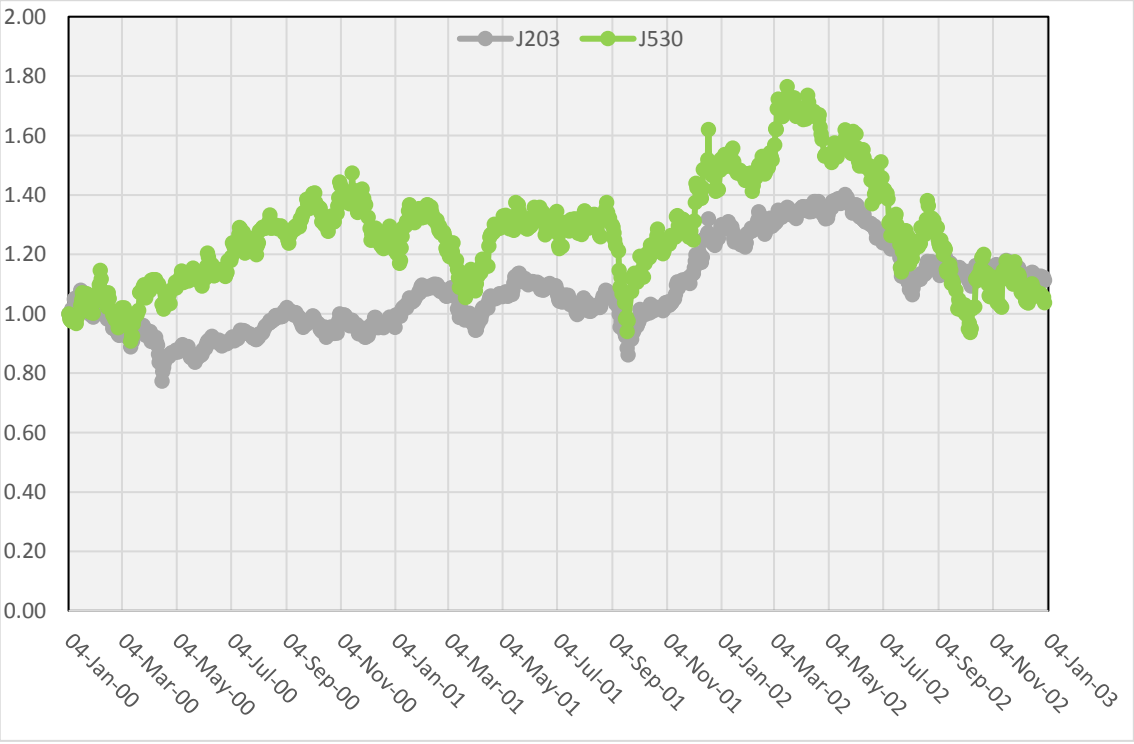

Figure 4: Consumer Goods industry index (J530) growth versus the ALSI (J203) growth over the period 4 January 2000 to 31 December 2002

At the end of the period, the ALSI was found to have increased to 1.11 times the value at the start of the period while the Consumer Goods industry index had increased by 1.04 times. Thus, the Consumer Goods industry index had not grown at a faster rate than that of the ALSI over that period.

5.1.5 Healthcare industry (ICB code 4000)

In the Healthcare industry index (ICB 4000 or J540), one multi-bagger company was found. The multi-bagger was ASPEN. The multi-bagger company has been highlighted in Table 5-8.

5.1.5.1 P/E ratio

The P/E ratios of the companies in the Healthcare industry index sample for the year 2002 were ranked in ascending order and are shown in Table 5-8. Table 5-8 shows that the multi-bagger company was ranked 2 out of 2 companies. Thus, classifying the multi-bagger company as a growth company.

Table 5-8: P/E ratios ranking for Healthcare industry index (J540) sample

Company name	P/E ratio	Rank	Description
ASPEN	11.55	2	Ranked 2 of 2 – Growth
NETCARE	8.07	1	

5.1.5.2 Size

The market capitalisation of the companies in the Healthcare industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-9. Table 5-9 shows that the multi-bagger company was ranked 1 out of 2, thus classifying the company as a small market capitalisation company within the Healthcare industry.

Table 5-9: Market capitalisation ranking for the Healthcare industry index (J540) sample

Company name	Market capitalisation	Rank	Description
ASPEN	2 866 938 274	1	Ranked 1 of 2 – Small Market Capitalisation
NETCARE	4 713 255 490	2	

5.1.5.3 Leverage

The leverage of the companies in the Healthcare industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-10. Table 5-10 shows that ASPEN was ranked 2 out of 2, thus classifying the company as a company with high leverage within the Healthcare industry.

Table 5-10: Leverage ranking for a Healthcare industry index (J540) sample

Company name	Leverage	Rank	Description
ASPEN	0.7	2	Ranked 2 of 2 – High leverage
NETCARE	0.46	1	

5.1.5.4 Growth

The results of comparing whether the Healthcare industry index had grown at a faster rate than that of the ALSI over the period 4 January 2000 to 31 December 2002 are presented graphically in Figure 5. Figure 5 shows that over that period the Healthcare industry index had tracked the ALSI.

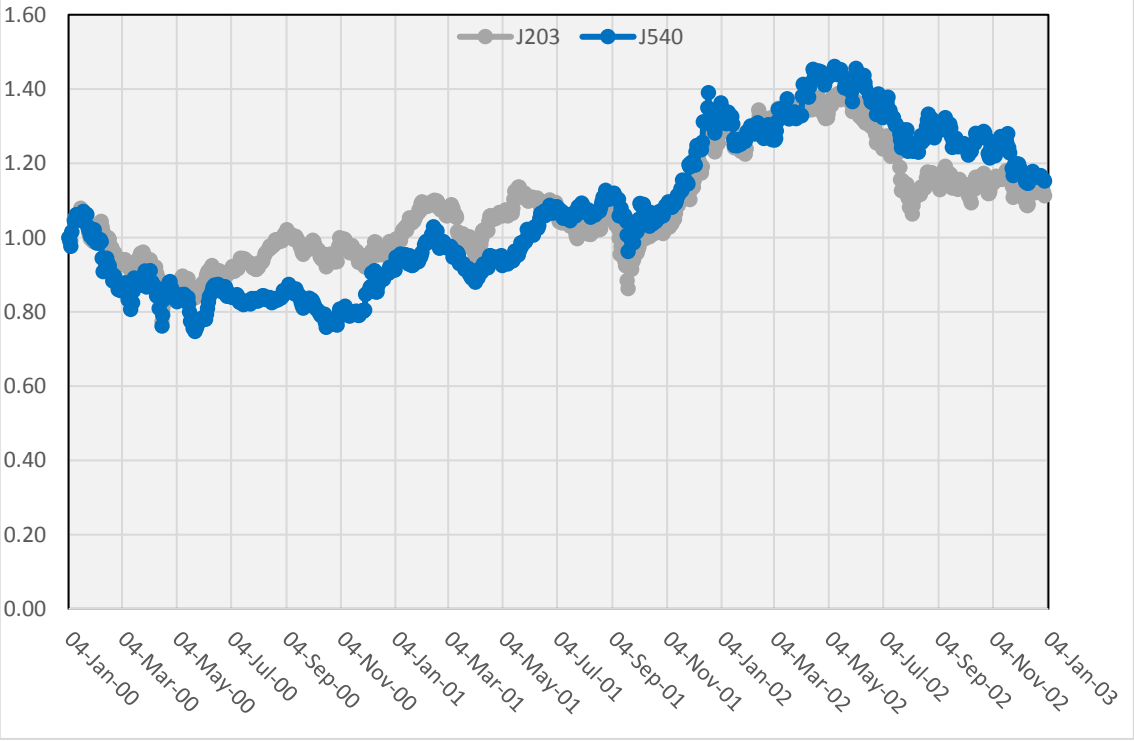

Figure 5: Healthcare industry index (J540) growth versus the ALSI (J203) growth over the period 4 January 2000 to 31 December 2002

At the end of the period, the ALSI was found to have increased to 1.11 times the value at the start of the period while the Healthcare industry index had increased by 1.15 times. Thus, the Healthcare industry index had grown at a faster rate than that of the ALSI over that period.

5.1.6 Consumer Services industry (ICB code 5000)

In the Consumer Services industry index (ICB 5000 or J550), eight multi-bagger companies were found. One of the multi-bagger companies, AME, was removed from the list of multi-baggers as it did not have a complete data set. The multi-bagger companies identified included: ADVTECH, CASHBIL, CLICKS, FAMBRANDS, MR PRICE, NASPERS and SHOPRIT. The multi-bagger companies are highlighted in Table 5-11.

5.1.6.1 P/E ratio

The P/E ratios of the companies in the Consumer Services industry index sample for the year 2002 were ranked in ascending order and are shown in Table 5-11. Table 5-11 shows that the seven multi-bagger companies were ranked 1, 4, 7, 8, 10, 16, and 19 out of 24 companies. From the ranking of the multi-bagger companies, it can be seen in Table 5-11 that five of the companies (ADVETECH, CASHBIL, FAMBRANDS, MR PRICE, and NASPERS) were classified as value companies. Whereas the multi-bagger companies SHOPRIT and CLICKS were classified as growth companies.

Table 5-11: P/E ratios ranking for the Consumer Services industry index (J550) sample

Company name	P/E ratio	Rank	Description
ADVTECH	6.60	8	Ranked 8 of 24 – Value
CASHBIL	3.96	4	Ranked 4 of 24 – Value
CAXTON	10.78	18	
CITYLDG	8.39	13	
CLICKS	9.26	16	Ranked 16 of 24 – Growth
COMAIR	20.83	23	
CMH	5.02	5	
E MEDIA N	3.00	3	
FAMBRANDS	6.24	7	Ranked 7 of 24 – Value
ITLTILE	8.83	14	
MASSMART	7.49	11	
MR PRICE	7.45	10	Ranked 10 of 24 – Value
NASPERS-N-	-4.32	1	Ranked 1 of 24 – Value
NICTUS	18.92	22	
PHUMELELA	0.52	2	
PICKNPAY	13.53	20	
REX TRUE	14.51	21	
SHOPRIT	11.20	19	Ranked 19 of 24 – Growth
SPURCORP	6.80	9	
SUNINT	48.07	24	
TFG	7.95	12	
TRUWTHS	8.93	15	
TSOGO SUN	5.69	6	
WOOLIES	9.73	17	

5.1.6.2 Size

The market capitalisation of the companies in the Consumer Services industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-12. Table 5-12 shows that the seven multi-bagger companies were ranked 3, 4, 6, 14, 16, 21, and 24 out of 24 companies. From the ranking of the multi-bagger companies, it can be seen in Table 5-12 that three of the companies (ADVETECH, CASHBIL and FAMBRANDS) were classified as small companies. Whereas the multi-bagger companies SHOPRIT, CLICKS, MR PRICE and NASPERS were classified as large companies.

Table 5-12: Market capitalisation ranking for the Consumer Services industry index (J550) sample

Company name	Market capitalisation	Rank	Description
ADVTECH	157 465 954	4	Ranked 4 of 24 – Small Market Capitalisation
CASHBIL	209 071 260	6	Ranked 6 of 24 – Small Market Capitalisation
CAXTON	2 687 952 406	17	
CITYLDG	704 744 090	12	
CLICKS	2 465 225 770	16	Ranked 16 of 24 – Large Market Capitalisation
COMAIR	390 600 000	10	
CMH	238 516 200	7	
E MEDIA N	320 146 164	8	
FAMBRANDS	94 189 854	3	Ranked 3 of 24 – Small Market Capitalisation
ITLTILE	1 195 346 112	13	
MASSMART	3 620 426 103	20	
MR PRICE	1 312 685 424	14	Ranked 14 of 24 – Large Market Capitalisation
NASPERS-N-	6 923 216 680	24	Ranked 24 of 24 – Large Market Capitalisation
NICTUS	42 754 800	2	
PHUMELELA	168 000 684	5	
PICKNPAY	6 429 803 630	23	
REX TRUE	11 623 220	1	
SHOPRIT	3 858 704 166	21	Ranked 21 of 24 – Large Market Capitalisation
SPURCORP	322 188 348	9	
SUNINT	2 395 338 139	15	
TFG	2 741 679 947	18	
TRUWTHS	3 147 830 673	19	
TSOGO SUN	587 240 032	11	
WOOLIES	4 777 728 809	22	

5.1.6.3 Leverage

The leverage of the companies in the Consumer Services industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-13. Table 5-13 shows that the seven multi-bagger companies were ranked 8, 14, 15, 17, 20, 21 and 24 out of 24 companies. From the ranking of the multi-bagger companies, it can be seen in Table 5-12 that seven of the companies (ADVETECH, CASHBIL SHOPRIT, CLICKS, NASPERS and FAMBRANDS) were classified as high leverage companies. Whereas the multi-bagger company MR PRICE was classified as a low leverage company.

Table 5-13: Leverage ranking for the Consumer Services industry index (J550) sample

Company name	Leverage	Rank	Description
ADVTECH	0.56	17	Ranked 17 of 24 – High leverage
CASHBIL	0.75	21	Ranked 21 of 24 – High leverage
CAXTON	0.18	3	
CITYLDG	0.22	5	
CLICKS	0.54	15	Ranked 15 of 24 – High leverage
COMAIR	0.48	13	
CMH	0.67	18	
E MEDIA N	0.55	16	
FAMBRANDS	0.52	14	Ranked 14 of 24 – High leverage
ITLTILE	0.39	8	
MASSMART	0.76	22	
MR PRICE	0.39	8	Ranked 8 of 24 – Low leverage
NASPERS-N-	0.86	24	Ranked 24 of 24 – High leverage
NICTUS	0.68	19	
PHUMELELA	0.46	12	
PICKNPAY	0.83	23	
REX TRUE	0.15	1	
SHOPRIT	0.69	20	Ranked 20 of 24 – High leverage
SPURCORP	0.19	4	
SUNINT	0.40	10	
TFG	0.34	6	
TRUWTHS	0.16	2	
TSOGO SUN	0.41	11	
WOOLIES	0.34	6	

5.1.6.4 Growth

The results of comparing whether the Consumer Services care industry index had grown at a faster rate than that of the ALSI over the period 4 January 2000 to 31 December 2002 are presented graphically in Figure 6. Figure 6 shows that over that period the Consumer Services industry index had not grown at a faster rate than that of the ALSI. It had underperformed compared to the ALSI for that period. At the end of the period, the ALSI was found to have increased to 1.11 times the value at the start of that period while the Consumer Services industry index had decreased by 0.62 times. Thus, the Consumer Services industry index had not grown at a faster rate than that of the ALSI over that period.

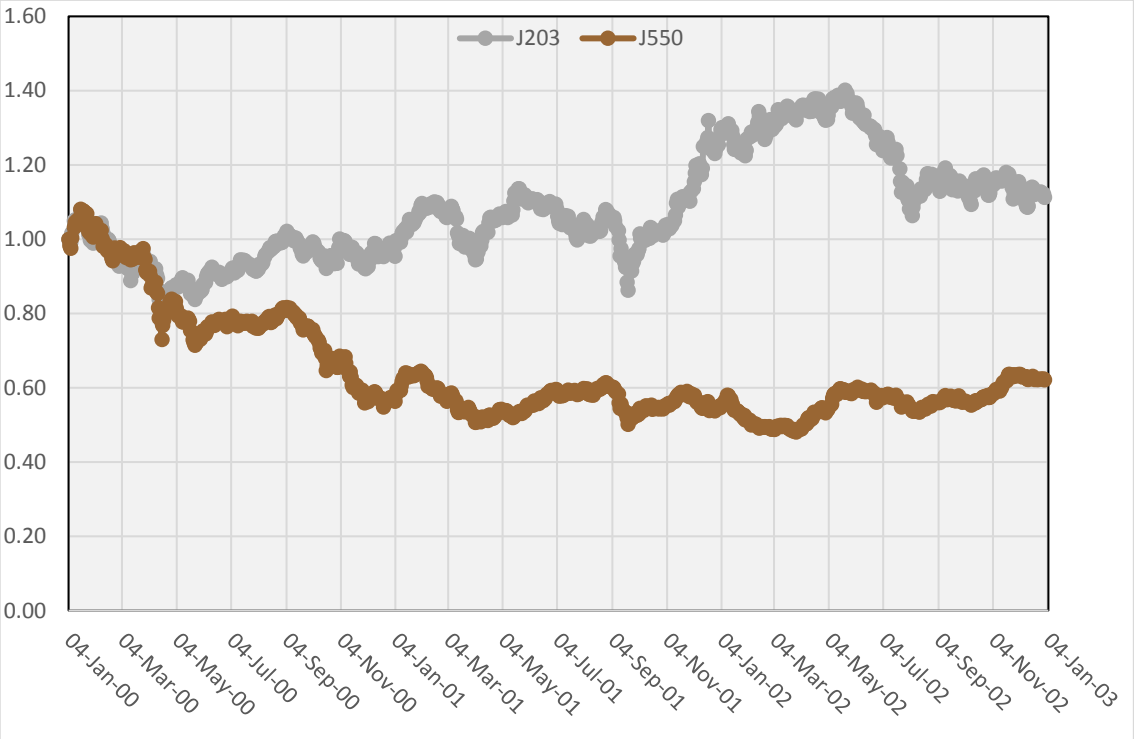

Figure 6: Consumer Services industry index (J550) growth versus the ALSI (J203) growth over the period 4 January 2000 to 31 December 2002

5.1.7 Telecommunication industry (ICB code 6000)

In the Telecommunication industry index (ICB 6000 or J560), no multi-bagger was found in the sample.

5.1.7.1 P/E ratio, size and leverage

No multi-bagger companies were found in the Telecommunication industry sample. Thus, there were no multi-bagger companies to evaluate for their P/E ratio, size and leverage over the period.

5.1.7.2 Growth

The results of comparing whether the Telecommunication industry index had grown at a faster rate than that of the ALSI over the period 4 January 2000 to 31 December 2002 are presented graphically in Figure 7. Figure 7 shows that over that period the Telecommunication industry index was higher than that of the ALSI. However, since November 2000, the Telecommunication industry had been contracting and ended the period with growth lower than that of the ALSI.

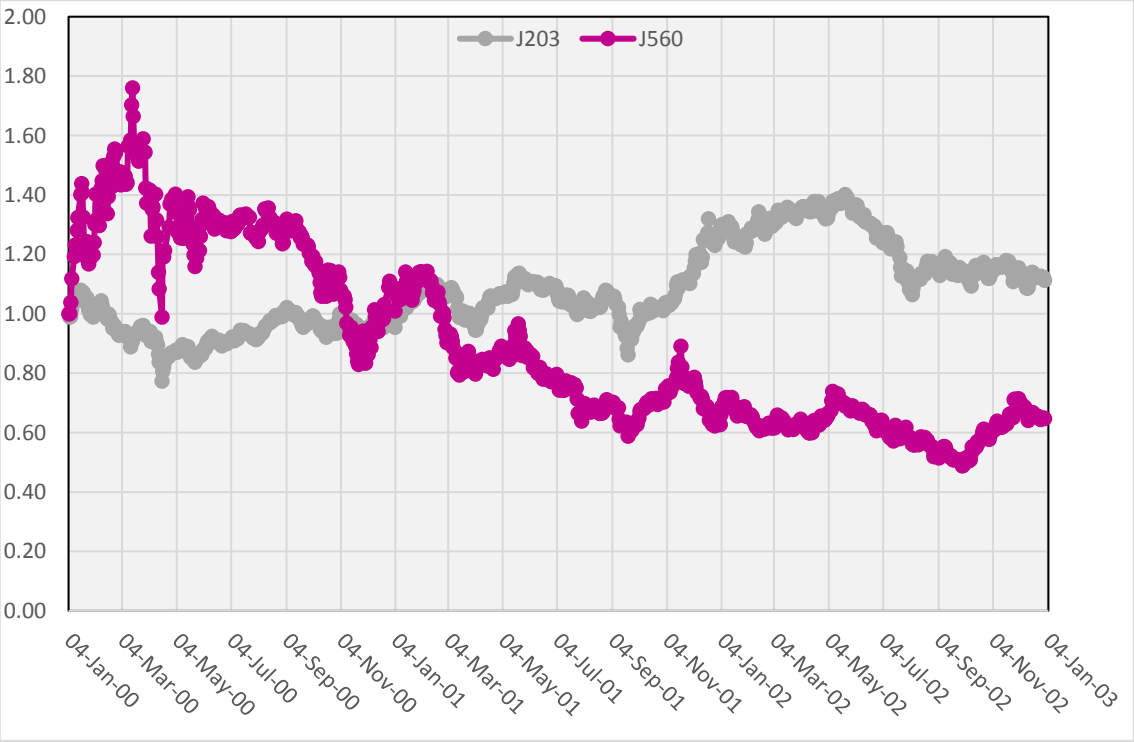

Figure 7: Telecommunication industry index (J560) growth versus the ALSI (J203) growth over the period 4 January 2000 to 31 December 2002

At the end of the period, the ALSI was found to have increased to 1.11 times the value at the start of the period while the Telecommunication industry index had decreased by 0.65 times. Thus, the Telecommunication industry index had not grown at a faster rate than that of the ALSI over the period.

5.1.8 Utilities industry (ICB code 7000)

In the Utilities industry index (ICB 7000 or J570), no multi-bagger was found.

5.1.8.1 P/E ratio, size and leverage

There were no multi-bagger companies found in the Utilities industry sample. Thus, there were no multi-bagger companies to evaluate for their P/E ratio, size and leverage over the period.

5.1.8.2 Growth

Over the defined period (start of 2000 to the end of 2017) IRESS did not have any data for the Utilities industry index. This was checked against two other sources, namely, IRESS expert and Sharenet. Both alternate sources did not have any data for the Utilities industry index.

5.1.9 Financial industry (ICB code 8000)

In the Financial industry index (ICB 8000 or J580), eleven multi-bagger companies were found. Eight of those multi-bagger companies (ADRENNA, CAPITEC, CONDUIT, CORONAT, PSG, RESILIENT, SABVSET and SABVSET -N-) were removed from the list of multi-baggers as they did not have a complete data set. The remaining multi-bagger companies were DISCOVERY, HCL and PERGRIN. The multi-bagger companies are highlighted in Table 5-14.

5.1.9.1 P/E ratio

The P/E ratios of the companies in the Financial industry index sample for the year 2002 were ranked in ascending order and are shown in Table 5-14. Table 5-14 shows that the three multi-bagger companies were ranked 2, 5 and 11 out of 12 companies. From the ranking of the multi-bagger companies, it can be seen in Table 5-14, that HCL and PERGRIN were classified as value companies. Whereas the multi-bagger company DISCOVERY was classified as a growth company.

Table 5-14: P/E ratios ranking for the Financial industry index (J580) sample

Company name	P/E ratio	Rank	Description
AFDAWN	5.00	6	
AEEI	1.15	3	
BRIMSTN-N-	3.92	4	
DISCOVERY	13.3	11	Ranked 11 of 12 – Growth
GROWPNT	5.82	8	
HCI	-5.76	2	Ranked 2 of 12 – Value
HYPROP	7.96	9	
INTUPLC	319.41	12	
LIB HOLD	12.88	10	
MMI HLDGS	-12.83	1	
OCTODEC	5.46	7	
PERGRIN	4.75	5	Ranked 5 of 12 – Value

5.1.9.2 Size

The market capitalisation of the companies in the Financial industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-15. Table 5-15 shows that the multi-bagger companies were ranked 5, 7 and 9 out of 12. PERGRIN, with a rank of 5 out of 12, had a small market capitalisation compared to the Financial industry. Whereas, HCL and DISCOVERY, ranked 7 and 9 out of 11, had large market capitalisation compared to that of the Financial industry.

Table 5-15: Market capitalisation ranking for the Financial industry index (J580) sample

Company name	Market capitalisation	Rank	Description
AFDAWN	4 544 980	1	
AEEI	35 542 427	2	
BRIMSTN-N-	87 263 613	3	
DISCOVERY	2 890 627 190	9	Ranked 9 of 12 – Large Market Capitalisation
GROWPNT	1 802 289 910	8	
HCI	874 502 301	7	Ranked 7 of 12 – Large Market Capitalisation
HYPROP	744 273 997	6	
INTUPLC	24 628 065 530	12	
LIB HOLD	7 394 928 000	11	
MMI HLDGS	4 117 899 983	10	
OCTODEC	173 814 330	4	
PERGRIN	612 789 392	5	Ranked 5 of 12 – Small Market Capitalisation

5.1.9.3 Leverage

The leverage of the companies in the Financial industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-16. Table 5-16 shows that the multi-bagger companies were ranked 5, 7 and 9 out of 12. PERGRIN, with a rank of 8 out of 12, had a high leverage compared to the Financial industry. Whereas, HCL and DISCOVERY, ranked 3 and 4 out of 12, had a low leverage compared to that of the Financial industry.

Table 5-16: Leverage ranking for the Financial industry index (J580) sample

Company name	Leverage	Rank	Description
AFDAWN	0.31	6	
AEEI	0.83	10	
BRIMSTN-N-	0.30	4	
DISCOVERY	0.30	4	Ranked 4 of 12 – Low leverage
GROWPNT	1.00	12	
HCI	0.25	3	Ranked 3 of 12 – Low leverage
HYPROP	0.62	9	
INTUPLC	0.43	7	
LIB HOLD	0.04	1	
MMI HLDGS	0.04	1	
OCTODEC	0.90	11	
PERGRIN	0.55	8	Ranked 8 of 12 – High leverage

5.1.9.4 Growth

The results of comparing whether the Financial industry index had grown at a faster rate than that of the ALSI over the period 4 January 2000 to 31 December 2002 are presented graphically in Figure 8. Figure 8 shows that over that period, the Financial industry index had not grown at a faster rate than that of the ALSI. At the end of that period, the ALSI was found to have increased to 1.11 times the value at the start of the period while the Financial industry index had decreased by 0.83 times. Thus, the Financial industry index had not grown at a faster rate than that of the ALSI over that period.

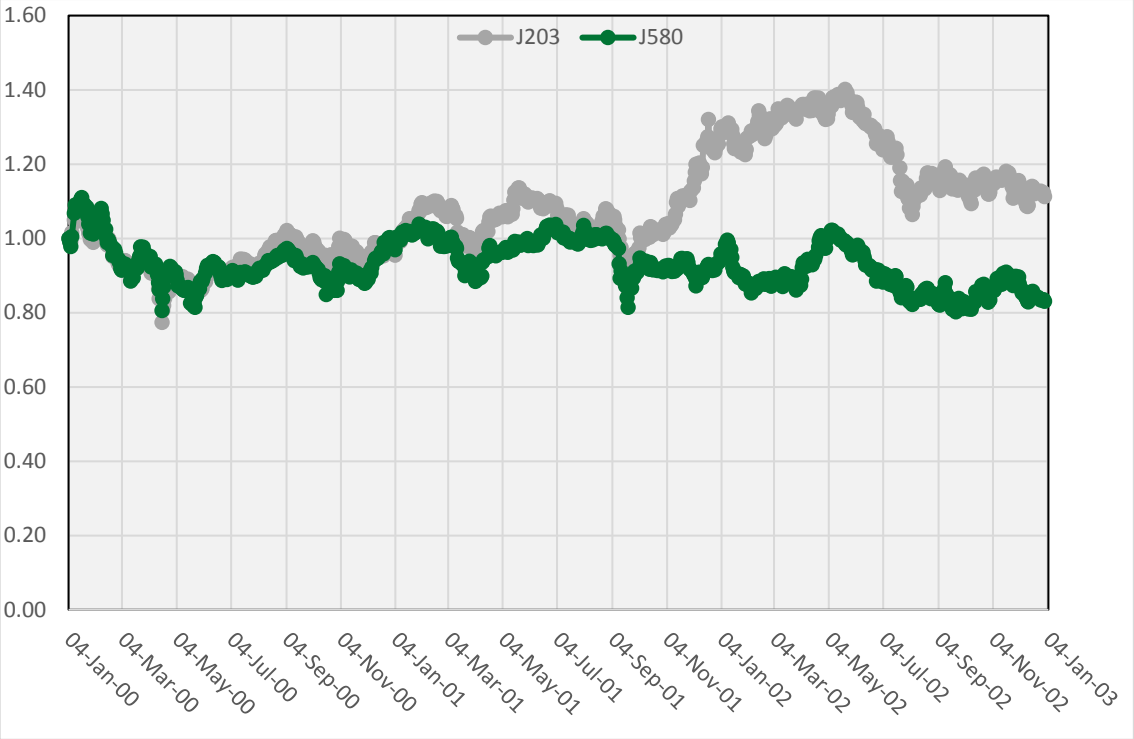

Figure 8: Financial industry index (J580) growth versus the ALSI(J203) growth over the period 4 January 2000 to 31 December 2002

5.1.10 Technology industry (ICB code 9000)

In the Technology industry index (ICB 9000 or J590), five multi-bagger companies were found. The multi-bagger companies included ADAPTIT, ALVIVA, COGNITION, EOH and ISA. The multi-bagger companies are highlighted in Table 5-17.

5.1.10.1 P/E ratio

The P/E ratios of the companies in the Technology industry index sample for the year 2002 were ranked in ascending order and are shown in Table 5-17. Table 5-17 shows that the multi-bagger companies were ranked 1, 2 ,3, 6 and 7 out of 10 companies. From the ranking of the multi-bagger companies, it can be seen in Table 5-17, that ADAPTIT and EOH were classified as growth companies. Whereas the multi-bagger companies ALVIVA, COGNITION and ISA were classified as value companies.

Table 5-17: P/E ratios ranking for the Technology industry index (J590) sample

Company name	P/E ratio	Rank	Description
ADAPTIT	3.77	6	Ranked 6 of 10 – Growth
ALTRON A	5.94	8	
ALVIVA	2.27	3	Ranked 3 of 10 – Value
COGNITION	-2.94	1	Ranked 1 of 10 – Value
DATATEC	6.80	10	
EOH	4.39	7	Ranked 7 of 10 – Growth
ISA	-0.26	2	Ranked 2 of 10 – Value
JASCO	2.36	4	
MUSTEK	3.55	5	
SILVERB	6.25	9	

5.1.10.2 Size

The market capitalisation of the companies in the Technology industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-18. Table 5-18 shows that the multi-bagger companies were ranked 1, 3, 4, 5 and 6 out of 10. ISA, COGNITION, ALVIVA and ADAPTIT, having a rank of 1, 3, 4, 5 out of 10, had a small market capitalisation compared to the Technology industry. Whereas, EOH, ranked 6 out of 10, had a high market capitalisation compared to that of the Technology industry.

Table 5-18: Market capitalisation ranking for the Technology industry index (J590) sample

Company name	Market capitalisation	Rank	Description
ADAPTIT	22 273 736	5	Ranked 5 of 10 – Small Market Capitalisation
ALTRON A	850 273 506	9	
ALVIVA	16 346 797	4	Ranked 4 of 10 – Small Market Capitalisation
COGNITION	11 592 000	3	Ranked 3 of 10 – Small Market Capitalisation
DATATEC	929 908 323	10	
EOH	80 054 422	6	Ranked 6 of 10 – Large Market Capitalisation
ISA	1 567 601	1	Ranked 1 of 10 – Small Market Capitalisation
JASCO	82 003 457	7	
MUSTEK	439 649 595	8	
SILVERB	2 502 480	2	

5.1.10.3 Leverage

The leverage of the companies in the Technology industry index sample for the year 2002 was ranked in ascending order and is shown in Table 5-19. Table 5-19 shows that the multi-bagger companies were ranked 1, 4, 6, 8 and 10 out of 10, thus classifying the companies as low leverage companies within the financial industry. ADAPTIT and ALVIVA, with ranks of 1 and 4 out of 10, had low leverage compared to the Technology industry. Whereas, COGNITION, EOH, and ADAPTIT, ranked 6, 8 and 10 out of 10, had high leverage compared to that of the technology industry.

Table 5-19: Leverage ranking for the Technology industry index (J590) sample

Company name	Leverage	Rank	Description
ADAPTIT	0.27	1	Ranked 1 of 10 – Low leverage
ALTRON A	0.49	3	
ALVIVA	0.61	4	Ranked 4 of 10 – Low leverage
COGNITION	0.63	6	Ranked 6 of 10 – High leverage
DATATEC	0.62	5	
EOH	0.80	8	Ranked 8of 10 – High leverage
ISA	1.91	10	Ranked 10 of 10 – High leverage
JASCO	0.87	9	
MUSTEK	0.66	7	
SILVERB	0.33	2	

5.1.10.4 Growth

The results of comparing whether the Technology industry index had grown at a faster rate than that of the ALSI over the period 4 January 2000 to 31 December 2002 are presented graphically in Figure 9. Figure 9 shows that over that period, the Technology industry index had not grown at a faster rate than that of the ALSI. In the first four months of that period, the Technology industry index grew faster than the ALSI. However, thereafter it contracted. At the end of the period, the ALSI was found to have increased to 1.11 times the value at the start of the period, while the Technology industry index had decreased by 0.10 times. Thus, the Technology industry index had not grown at a faster rate than that of the ALSI over that period.

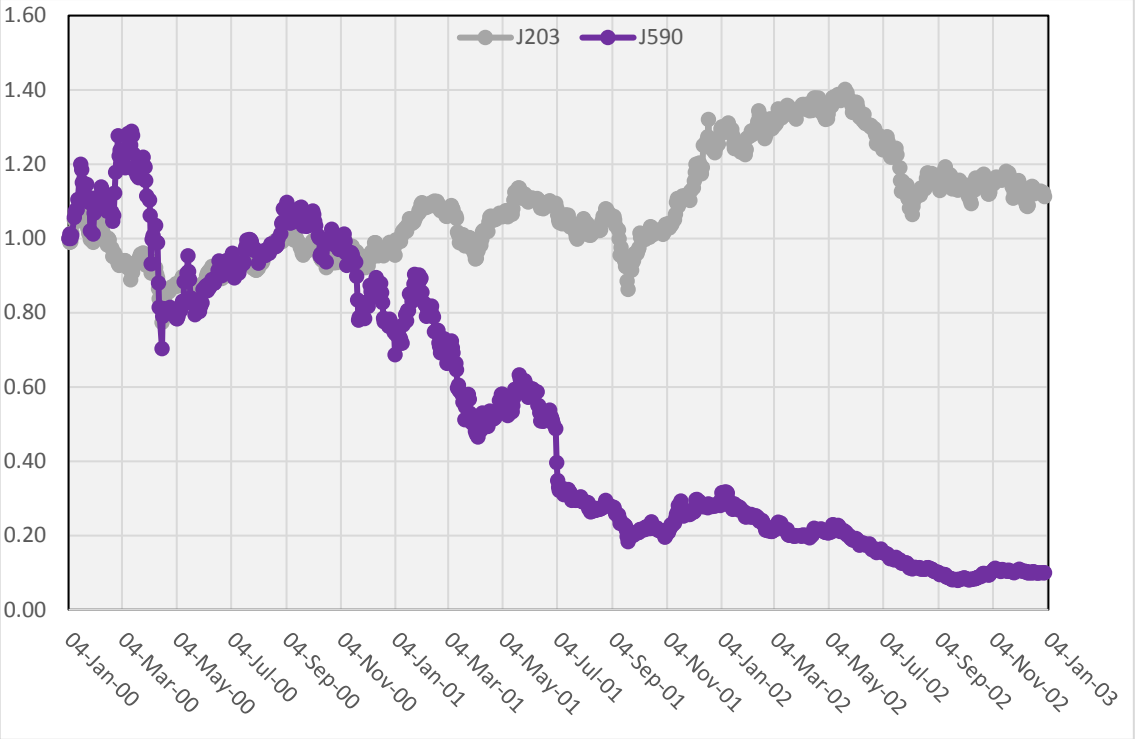

Figure 9: Technology industry index (J590) growth versus the ALSI(J203) growth over the period 4 January 2000 to 31st December 2002

5.2 Hypothesis 2

Hypothesis 2 stated that the null hypothesis was that the multi-bagger would have a greater; i) net profit margin, ii) operating profit, iii) return on assets than that of the industry average and iv) that the growth rate in the industry would be greater than that of the market. The alternate hypothesis was that the multi-bagger would not have a greater; i) net profit margin, ii) operating profit, iii) return on assets than that of the industry average and iv) that the growth rate in the industry was not greater than that of the market.

The sample for each of the different industries defined in the section above described the companies in the sample. Below are the results for each of the different industries on the JSE from the start of 2003 through to the end of 2017.

5.2.1 Oil and Gas industry (ICB code 0001)

Within the sample frame for the Oil and Gas industry, no companies in the sample and no multi-bagger companies were found.

5.2.1.1 Net profit margin, operating profit margin and Return on Assets (ROA)

There were no companies in the Oil and Gas industry sample and no multi-bagger companies to evaluate for their net profit margin, operating profit margin and ROA over the defined period.

5.2.1.2 Growth

Growth for the Oil and Gas industry index was compared to the ALSI over the multi-bagger period (January 2013 to December 2017). In the data for the J500 (Oil and Gas industry index) extracted from the IRESS database, it was found that from the 18th of July 2017 to the end of the period, the price in the data decreased by a factor multiple of ten. To confirm whether the information on and after the 18th of July 2017 was correct, IRESS expert (Figure 10) was used, as well as information from Sharenet (Table 5-20).

The graphical information in Figure 10 shows that there was no drop in the price by a factor of ten on the 18th of July 2017 to the end of the defined period.

Figure 10: IRESS expert, Oil and Gas (J500) index chart for the period 01 January 2000 to 31 December 2017 (Iress, 2018)

The data was then checked against another source of data, Sharenet, shown in Table 5-20, to confirm the anomaly in the data. The data displayed in Table 5-20 does not show a drop in the price of the index by a factor of ten from the 18th of July 2017 to the end of the period. From this information, it was concluded that there was an error in the data for from 18th of July 2017 to the end of the period. The data was then adjusted by a factor of ten to correct this error.

Table 5-20: Information gathered from Sharenet on the JSE Oil & Gas index

General Share Information	
Short Name	Jse-oilg (J500)
Long Name	Oil & Gas Index
JSE Sector	JSE Indices (00)
Period	**Close**
Month-to-date	12527
Quarter-to-date	12262
Year-to-date	7196
7 Days	12565
14 Days	12525
21 Days	12635
1 Month	12403
2 Months	12497
3 Months	12815
6 Months	7196
1 Year	7196
2 Years	7196
3 Years	8889
5 Years	3705
10 Years	2858

Note. Source of information obtained from Sharenet, 2018

The results comparing whether the Oil and Gas industry index had grown at a faster rate than that of the ALSI over the period of 2003 to 2017 are presented graphically in Figure 11. Figure 11 shows that over that period, the Oil and Gas industry index had grown at a faster rate than that of the ALSI. From 2003 until 2008 the Oil and Gas industry index tracked the ALSI. Between 2008 and 2010 the Oil and Gas index grew at a faster rate than that of the ALSI. In 2010 the Oil and Gas index contracted, bringing the index growth back to that of the ALSI. From halfway through the year 2015 to the end of the period there was a significant volatility, large growth and contraction in the Oil and Gas industry index. At the end of the period, the ALSI was found to have increased to 6.42 times the value at the start of the period, while the Oil and Gas industry index had increased by 11.83 times. Thus, the Oil and Gas industry index had grown at a faster rate than that of the ALSI over the period.

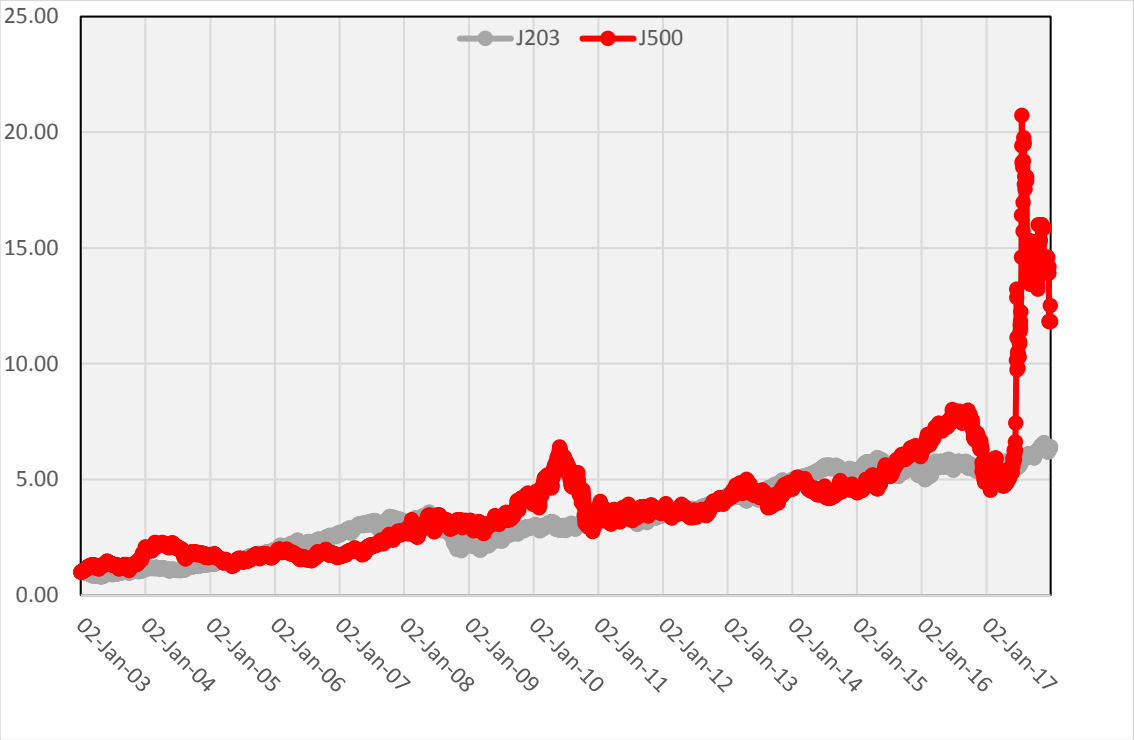

Figure 11: Oil and Gas industry index (J500) growth versus the ALSI (J203) growth over the period 3 January 2003 to 31 December 2017

5.2.2 Basic Materials industry (ICB code 1000)

There were twenty companies in the sample for the Basic Materials industry. Within the sample for the Basic Materials industry, one multi-bagger company was found. The multi-bagger was ASSORE.

ASSORE began the period with a size ranking of 7 and ended the period with a size ranking of 14, in other words, the company had grown in size (market capitalisation) compared to the rest of the companies in the industry. ASSORE started in portfolio 3 and in 2010 moved into portfolio 4. It remained in portfolio 4 until the end of 2017.

Figures 12 - 15 illustrate the results for the graphical comparison of the multi-bagger financial metrics to the sample portfolios, and a graphical comparison of the growth within the industry compared to that of the market.

5.2.2.1 Operating profit margin (%)

The null hypothesis was that the operating profit margin for multi-bagger companies would be higher than that of the industry portfolio (average). The operating profit margin for the multi-bagger company, ASSORE, and the portfolios are displayed in Figure 12.

ASSORE's operating profit margin remained below the industry portfolio until the year 2008. From 2009 until the end of the period, except for the year 2015, the company operated at a higher operating profit margin than that of the industry average.

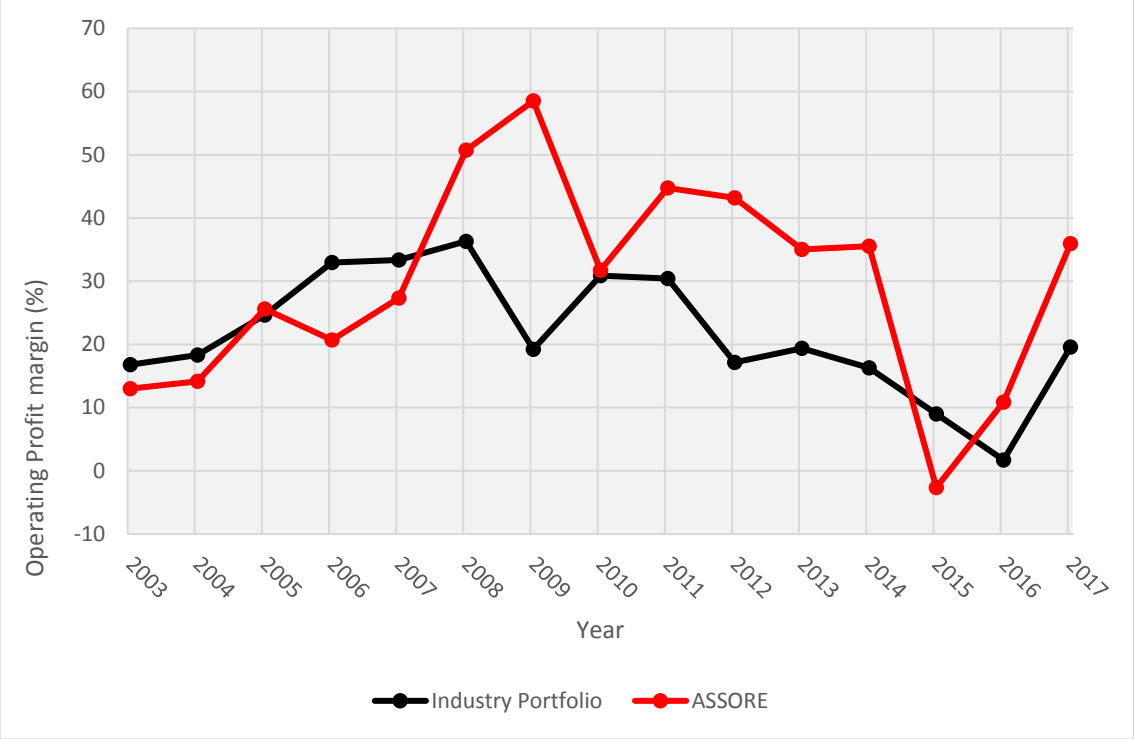

Figure 12: Operating profit margin for the Basic Materials industry portfolios and multi-bagger company plotted over the period 2003 to 2017

Descriptive statistics performed on the operating profit margin for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-21. The average for the multi-bagger company, ASSORE, was lower than that of the industry portfolio. The median had similar results. The standard deviation for the multi-bagger was greater than that for the industry portfolio. This suggests that the operating profit margin for the multi-bagger company was more volatile than that of the industry.

Table 5-21: Descriptive statistics on the Basic Materials industry operating profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	21.74	19.37	9.66
ASSORE	29.64	31.75	16.50

Looking at the data points in Figure 12, ten of the fifteen data points (67%) displayed for ASSORE are above the industry portfolio. It was concluded that the operating profit margin for ASSORE was higher than that of the industry over the period 2003 to 2017.

5.2.2.2 Net profit margin (%)

The null hypothesis was that the net profit margin for multi-bagger companies would be higher than that of the industry portfolio (average). The net profit margin for the multi-bagger company, ASSORE, and the portfolios are displayed in Figure 13. ASSORE's operating profit margin remained below the industry portfolio until the year 2008. From 2009 until the end of the period, the company operated at a higher net profit margin than that of the industry portfolio.

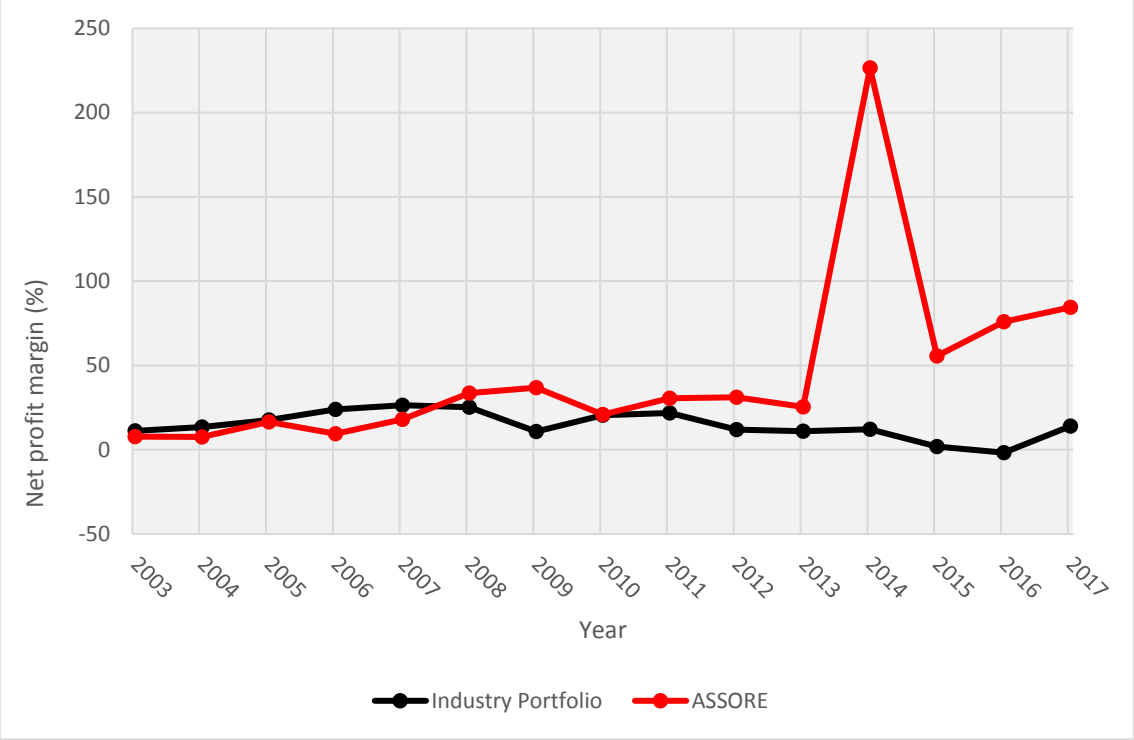

Figure 13: Net profit margin for the Basic Materials industry portfolios and multi-bagger company plotted over the period 2003 to 2017

Descriptive statistics performed on the net profit margin for industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-22. The average for the industry portfolio net profit margin was less than that of ASSORE. The median had similar results. The standard deviation for the multi-bagger was greater than that of the industry. This suggests that the net profit margin for the multi-bagger company was more volatile than that of the industry.

Table 5-22: Descriptive statistics on the Basic Materials industry net profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	14.67	13.36	8.10
ASSORE	45.33	30.53	55.23

Looking at the data points in Figure 13, ten of the fifteen data points (67%) displayed for ASSORE were above the industry portfolio. Thus, the net profit margin for ASSORE was higher than that of the industry over the period 2003 to 2017

5.2.2.3 Return on Assets (ROA) (%)

The null hypothesis was that the return on assets (ROA) for multi-bagger companies would be higher than that of the industry portfolio (average). The ROA for the multi-bagger company, ASSORE, and the portfolios are displayed in Figure 14.

ASSORE's ROA (%) was volatile over the period 2003 to 2017. The ROA for the multi-bagger company crossed that of the industry average several times.

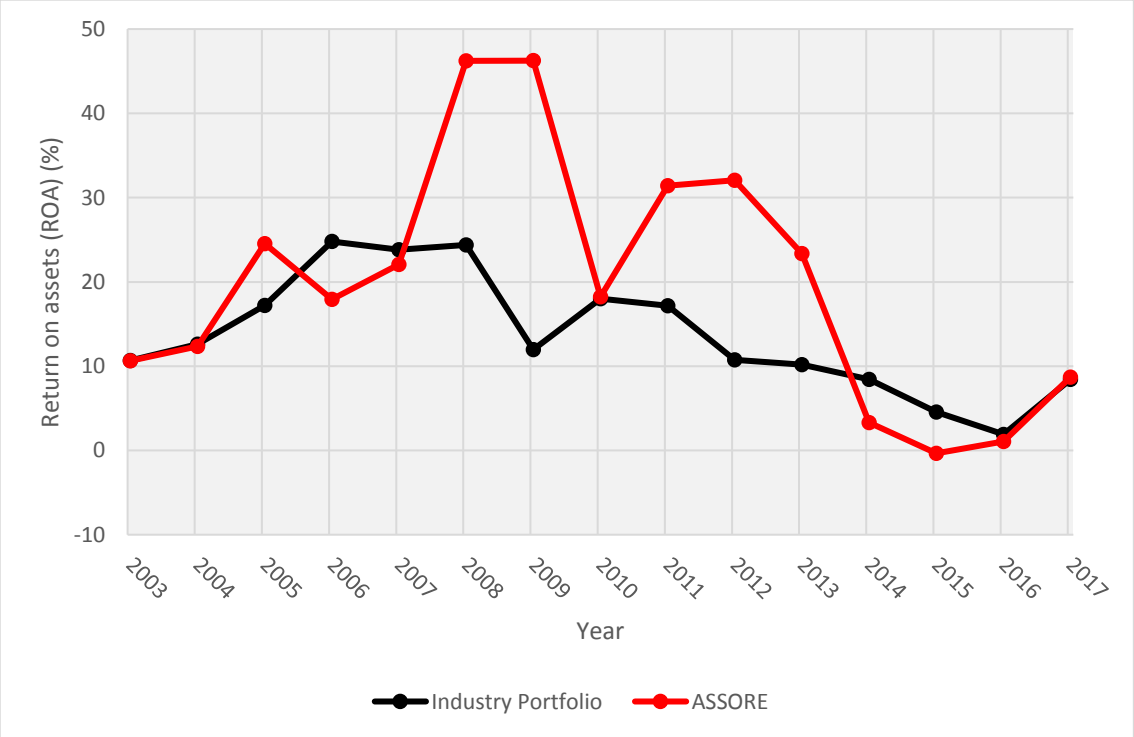

Figure 14: Return on assets for the Basic Materials industry portfolios and multi-bagger company plotted over the period 2003 to 2017

Descriptive statistics performed on the operating profit margin for industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-23. The industry portfolio ROA was less than that of the multi-bagger ASSORE. The median had similar results. The standard deviation for the multi-bagger was greater than that of the industry. This suggests that the ROA for the multi-bagger company was more volatile than that of the industry.

Table 5-23: Descriptive statistics on the Basic Materials industry return on assets for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	13.66	11.98	7.04
ASSORE	19.86	18.22	14.69

Looking at the data points, eight of the fifteen data points (53%) displayed for ASSORE are above the industry portfolio. Thus, the ROA for ASSORE was higher than that of the industry over the period 2003 to 2017.

5.2.2.4 Growth

The results of comparing whether the Basic Materials industry index had grown at a faster rate than that of the ALSI, over the period 2003 to 2017, are presented graphically in Figure 15. Figure 15 shows that over that period the Basic Materials industry index had not grown at a faster rate than that of the ALSI. From 2003 until 2008 the Basic Materials industry index tracked the ALSI. From the start of 2009, the ALSI continued to grow while the Basic Materials industry index growth stagnated. At the end of the period, the ALSI was found to have increased to 6.42 times the value at the start of the period, while the Basic Materials industry index had increased by 2.20 times. Thus, the Basic Materials industry index had not grown at a faster rate than that of the ALSI over the defined period.

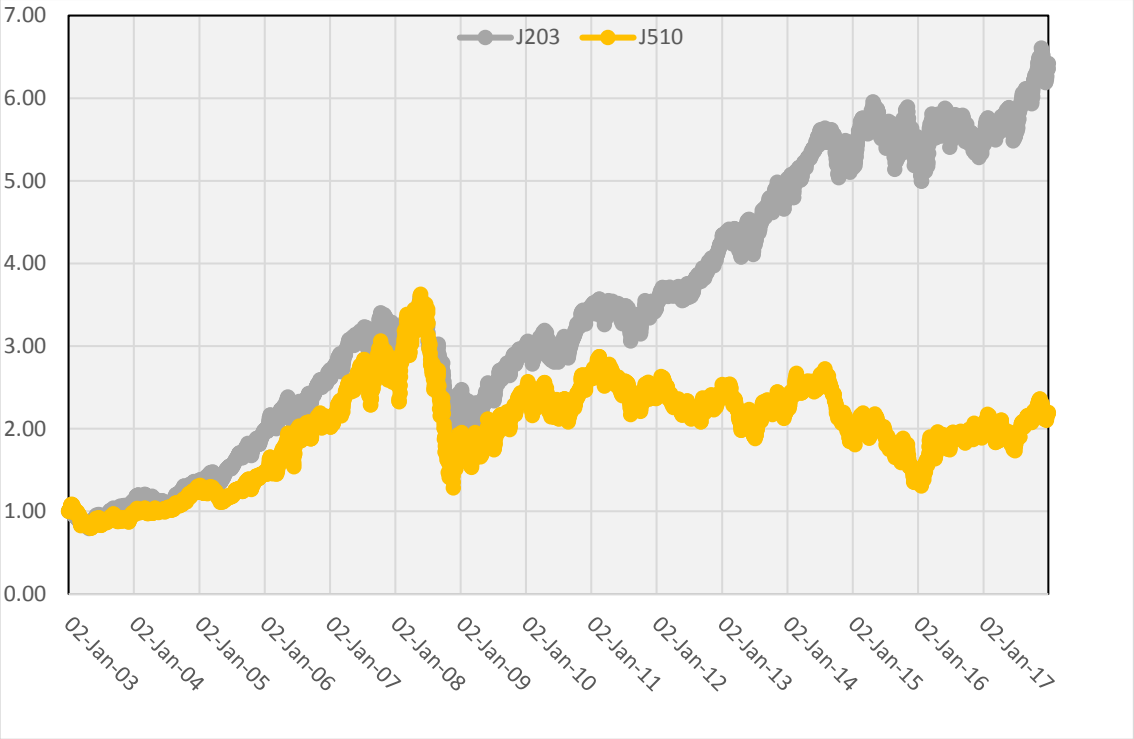

Figure 15: Basic Materials industry index (J510) growth versus the ALSI (J203) growth over the period 3 January 2003 to 31 December 2017

5.2.3 Industrials industry (ICB code 2000)

There were twenty-five companies in the sample for the Industrials industry. Within the sample for the Industrials industry, there were three multi-bagger companies. The multi-bagger companies were HOWDEN, METROFILE, and ONELOGIX.

HOWDEN started the period with a size ranking of 5 and ended the period with a size ranking of 12, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. METROFILE started the period with a size ranking of 1 and ended the period with a size ranking of 11, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. ONELOGIX, started the period with a size ranking of 2 and ended the period with a size ranking of 8, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry.

Figure 16 illustrates the results for the graphical comparison of the multi-bagger financial metrics to the sample portfolios and a graphical comparison of the growth within the industry compared to that of the market.

5.2.3.1 Operating profit margin (%)

The null hypothesis was that the operating profit margin for multi-bagger companies would be higher than that of the industry portfolio (average).

Figure 16 shows the operating profit margins for the industry portfolio (average) and the multi-bagger company's, HOWDEN, METROFILE, and ONELOGIX, in the industry over the period 2003 to 2017. HOWDEN's operating profit margin was below the industry portfolio for the first year. The following year the operating profit margin increased above that of the industry portfolio. From 2005 until 2008 the operating profit margin for HOWDEN remained below the industry portfolio. From 2009 until the end of the defined period, the company operated at a higher operating profit margin than that of the industry portfolio. METROFILE's operating profit margin was below the industry portfolio for the first two years. From 2005 until the end of the period the company operated at a higher operating profit margin than that of the industry portfolio. ONELOGIX's operating profit margin followed that of the industry and they regularly crossed each other. A clear graphical difference between the operating profit margin of ONELOGIX and that of the industry portfolio is not apparent.

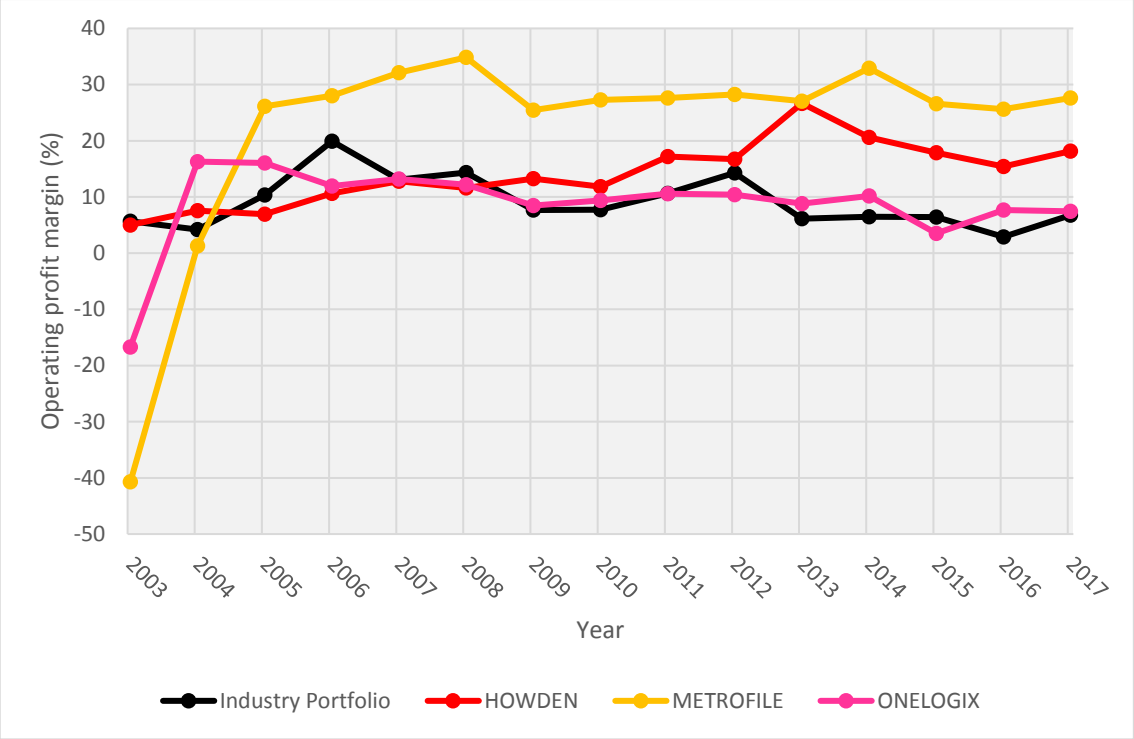

Figure 16: Operating profit margin for the Industrial industry portfolios and multi-bagger companies, HOWDEN, METROFILE, and ONELOGIX, plotted over the period 2003 to 2017

Descriptive statistics performed on the operating profit margin for industry portfolio and multi-bagger companies over the period 2003 to 2017 is displayed in Table 5-24. The average operating profit margins for HOWDEN and METROFILE, but not ONELOGIX, were higher than that of the industry portfolio. The median for the multi-bagger companies was higher than that of the industry portfolio. The standard deviations for the multi-bagger companies were greater than that of the industry. This suggests that the operating profit margins for the multi-bagger companies were more volatile than that of the industry.

Table 5-24: Descriptive statistics on the Industrials industry operating profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	9.11	7.70	4.61
HOWDEN	14.15	13.26	5.68
METROFILE	22.01	27.26	18.91
ONELOGIX	8.62	10.19	7.74

Looking at the data points, HOWDEN had ten of the fifteen data points (67%) above the industry portfolio, METROFILE had thirteen of the fifteen data points (87%) above the

industry portfolio and ONELOGIX had nine of the fifteen data points (60%) above the industry portfolio. Thus, the operating profit margins for HOWDEN, METROFILE, and ONELOGIX were higher than that of the industry over the period 2003 to 2017.

5.2.3.2 Net profit margin (%)

The null hypothesis was that the net profit margin for multi-bagger companies would be higher than that of the industry portfolio (average). The net profit margin for the multi-bagger companies, HOWDEN, METROFILE, and ONELOGIX, and the portfolios are displayed in Figure 17.

Figure 17 shows the net profit margin for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. HOWDEN's net profit margin was below the industry portfolio from 2003 until 2012. In the following three years, the net profit margin increased above that of the industry portfolio. In 2016, the net profit margin dropped below the industry portfolio. In 2017, HOWDEN ended with a higher net profit margin than that of the industry portfolio. METROFILE's net profit margin was below the industry portfolio until 2009. In 2010, METROFILE's net profit was higher than that of the industry. In the next two years, the company's net profit margin dropped below the industry portfolio. From 2013 to 2017, METROFILE's net profit margin was greater than that of the industry portfolio. ONELOGIX's net profit margin did not exceed that of the industry portfolio over the period 2003 to 2017.

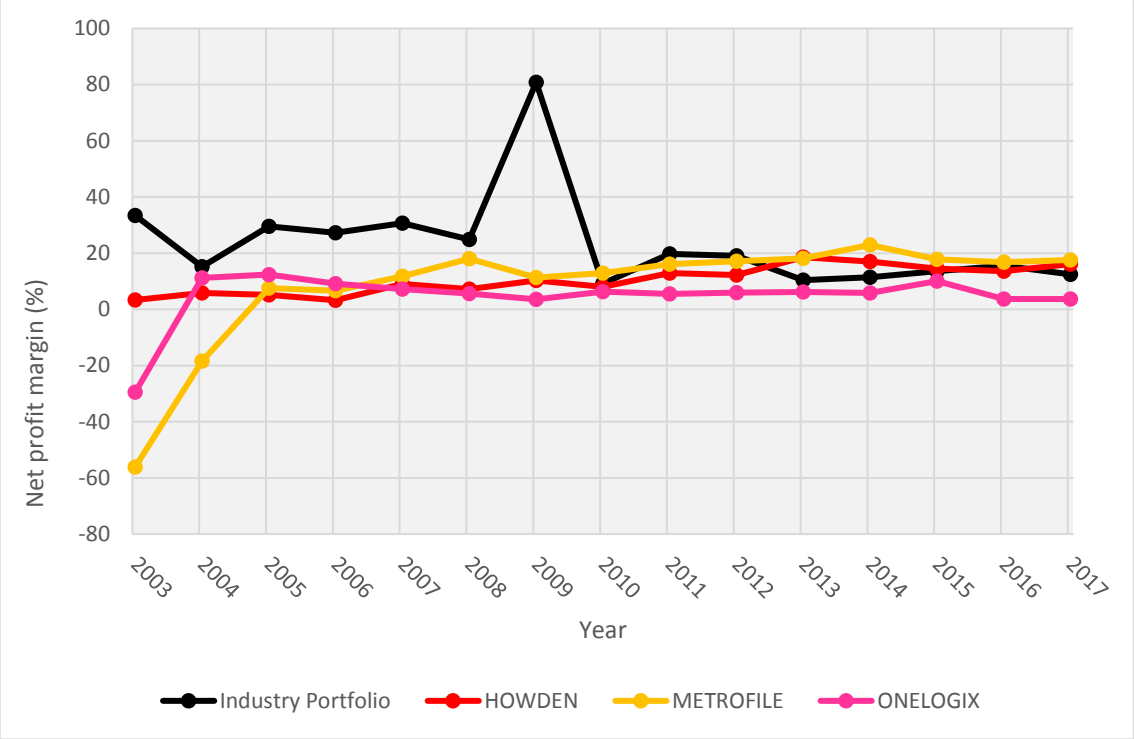

Figure 17: Net profit margin for the Industrials industry portfolio and multi-bagger companies, HOWDEN, METROFILE, and ONELOGIX, plotted over the period 2003 to 2017

Descriptive statistics performed on the net profit margin for industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-25. The average for the multi-bagger companies was lower than that of the industry portfolio. The median for the multi-bagger companies was lower than that of the industry portfolio. The standard deviation for the multi-bagger companies was greater than that of the industry. This suggests that the operating profit margin for the multi-bagger companies was more volatile than that of the industry.

Table 5-25: Descriptive statistics on the Industrials industry net profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	23.53	19.03	17.71
HOWDEN	10.44	10.27	4.98
METROFILE	7.99	16.04	20.17
ONELOGIX	4.46	6.00	9.78

Looking at the data points, HOWDEN had ten of the fifteen data points (67%) above the industry portfolio, METROFILE had thirteen of the fifteen data points (87%) above the industry portfolio and ONELOGIX had nine of the fifteen data points (60%) above the

industry portfolio. Thus, the operating profit margins for HOWDEN, METROFILE, and ONELOGIX were higher than that of the industry over the period 2003 to 2017.

5.2.3.3 Return on Assets (ROA) (%)

The null hypothesis was that the return on assets (ROA) for multi-bagger companies would be higher than that of the industry portfolio (average).

Figure 18 shows the ROA for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. HOWDEN's ROA was above the industry portfolio for the first two years (2003 and 2004). This dropped below the industry portfolio in 2005 and then rose above the industry portfolio until 2017. METROFILE's ROA was below the industry portfolio for the first two years and then rose above the industry portfolio until the end of the period in 2017. ONELOGIX's ROA was below the industry portfolio for the first year and then rose above the industry portfolio until 2015 when it dropped below the industry portfolio. For 2016 and 2017 ONELOGIX's ROA returns were above the industry portfolio.

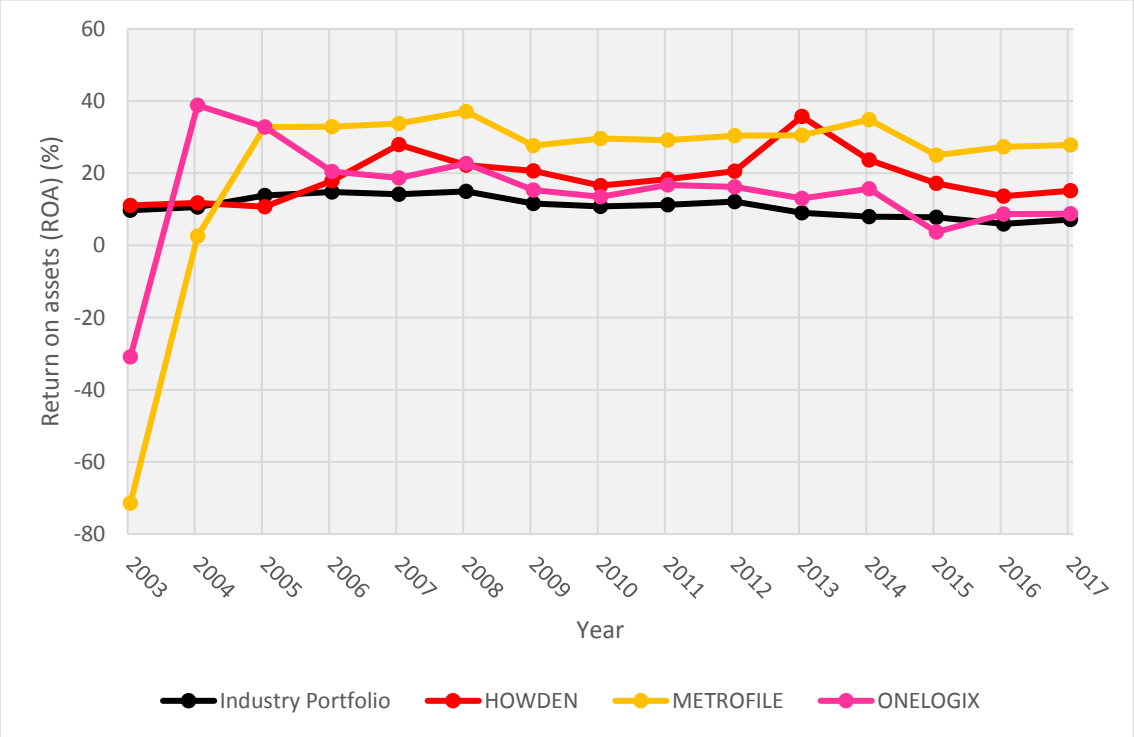

Figure 18: Return on assets for the Industrials industry portfolio and multi-bagger companies, HOWDEN, METROFILE, and ONELOGIX, plotted over the period 2003 to 2017

Descriptive statistics performed on the ROA for industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-26. The average ROA for the industry portfolio was less than that of the average ROA for multi-bagger companies. The median for the multi-bagger companies was lower than that of the industry portfolio. The standard deviation for the multi-bagger companies was greater than that of the industry. This indicates that the operating profit margin for the multi-bagger companies was more volatile than that of the industry.

Table 5-26: Descriptive statistics on the Industrials industry return on assets for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	10.79	10.77	2.86
HOWDEN	18.87	17.89	6.73
METROFILE	22.00	29.65	27.04
ONELOGIX	14.28	15.65	15.37

Looking at the data points, HOWDEN had fourteen of the fifteen data points (93%) above the industry portfolio, METROFILE had thirteen of the fifteen data points (87%) above the industry portfolio and ONELOGIX had thirteen of the fifteen data points (87%) above the industry portfolio. Thus, the ROA for HOWDEN, METROFILE, and ONELOGIX were higher than that of the industry over the period 2003 to 2017.

5.2.3.4 Growth

The results comparing whether the Industrials industry index had grown at a faster rate than that of the ALSI over the period 2003 to 2017 are presented graphically in Figure 19. Figure 19 shows that over that period the Industrials industry index grew at a faster rate than that of the ALSI. From 2003 until 2007 the Industrials industry index increased, with some volatility, at a faster rate than that of the ALSI. From 2008 until 2017, the Industrials industry index growth remained above the ALSI. The gap between the two indices did not grow or decrease by a large margin. At the end of the period, the ALSI was found to have increased to 6.42 times the value at the start of the period, while the Industrials industry index had increased by 7.00 times. Thus, the Industrials industry index had grown at a faster rate than that of the ALSI over the period.

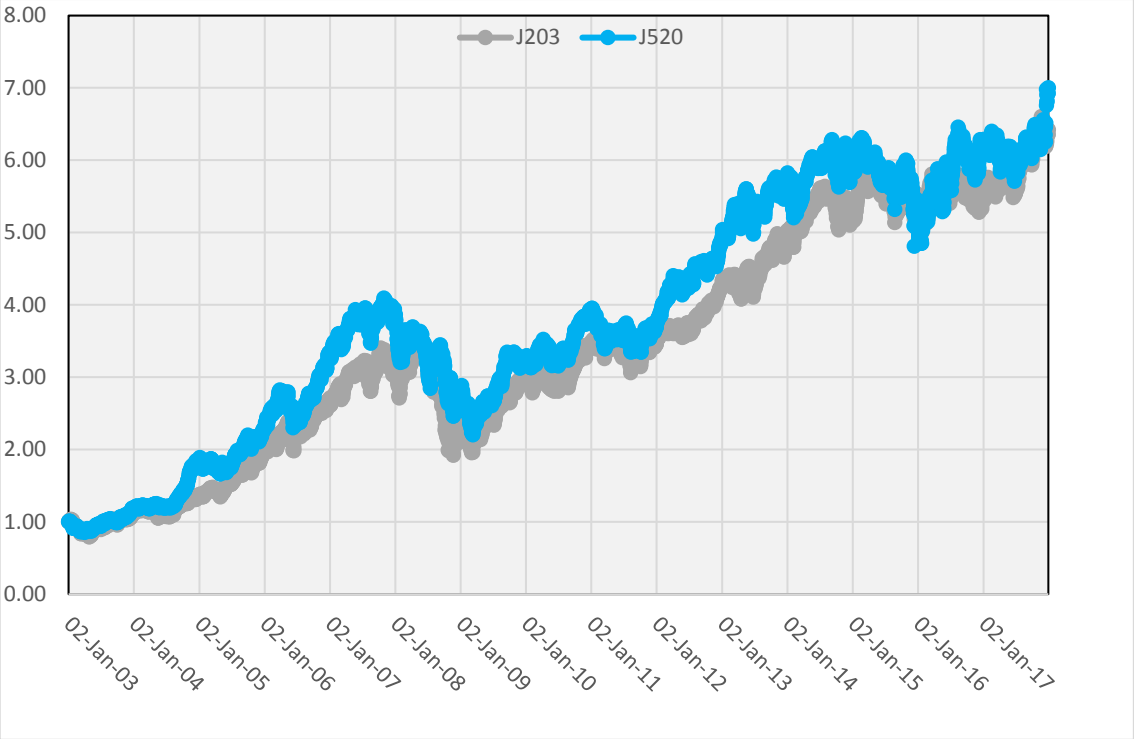

Figure 19: Industrials industry index (J520) growth versus the ALSI (J203) growth over the period 3 January 2003 to 31 December 2017

5.2.4 Consumer Goods industry (ICB code 3000)

There were ten companies in the sample. Within the sample for the Consumer Goods industry, multi-bagger was found in the sample.

5.2.4.1 Net profit margin, operating profit margin and Return on Assets (ROA)

There were ten companies in the Consumer Goods industry sample; however, there were no multi-bagger companies to evaluate for their net profit margin, operating profit margin and ROA over the defined period.

5.2.4.2 Growth

The results of comparing whether the Consumer Goods industry index had grown at a faster rate than that of the ALSI over the period of 2003 to 2017 are presented graphically in Figure 20. Figure 20 shows that over that period, the Consumer Goods industry index grew at a faster rate than that of the ALSI. From 2003 until 2008 the Consumer Goods industry index tracked the ALSI. From 2008 until 2017, the Consumer Goods industry index grew at a faster rate than that of the ALSI.

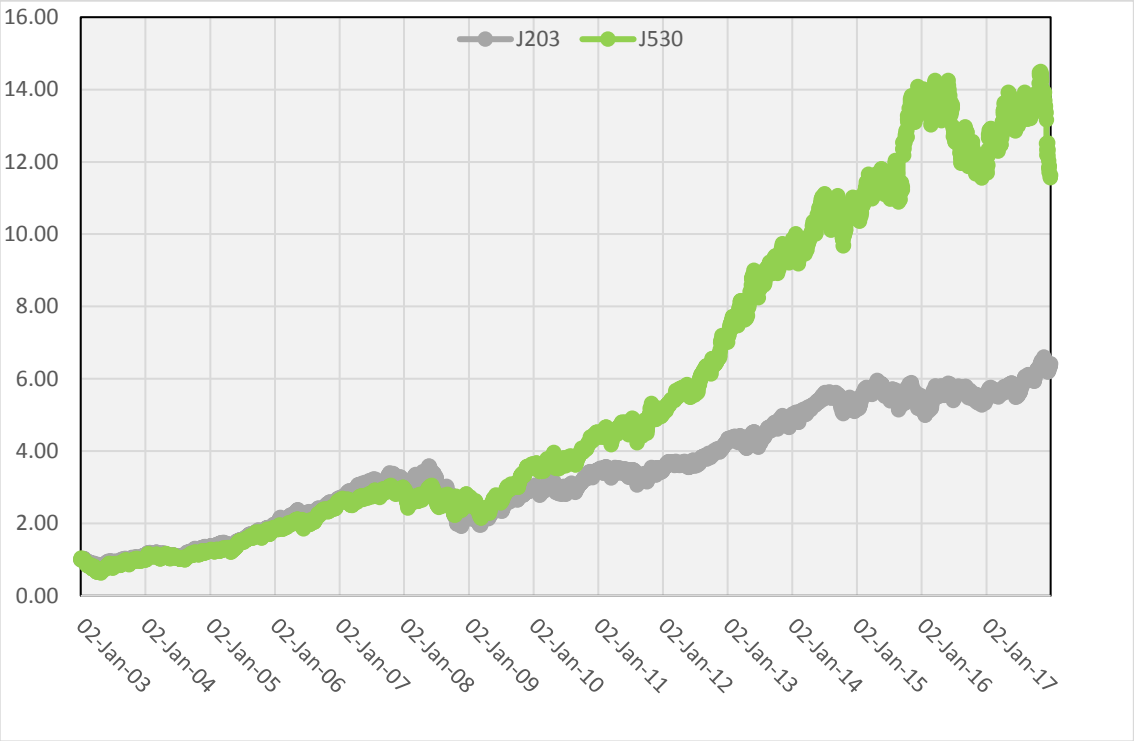

Figure 20: Consumer Goods industry index (J530) growth versus the ALSI (J203) growth over the period 3 January 2003 to 31 December 2017

At the end of the period, the ALSI was found to have increased to 6.42 times the value at the start of the period, while the Consumer Goods industry index had increased by 11.63 times. Thus, the Consumer Goods industry index had grown at a faster rate than that of the ALSI over that period.

5.2.5 Healthcare industry (ICB code 4000)

There were two companies in the sample for the Healthcare industry. Within the sample for the Healthcare industry, one multi-bagger company was found. The multi-bagger was ASPEN.

ASPEN started the period with a size ranking of 1 and ended the period with a size ranking of 2, in other words, the company grew in size (market capitalisation) compared to the other company in the industry sample. ASPEN started in portfolio 1 and in 2010 moved into portfolio 2. It remained in portfolio 2 until the end of 2017.

Figure 21 shows the graphical comparison of the multi-bagger financial metrics to the sample portfolio and the growth within the industry compared to that of the market.

5.2.5.1 Operating profit margin (%)

The null hypothesis is that the operating profit margin for multi-bagger companies is higher than that of the industry portfolio (average). The operating profit margin for the multi-bagger company, ASPEN, and the portfolios are displayed in Figure 21. The multi-bagger company's, ASPEN, operating profit margin remains above the industry portfolio for the entire period.

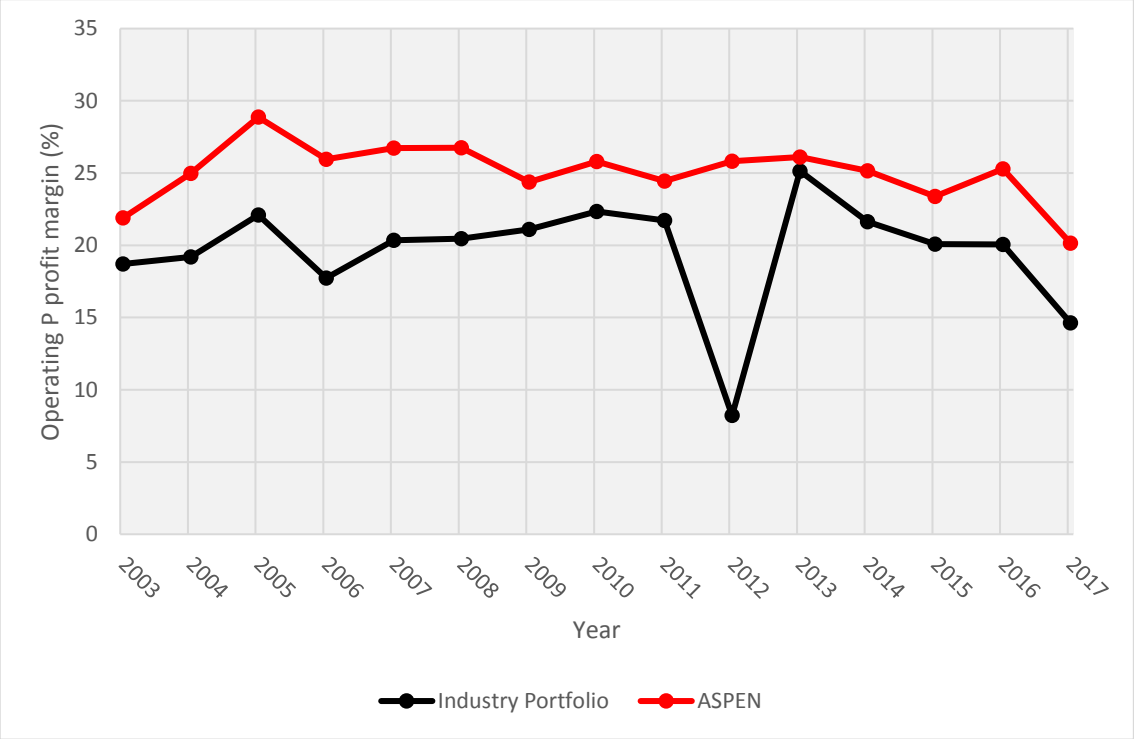

Figure 21: Operating profit margin for the Healthcare industry portfolios and multi-bagger company plotted over the period 2003 to 2017

Descriptive statistics performed on the operating profit margin for the industry portfolio and the multi-bagger company over the period 2003 to 2017 are displayed in Table 5-27. The average operating profit margin for the multi-bagger company, ASPEN, was higher than that of the industry portfolio. The median demonstrated similar results. The standard deviation for the multi-bagger was lower than that of the industry portfolio. This suggests that the operating profit margin for the multi-bagger company was more consistent than that of the industry.

Table 5-27: Descriptive statistics on the Healthcare industry operating profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	19.57	20.35	3.93
ASPEN	25.05	25.28	2.09

Looking at the data points, fifteen of the fifteen data points (100%) displayed for ASPEN were above the industry portfolio. Thus, the operating profit margin for ASPEN was higher than that of the industry over the period 2003 to 2017.

5.2.5.2 Net profit margin (%)

The null hypothesis was that the net profit margin for multi-bagger companies would be higher than that of the industry portfolio (average). The net profit margin for the multi-bagger company, ASPEN, and the portfolios are displayed in Figure 22. ASPEN's net profit margin remained above the industry portfolio for the entire period.

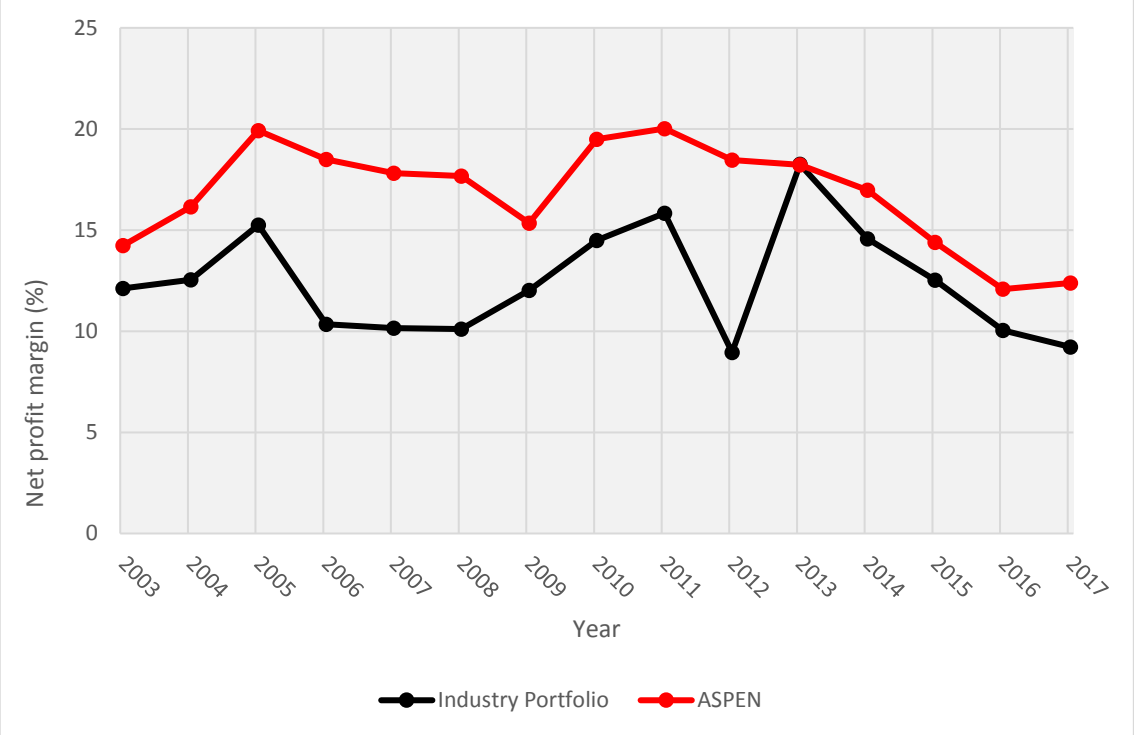

Figure 22: Net profit margin for the Healthcare industry portfolios and multi-bagger company plotted over the period 2003 to 2017

Descriptive statistics performed on the net profit margin for the industry portfolio and the multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-28. The average net profit margin for the industry portfolio was less than that of the multi-bagger ASPEN. The median demonstrated similar results. The standard deviation for the multi-bagger was less than that of the industry. This suggests that the net profit margin for the multi-bagger company was more consistent than that of the industry.

Table 5-28: Descriptive statistics on the Healthcare industry net profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	12.43	12.12	2.75
ASPEN	16.78	17.68	2.59

Looking at the data points, fourteen of the fifteen data points (93%) displayed for ASPEN were above the industry portfolio. Thus, the net profit margin for ASPEN was higher than that of the industry over the period 2003 to 2017.

5.2.5.3 Return on Assets (ROA) (%)

The null hypothesis was that the return on assets (ROA) for multi-bagger companies would be higher than that of the industry portfolio (average). The ROA for the multi-bagger company, ASPEN, and the portfolios are displayed in Figure 23. ASPEN's ROA was above the industry portfolio from 2003 until 2012. The multi-bagger ROA dropped below the industry portfolio for the year 2013. From 2014 to 2017 the ROA was above the industry portfolio.

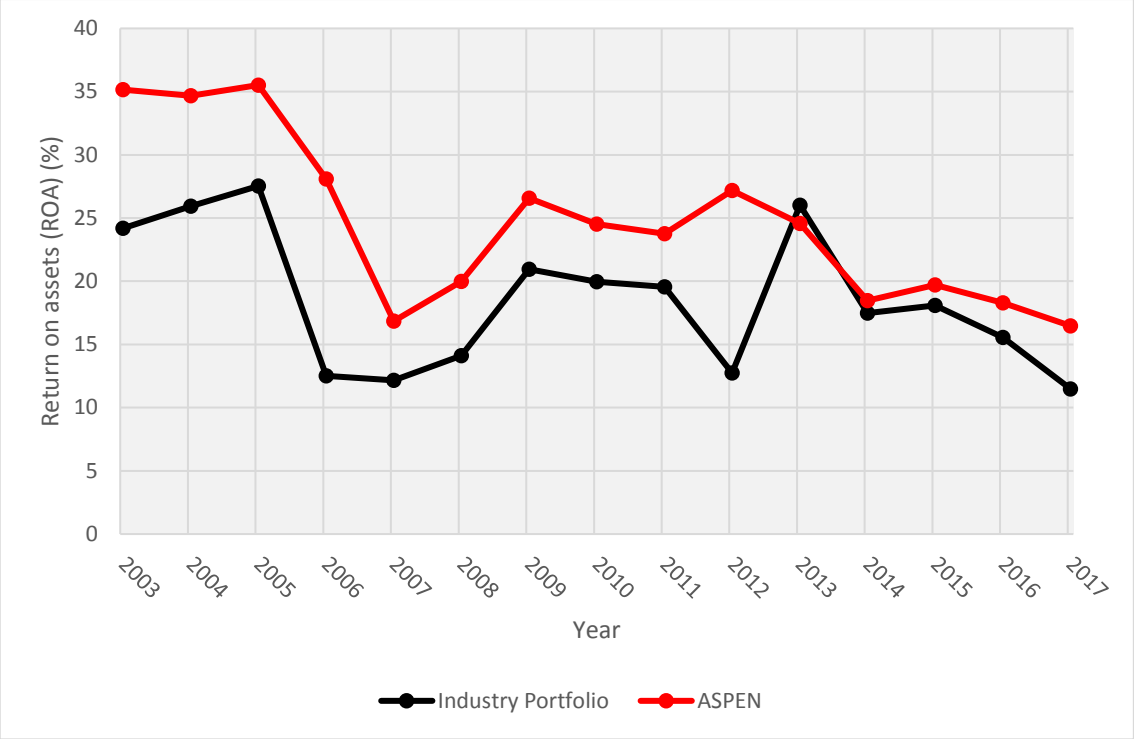

Figure 23: Return on assets for the Healthcare industry portfolios and multi-bagger company plotted over the period 2003 to 2017

Descriptive statistics performed on the operating profit margin for industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-29. The industry portfolio ROA was less than that of the multi-bagger ASPEN. The median demonstrated similar results. The standard deviation for the multi-bagger was greater than that of the industry. This suggests that the ROA for the multi-bagger company was more volatile than that of the industry.

Table 5-29: Descriptive statistics on the Healthcare industry return on assets for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	18.55	18.08	5.49
ASPEN	24.66	24.53	6.57

Looking at the data points, fourteen of the fifteen data points (93%) displayed for ASPEN were above the industry portfolio. Thus, the ROA for ASPEN was higher than that of the industry over the period 2003 to 2017.

5.2.5.4 Growth

In the data for the Healthcare industry index (J540) extracted from the IRESS database, it was found that the on the 16th of October 2014 to the end of the period, the price in the data decreased by a factor multiple of ten. To confirm whether the information on and after the 16th of October 2014 was correct, IRESS expert (Figure 10) was used, as well as information from Sharenet.

The graphical information in Figure 10 shows that there was not a drop in the price by a factor of ten on the 18th of July 2017 to the end of the period.

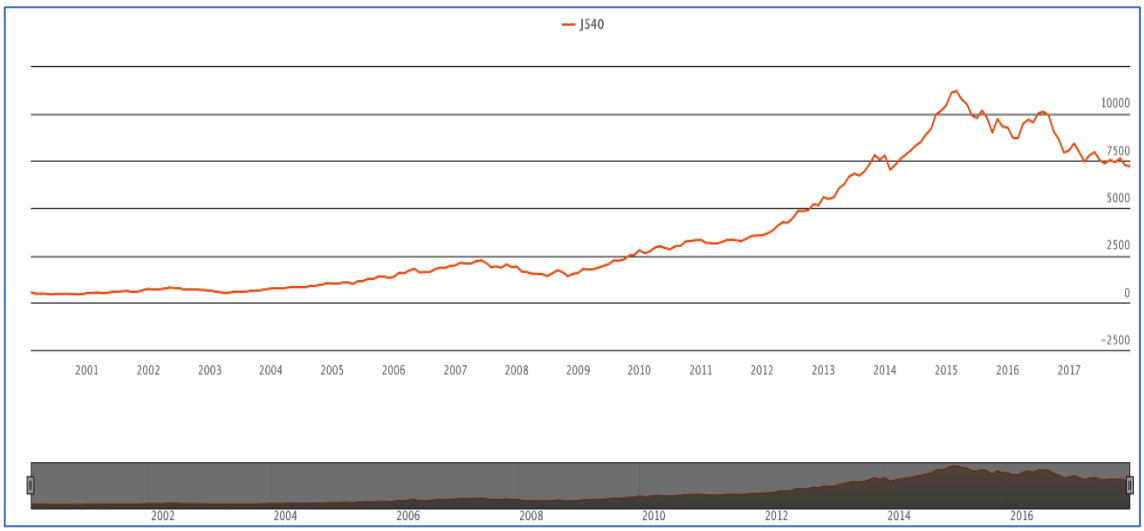

Figure 24: IRESS expert, Healthcare (J540) index chart for the period 01 January 2000 to 31 December 2017 (Iress, 2018)

The data was then checked against another source of data, Sharenet, shown in Table 5-30, to confirm the anomaly in the data. The data displayed in Table 5-30 do not show a drop in the price of the index by a factor of ten from the 18th of July 2017 to the end of the period.

Table 5-30: Information gathered from Sharenet on the JSE Healthcare (J540) index

General Share Information	
Short Name	Jse-heal (J540)
Long Name	Healthcare Index
JSE Sector	JSE Indices (00)
Period	Close
Month-to-date	7368
Quarter-to-date	6800
Year-to-date	7218
7 Days	7286
14 Days	7079
21 Days	6685
1 Month	6758
2 Months	6909
3 Months	7016
6 Months	7140
1 Year	7363
2 Years	10085
3 Years	9280
5 Years	69822
10 Years	16831

Note. Source of information obtained from Sharenet, 2018

The graphical information in Figure 24 shows that there was not a drop in the price by a factor of ten. This was then checked against another source of data, Sharenet, shown in Table 5-30, to confirm the anomaly in the data. The data displayed in Table 5-30 do not show a drop in the price of the index by a factor of ten. From this information, it was concluded that there was an error in the data for from 16th of October 2014 to the end of the period. In the data for the Healthcare industry index (J540) from Sharenet, it was found that the on the 16th of October 2014 to the end of the period, the price in the data was found to be a factor of ten less than what the actual value was. The data collected from IRESS on the 16th of October to the end of the period was adjusted to correct for this error.

The results of comparing whether the Healthcare industry index grew at a faster rate than that of the ALSI over the period 2003 to 2017 are graphically in Figure 25. Figure 25 shows that over that period, the Healthcare industry index grew at a faster rate than that of the ALSI. From 2003 until 2007 the Healthcare industry index tracked the ALSI. In 2008 the Healthcare industry index contracted to bring the growth rate below that of the ALSI. From 2009 to the beginning of 2015 the Healthcare industry index grew at a faster rate than that of the ALSI. Thereafter the Healthcare industry index contracted. At

the end of the period, the ALSI was found to have increased to 6.42 times the value at the start of the period, while the Healthcare industry index had increased by 11.15 times. Thus, the Healthcare industry index had grown at a faster rate than that of the ALSI over that period.

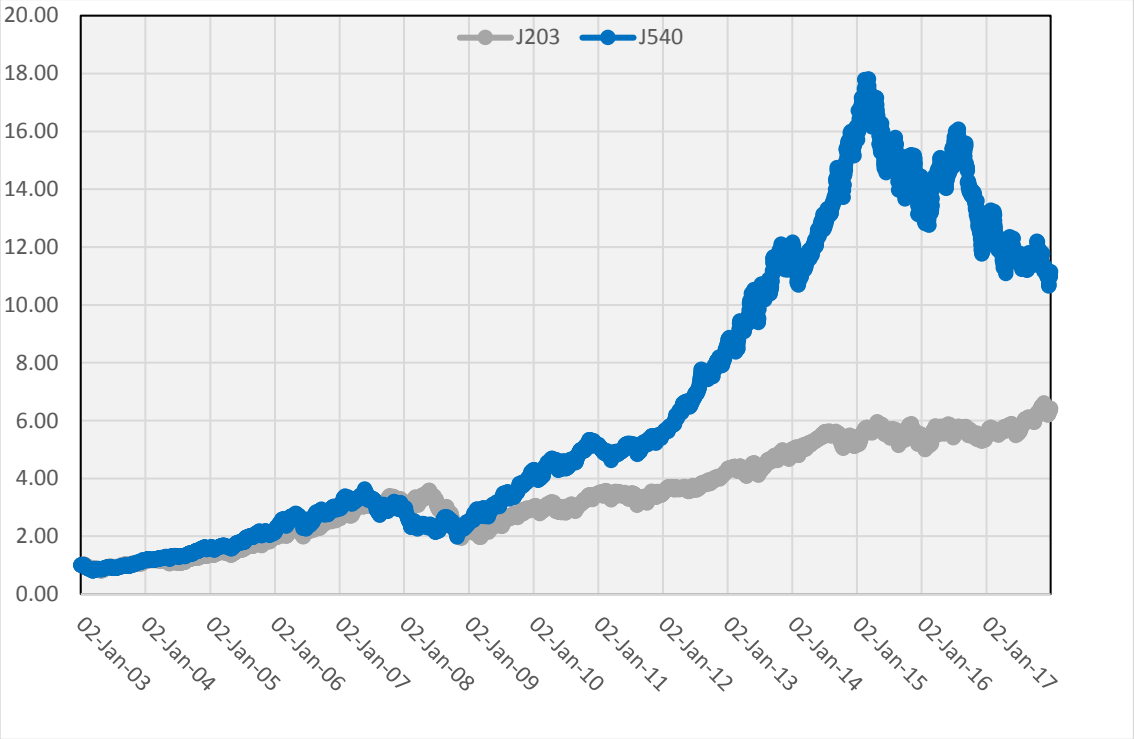

Figure 25: Healthcare industry index (J540) growth versus the ALSI (J203) growth over the period 3 January 2003 to 31 December 2017

5.2.6 Consumer Services industry (ICB code 5000)

There were twenty-four companies in the sample for the Basic Materials industry. Within the sample for the Basic Materials industry, there were seven multi-bagger companies. The multi-baggers included ADVTECH, CASHBIL, CLICKS, FAMBRANDS, MR PRICE, NASPERS, and SHOPRITE.

ADVTECH started the period with a size ranking of 6 and ended the period with a size ranking of 11, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. CASHBIL started the period with a size ranking of 10 and ended the period with a size ranking of 13, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. CLICKS started the period with a size ranking of 15 and ended the period with a size ranking of 19, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. FAMBRANDS started the period with a size ranking of 3 and ended the period with a size ranking of 12, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. MR PRICE started the period with a size ranking of 14 and ended the period with a size ranking of 21, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. NASPERS started the period with a size ranking of 24 and ended the period with a size ranking of 24. While there was no change to the size ranking, as it was the largest company in the sample over the period, the size of the company did increase. SHOPRITE started the period with a size ranking of 20 and ended the period with a size ranking of 23, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry.

Figure 26 illustrates the results for the graphical comparison of the multi-bagger financial metrics to the sample portfolios and a graphical comparison of the growth within the industry compared to that of the market.

5.2.6.1 Operating profit margin (%)

The null hypothesis was that the operating profit margin for multi-bagger companies would be higher than that of the industry portfolio (average). The operating profit margin for the multi-bagger companies, ADVTECH, CASHBIL, CLICKS, FAMBRANDS, MR PRICE, NASPERS, and SHOPRITE, and the portfolios are displayed in Figure 26.

Figure 26 shows the operating profit margin for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. ADVTECH's operating profit margin was above the industry portfolio for the first year. In the following three years the operating profit margin was below that of the industry portfolio. For the years 2007 and 2008, the operating profit margin was above the industry portfolio. In 2009, it dropped below the industry portfolio. In 2010, the operating profit margin was above the industry portfolio. In 2011, it dropped below the industry portfolio. From 2012 until 2016 the company operated at a higher operating profit margin than that of the industry portfolio. In 2017, the ADVTECH operating profit margin dropped below the industry portfolio. CASHBIL's operating profit margin was below the industry portfolio for the period 2003 until 2017. CLICKS' operating profit margin was below the industry portfolio for all the years apart from the years 2014 and 2017. FAMBRANDS's operating profit margin was above the industry portfolio from 2003 until 2016. The year 2017 was the only year that operating profit margin was below the industry portfolio. MR PRICE's operating profit margin was above the industry portfolio for the first year. From 2004 until 2011, the operating profit margin was below that of the industry portfolio. For the years 2012 and 2016, the operating profit margin was above the industry portfolio. In 2017, MR PRICE's operating profit margin dropped below the industry portfolio. NASPERS's operating profit margin was below the industry portfolio for two years. For the next two years (2005 to 2006), the operating profit margin was above the industry portfolio. For the years 2007 and 2008, the operating profit margin was below the industry portfolio. In the following year, 2009, the operating profit margin was above the industry portfolio. From 2010 until 2016, the operating profit margin was below the industry portfolio. In 2017, NASPERS' operating profit margin rose above the industry portfolio. SHOPRITE's operating profit margin was below the industry portfolio for all the years except for the year 2014.

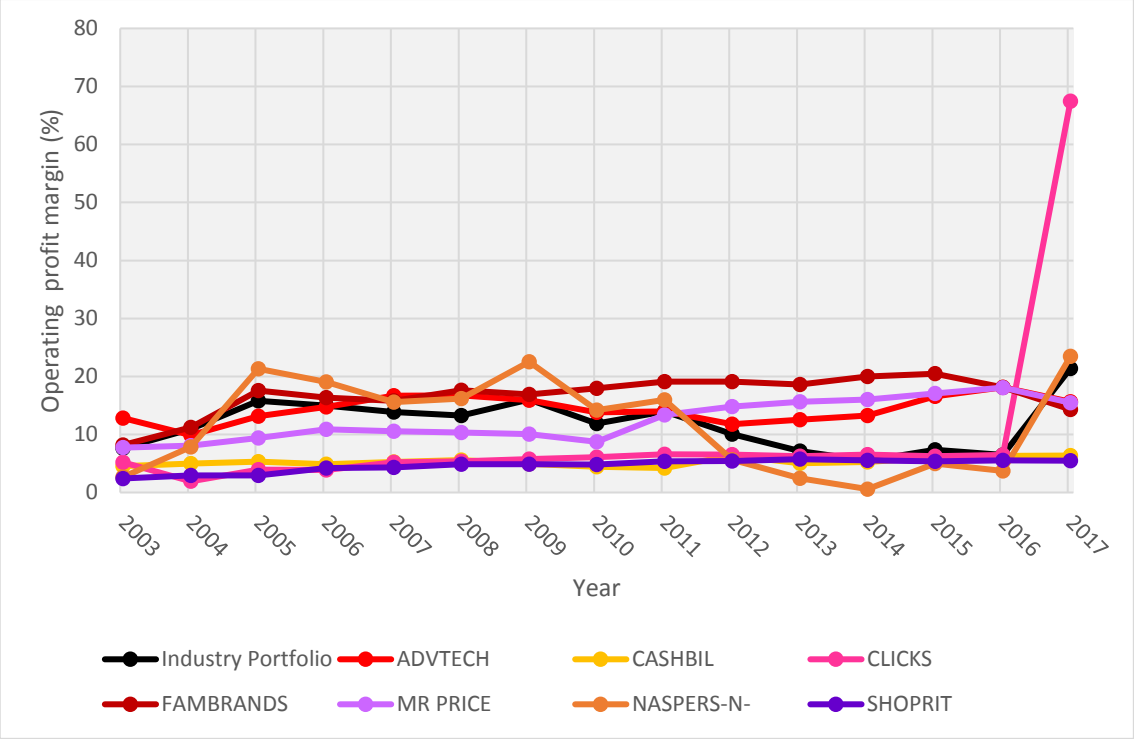

Figure 26: Operating profit margin for the Consumer Services industry portfolios and multi-bagger companies, ADVTECH, CASHBIL, CLICKS, FAMBRANDS, MR PRICE, NASPERS, and SHOPRITE, plotted over the period 2003 to 2017

Descriptive statistics performed on the operating profit margin for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-31. The average operating profit margins for the multi-bagger companies, ADVTECH, FAMBRANDS, and MR PRICE were higher than that of the industry portfolio but not for CASHBIL, CLICKS, NASPERS, and SHOPRITE. The medians for the multi-bagger companies, ADVTECH, FAMBRANDS, and NASPERS were higher than that of the industry portfolio but not for CASHBIL, CLICKS, MR PRICE, and SHOPRITE. The standard deviation for the multi-bagger companies, CLICKS and NASPERS, were greater than that of the industry portfolio but not for ADVTECH, CASHBIL, FAMBRANDS, MR PRICE, and SHOPRITE. The multi-bagger companies with higher standard deviations suggest that their operating profit margins were more volatile than that of the industry.

Table 5-31: Descriptive statistics on the Consumer Services operating profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry Portfolio	11.76	11.88	4.46
ADVTECH	14.38	13.99	2.23
CASHBIL	5.31	5.27	0.70
CLICKS	9.56	6.09	16.07
FAMBRANDS	16.76	17.61	3.32
MR PRICE	12.43	10.90	3.50
NASPERS-N-	11.75	14.18	8.07
SHOPRIT	4.66	4.86	1.08

Looking at the data points; ADVTECH had nine of the fifteen data points (60%) above the industry portfolio, CASHBIL had zero of the fifteen data points (0%) above the industry portfolio, CLICKS had two of the fifteen data points (13%) above the industry portfolio, FAMBRANDS had fourteen of the fifteen data points (93%) above the industry portfolio, MR PRICE had six of the fifteen data points (40%) above the industry portfolio, NASPERS had eight of the fifteen data points (53%) above the industry portfolio, and SHOPRITE had one of the fifteen data points (7%) above the industry portfolio. Thus, the operating profit margins for ADVTECH, FAMBRANDS, and NASPERS were higher than that of the industry over the period 2003 to 2017.

5.2.6.2 Net profit margin (%)

The null hypothesis was that the net profit margin for multi-bagger companies was higher than that of the industry portfolio (average). The net profit margins for the multi-bagger companies, ADVTECH, CASHBIL, CLICKS, FAMBRANDS, MR PRICE, NASPERS, and SHOPRITE, and the portfolios are displayed in Figure 27.

Figure 27 shows the net profit margin for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. ADVTECH's operating profit margin was above the industry portfolio for the years 2003, 2007, 2008 and 2010. For the rest of the years in the defined period, the net profit margin was below that of the industry portfolio. CASHBIL's net profit margin was below the industry portfolio for the period 2003 until 2017. CLICKS' net profit margin was below the industry portfolio for all the years apart from the year 2017. FAMBRANDS' net profit margin was below the industry portfolio for the first four years (2003 – 2006). In the following two years (2007,

2008) the net profit margin was greater than that of the industry portfolio. In 2009, the net profit margin dropped below the industry portfolio. From 2010 until 2014, the net profit margin was greater than that of the industry portfolio. From 2015 to 2017, the net profit margin was below the industry portfolio. MR PRICE's net profit margin was below the industry portfolio from 2003 to 2011. The net profit margin was greater for MR PRICE for the following three years. From 2015 to 2017, MR PRICE's net profit margin dropped below the industry portfolio. NASPERS' net profit margin was below the industry portfolio for two years. For the next seven years (2005 to 2011), the net profit margin was above the industry portfolio. For the year 2012, the net profit margin was below the industry portfolio. From 2013 to 2017, NASPERS' net profit margin was greater than the industry portfolio. SHOPRITE's net profit margin was below the industry portfolio for all the years in the defined time period.

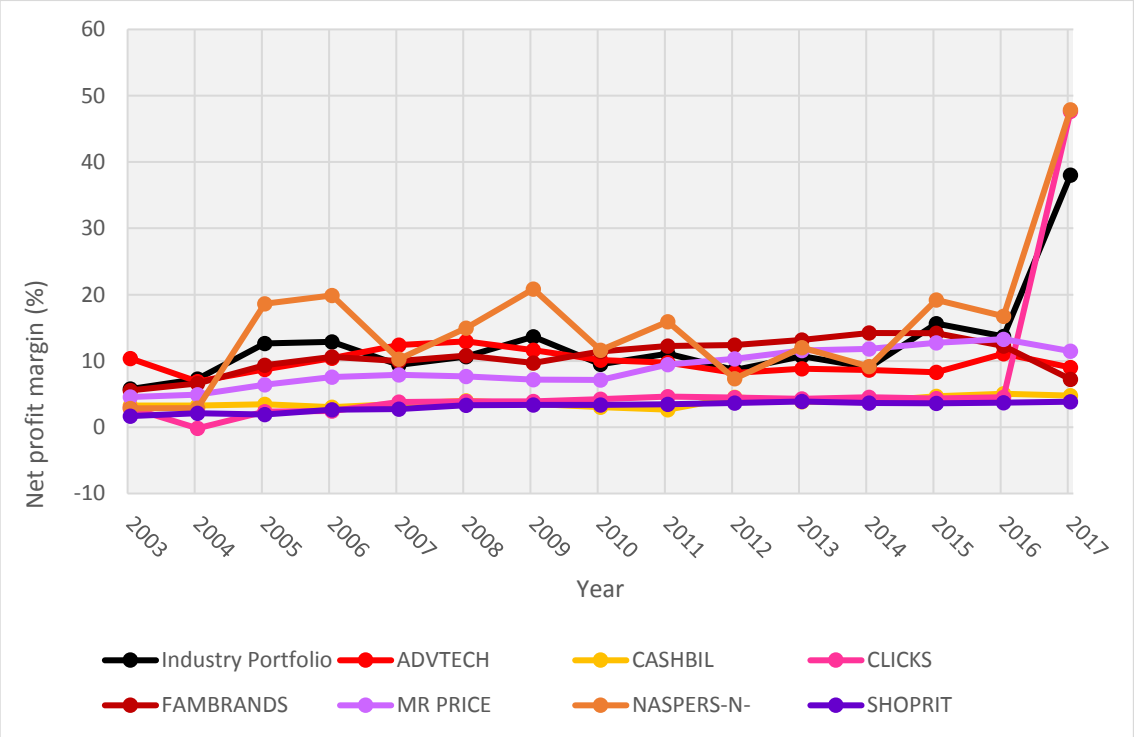

Figure 27: Net profit margin for the Consumer Services industry portfolio and multi-bagger companies, ADVTECH, CASHBIL, CLICKS, FAMBRANDS, MR PRICE, NASPERS, and SHOPRITE, plotted over the period 2003 to 2017

Descriptive statistics performed on the net profit margin for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-32. The average net profit margin for NASPERS was higher than that of the industry portfolio but not for ADVTECH, CASHBIL, CLICKS, FAMBRANDS, MR PRICE, and SHOPRITE. The

medians for FAMBRANDS and NASPERS were higher than that of the industry portfolio but not for ADVTECH, CASHBIL, CLICKS, MR PRICE, and SHOPRITE. The standard deviations for CLICKS and NASPERS were greater than that of the industry portfolio but not for ADVTECH, CASHBIL, FAMBRANDS, MR PRICE, and SHOPRITE. The multi-bagger companies with higher standard deviations suggest that their net profit margin was more volatile than that of the industry.

Table 5-32: Descriptive statistics on the Consumer Services net profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry Portfolio	12.58	10.72	7.51
ADVTECH	9.83	9.73	1.68
CASHBIL	3.77	3.53	0.72
CLICKS	6.52	4.26	11.45
FAMBRANDS	10.65	10.81	2.64
MR PRICE	8.93	7.91	2.80
NASPERS-N-	15.35	14.96	10.70
SHOPRIT	3.13	3.37	0.73

Looking at the data points; ADVTECH had four of the fifteen data points (27%) above the industry portfolio, CASHBIL had zero of the fifteen data points (0%) above the industry portfolio, CLICKS had one of the fifteen data points (7%) above the industry portfolio, FAMBRANDS had seven of the fifteen data points (47%) above the industry portfolio, MR PRICE had three of the fifteen data points (20%) above the industry portfolio, NASPERS had twelve of the fifteen data points (80%) above the industry portfolio, and SHOPRITE had zero of the fifteen data points (0%) above the industry portfolio. Thus, the net profit margin for NASPERS was higher than that of the industry over the period 2003 to 2017.

5.2.6.3 Return on Assets (ROA) (%)

The null hypothesis was that the ROA for the multi-bagger companies would be higher than that of the industry portfolio (average). The ROA for the multi-bagger companies, ADVTECH, CASHBIL, CLICKS, FAMBRANDS, MR PRICE, NASPERS, and SHOPRITE, and the portfolios are displayed in Figure 28.

Figure 28 shows the ROA for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. ADVTECH's ROA was above the industry portfolio for the first year (2003). In the next two years (2004 and 2005) the ROA was below the industry portfolio. Over the remainder of the period (2006 to 2017), the ROA was above the industry portfolio. CASHBIL's ROA was above the industry portfolio for the first year (2003). Over the next three years (2004, 2005 and 2006), the ROA was below the industry portfolio. In the following year, the ROA was above the industry portfolio. From 2008 to 2011, the ROA was below the industry portfolio. For the remainder of the period, (2012 to 2017), the ROA was above the industry portfolio. CLICKS' ROA was above the industry portfolio for the first year (2003). Over the next four years (2004, 2005 2006, and 2007), the ROA was below the industry portfolio. In the following year, the ROA was above the industry portfolio and in the following year (2009), the ROA was below the industry portfolio. From 2010 to 2017, the ROA was above the industry portfolio. FAMBRANDS's and MR PRICE's ROA was above the industry portfolio for the whole period (2003 to 2017). NASPERS's ROA was above the industry portfolio on one occasion (2005), and for the remainder of the period it was below the industry portfolio. SHOPRITE's ROA was below the industry portfolio from 2003 to 2009. Over the next two years (2010 and 2011), the ROA was greater than the industry portfolio. In 2012, the ROA dropped below the industry portfolio. For the remainder of the period (2013 to 2017), the ROA was greater than the industry portfolio.

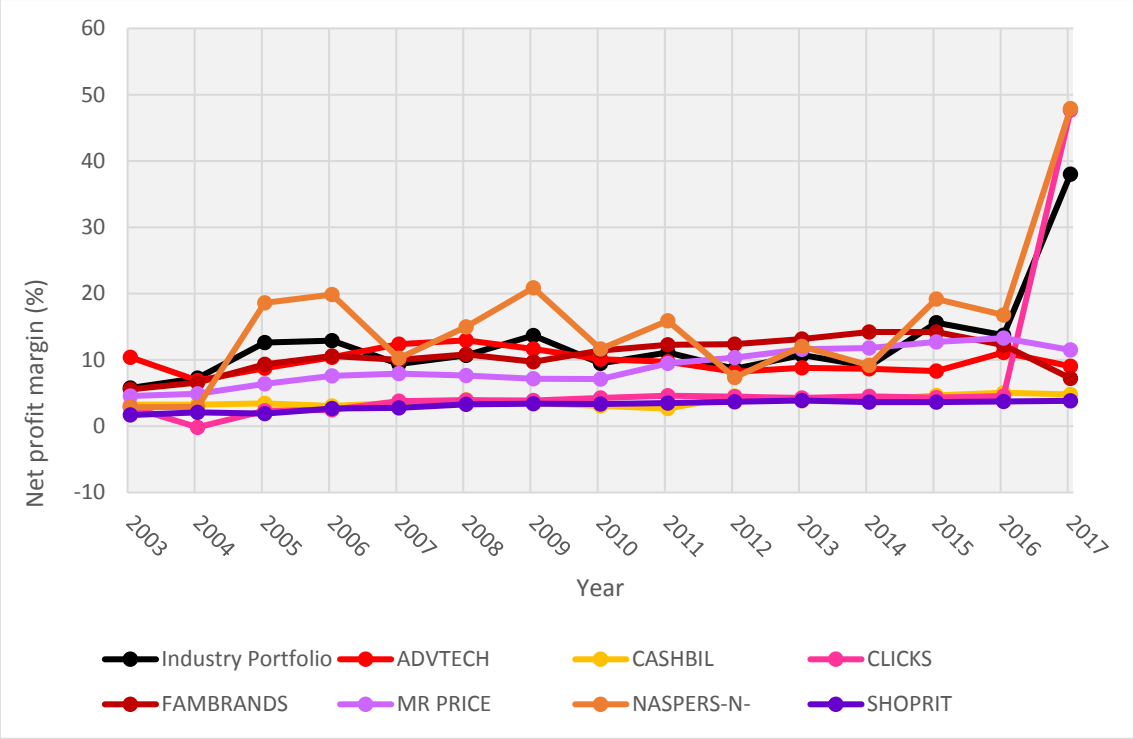

Figure 28: Return on assets for the Consumer Services industry portfolio and multi-bagger companies, ADVTECH, CASHBIL, CLICKS, FAMBRANDS, MR PRICE, NASPERS, and SHOPRITE, plotted over the period 2003 to 2017

Descriptive statistics performed on the ROA for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-33. The average ROA for the multi-bagger companies, ADVTECH, CASHBIL, CLICKS, FAMBRANDS, and MR PRICE were higher than that of the industry portfolio but not for NASPERS and SHOPRITE. The medians for the multi-bagger companies, ADVTECH, CLICKS, FAMBRANDS, and MR PRICE, were higher than that of the industry portfolio but not CASHBIL, NASPERS and SHOPRITE. The standard deviations for the multi-bagger companies, CLICKS, FAMBRANDS, MR PRICE, and NASPERS were greater than that of the industry portfolio but not for ADVTECH, CASHBIL and SHOPRITE. The multi-bagger companies with higher standard deviations suggest that their ROA was more volatile than that of the industry.

Table 5-33: Descriptive statistics on the Consumer Services ROA for the period 2003 to 2017

	Average	Median	Standard deviation
Industry Portfolio	14.73	16.60	4.08
ADVTECH	19.64	18.12	4.92
CASHBIL	15.45	14.89	2.49
CLICKS	17.62	19.65	5.46
FAMBRANDS	51.20	53.17	19.52
MR PRICE	31.38	27.88	9.99
NASPERS-N-	9.02	9.54	7.09
SHOPRIT	14.65	14.60	3.06

Looking at the data points; ADVTECH had four of the fifteen data points (87%) above the industry portfolio, CASHBIL had eight of the fifteen data points (53%) above the industry portfolio, CLICKS had one of the ten data points (67%) above the industry portfolio, FAMBRANDS had fifteen of the fifteen data points (100%) above the industry portfolio, MR PRICE had fifteen of the fifteen data points (100%) above the industry portfolio, NASPERS had one of the fifteen data points (7%) above the industry portfolio, and SHOPRITE had seven of the fifteen data points (47%) above the industry portfolio. Thus, the ROA for ADVTECH, CASHBIL, CLICKS, FAMBRANDS and MR PRICE were higher than that of the industry over the period 2003 to 2017.

5.2.6.4 Growth

The results comparing whether the Consumer Services industry index grew at a faster rate than that of the ALSI over the period 2003 to 2017 are shown graphically in Figure 29. Figure 29 shows that over that period, the Consumer Services industry index grew at a faster rate than that of the ALSI. From 2003 until 2007 the Consumer service industry index grew at a faster rate than the ALSI. In 2008 the Consumer Services industry index contracted but did not bring the growth below that of the ALSI. From 2009 to the end of the period, the Consumer Services industry index grew at a faster rate than that of the ALSI. Thereafter the Healthcare industry index contracted. At the end of the period, the ALSI was found to have increased to 6.42 times the value at the start of the period, while the Healthcare industry index had increased by 31.19 times. Thus, the Healthcare industry index had grown at a faster rate than that of the ALSI over the period.

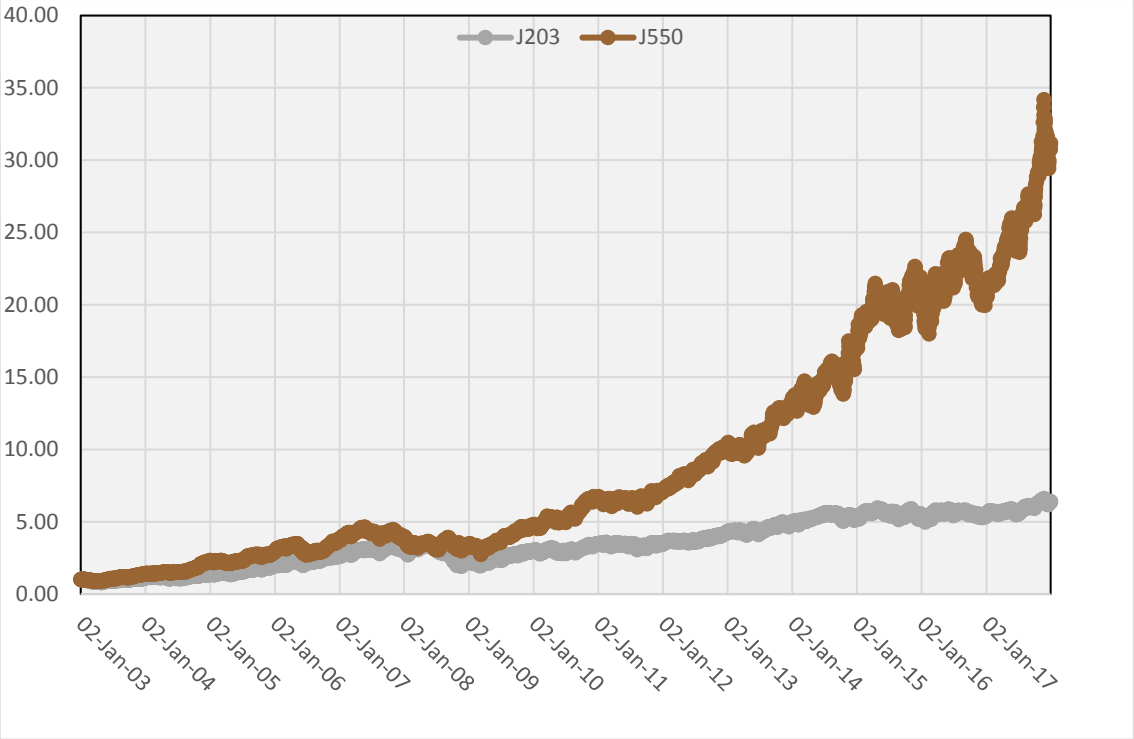

Figure 29: Consumer services industry index (J550) growth versus the ALSI (J203) growth over the period 3 January 2003 to 31 December 2017

5.2.7 Telecommunication industry (ICB code 6000)

There was one company in the sample. Within the sample for the Telecommunication industry, no multi-bagger was found.

5.2.7.1 Net profit margin, operating profit margin and Return on Assets (ROA)

There was one company in the Telecommunication industry sample; however, there were no multi-bagger companies to evaluate for their net profit margin, operating profit margin and ROA over the period.

5.2.7.2 Growth

The results of comparing whether the Telecommunication industry index grew at a faster rate than that of the ALSI over the period 2003 to 2017, are shown graphically in Figure 30. Figure 30 shows that over that period, the Telecommunication industry index grew at a faster rate than that of the ALSI. From 2003 until 2007 the Telecommunication industry index grew at a faster rate than the ALSI. In 2008, the Telecommunication industry index contracted but it did not drop below that of the ALSI. From 2009 to the

beginning of 2015, the Telecommunication industry index grew at a faster rate than that of the ALSI. Thereafter the Telecommunication industry index contracted. At the end of the period, the ALSI was found to have increased to 6.42 times the value at the start of the period, while the Telecommunication industry index had increased by 9.15 times. Thus, the Telecommunication industry index had grown at a faster rate than that of the ALSI over that period.

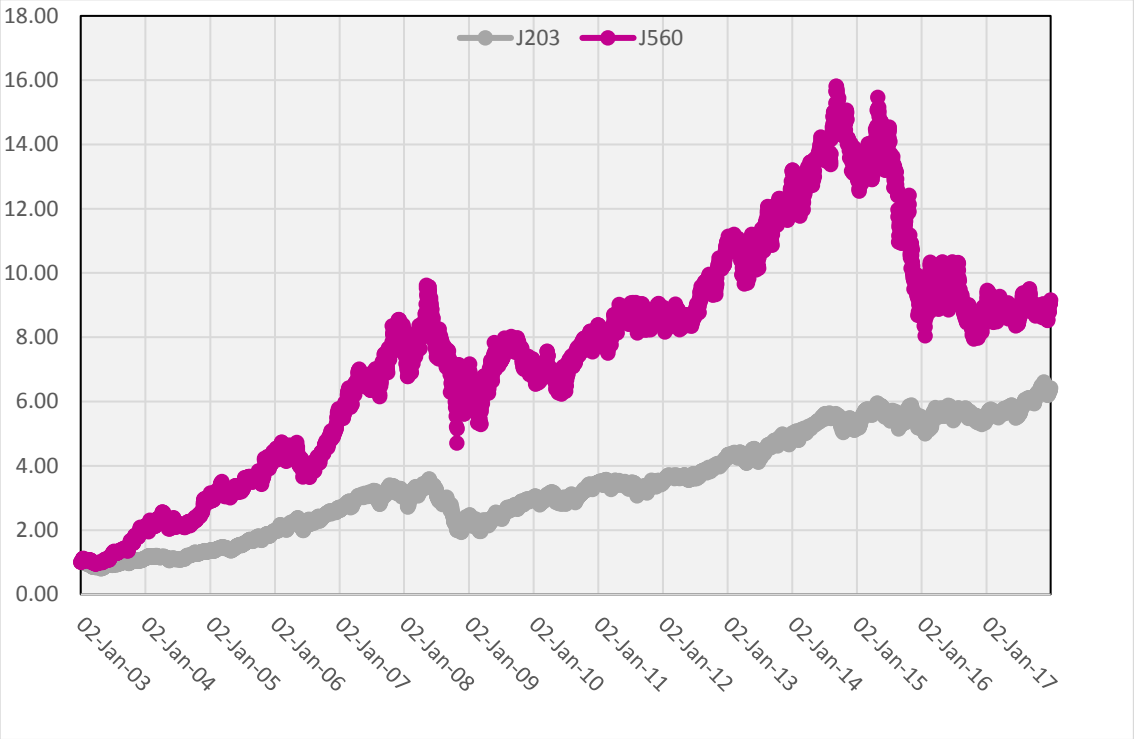

Figure 30: Telecommunication industry index (J560) growth versus the ALSI (J203) growth over the period 3 January 2003 to 31 December 2017

5.2.8 Utilities industry (ICB code 7000)

There were no companies in the Utilities sample and no multi-bagger company was found.

5.2.8.1 Net profit margin, operating profit margin and Return on Assets (ROA)

There was no multi-bagger company found in the Utilities industry sample. Thus, there was no multi-bagger company to evaluate for their net profit margin, operating profit margin and return on assets (ROA) over the period.

5.2.8.2 Growth

Over the period (start of 2000 to the end of 2017) IRESS did not have any data for the Utilities industry index. This was checked against two other sources, IRESS expert and Sharenet. Both alternate sources did not have any data for the Utilities industry index.

5.2.9 Financial industry (ICB code 8000)

There were twelve companies in the sample for the Financial industry. Within the sample for the Financial industry, three multi-bagger companies were found. The multi-baggers included DISCOVERY, HCL and PERGRIN.

DISCOVERY started the period with a size ranking of 10 and ended the period with a size ranking of 12, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. HCL started the period with a size ranking of 5 and ended the period with a size ranking of 6, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. PERGRIN started the period with a size ranking of 6 and ended the period with a size ranking of 5. This meant that the company decreased its size ranking but it grew in size (market capitalisation has grown by a factor of 10).

Figure 31 illustrates the results for the graphical comparison of the multi-bagger financial metrics to the sample portfolios and a graphical comparison of the growth within the industry compared to that of the market.

5.2.9.1 Operating profit margin (%)

The null hypothesis was that the operating profit margin for multi-bagger companies would be higher than that of the industry portfolio (average). The operating profit margins for the multi-bagger companies, DISCOVERY, HCL, PERGRIN and the industry portfolio are displayed in Figure 31.

Figure 31 shows the operating profit margin for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. DISCOVERY's operating profit margin was below the industry portfolio from 2003 until 2007. Over the next two years (2008 and 2009), the operating profit margin was greater than that of the industry portfolio. In the following year (2010), the operating profit margin for DISCOVERY dropped below that of the industry portfolio. In 2011, DISCOVERY's operating profit margin was greater than that of the industry portfolio. From 2012 until the end of the period (2017), the operating profit margin was less than that of the industry portfolio. HCL's operating profit margin was below the industry portfolio from 2003 until 2007. Over the next two years (2008 and 2009), the operating profit margin was greater than that of the industry portfolio. From 2010 until the end of the period (2017), the operating profit margin was less than that of the industry portfolio. PERGRIN's operating profit margin was below the industry portfolio from 2003 until 2006. Over the next two years (2007 and 2008), the operating profit margin was greater than that of the industry portfolio. From 2009 until the end of the period (2017), the operating profit margin was less than that of the industry portfolio.

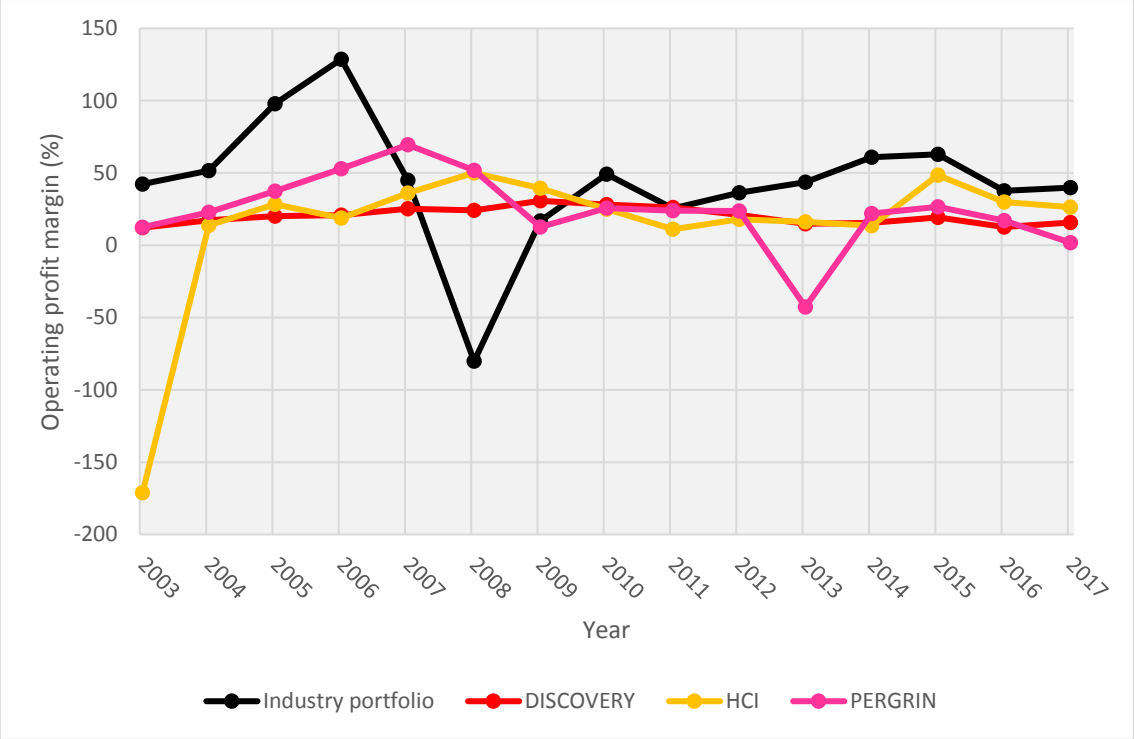

Figure 31: Operating profit margin for the Financial industry portfolios and multi-bagger companies, DISCOVERY, HCL and PERGRIN, plotted over the period 2003 to 2017

Descriptive statistics performed on the operating profit margins for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are shown in Table 5-34. The average operating profit margins for DISCOVERY, HCL and PERGRIN were lower than that of the industry portfolio. The median operating profit margins for the multi-bagger companies was lower than that of the industry portfolio. The standard deviation for the HCL was greater than that of the industry. This suggests that the operating profit margin for the multi-bagger company was more volatile than that of the industry. DISCOVERY and PERGRIN had lower standard deviations, suggesting that their operating profit margins were more stable than that of the industry.

Table 5-34: Descriptive statistics on the Financial industry operating profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	43.48	42.57	45.32
DISCOVERY	20.28	20.10	5.70
HCI	13.60	25.10	52.58
PERGRIN	23.83	23.68	25.51

Looking at the data points, DISCOVERY had three of the fifteen data points (20%) above the industry portfolio and HCL had two of the fifteen data points (13%) above the industry portfolio and HPERGRIN had two of the fifteen data points (13%) above the industry portfolio. Thus, the operating profit margins for DISCOVERY, HCL and PERGRIN were not higher than that of the industry over the period 2003 to 2017.

5.2.9.2 Net profit margin (%)

The null hypothesis was that the net profit margin for the multi-bagger companies would be higher than that of the industry portfolio (average). The net profit margin for the multi-bagger companies, DISCOVERY, HCL and PERGRIN, and the industry portfolio are displayed in Figure 32.

Figure 32 shows the net profit margins for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. DISCOVERY's net profit margin was below the industry portfolio from 2003 until 2006. Over the next three years (2007, 2008 and 2009), the net profit margin was greater than that of the industry portfolio. In the following year, the net profit margin dropped below the industry portfolio. In the following two years (2011 and 2012), the net profit margin for DISCOVERY was above that of the industry portfolio. From 2013 until the end of the period (2017), the net profit margin was less than that of the industry portfolio. HCL's net profit margin was below the industry portfolio from 2003 until 2006. Over the next three years (2007, 2008 and 2009), the net profit margin was greater than that of the industry portfolio. In the following year, the net profit margin dropped below the industry portfolio. In the following two years (2011 and 2012), the net profit margin for HCL was above that of the industry portfolio. From 2013 until the end of the period (2017), the net profit margin was less than that of the industry portfolio. PERIN's net profit margin was below the industry portfolio from 2003 until 2006. Over the next three years (2007, 2008 and 2009), the net profit margin was greater than that of the industry portfolio. The following year the net profit margin dropped below the industry portfolio. Over the following two years (2011 and 2012), the net profit margin for HCL was above that of the industry portfolio. From 2013 until 2015, the net profit margin was below the industry portfolio. In the following year, the net profit margin was above the industry portfolio. In the final year, the net profit margin for PERGRIN was below the industry portfolio.

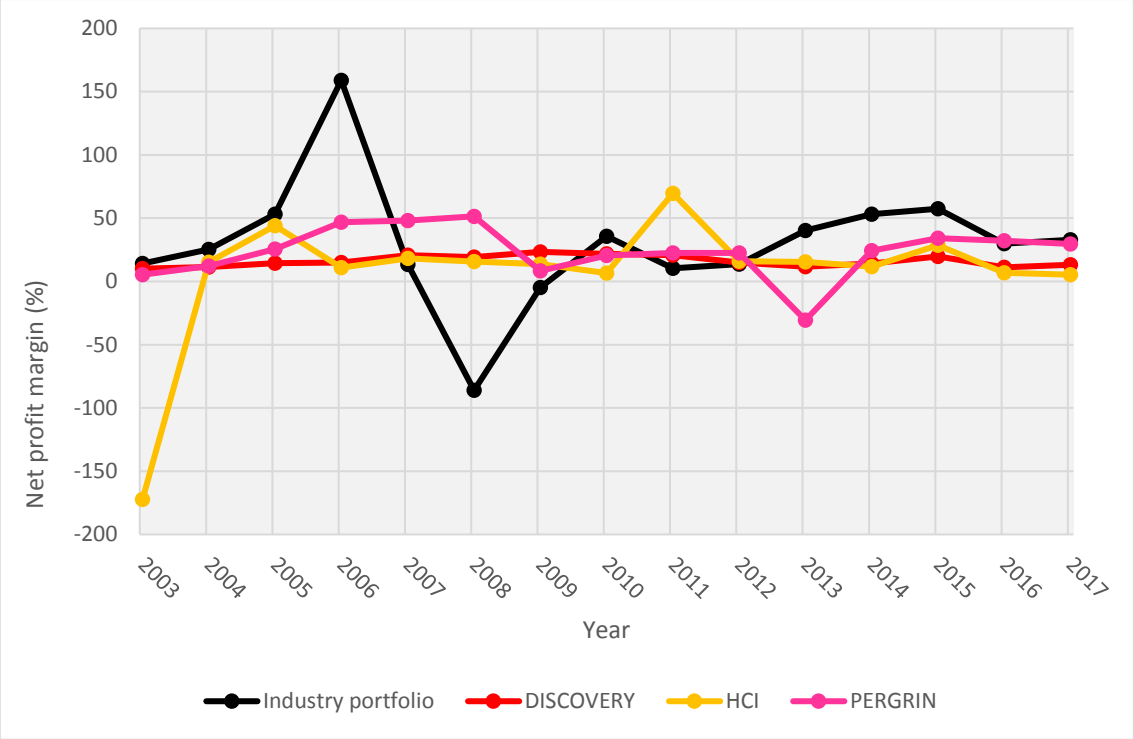

Figure 32: Net profit margins for the Financial industry portfolio and multi-bagger companies, DISCOVERY, HCL and PERGRIN, plotted over the period 2003 to 2017

Descriptive statistics performed on the net profit margins for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-35. The average net profit margins for the multi-bagger companies, DISCOVERY, HCL and PERGRIN were lower than that of the industry portfolio. The median net profit margins for the multi-bagger companies were lower than that of the industry portfolio. The standard deviation for the net profit margin for the HCL was greater than that of the industry portfolio. This suggests that the net profit margin for the HCL was more volatile than that of the industry.DISCOVERY and PERGRIN had lower standard deviations, suggesting that their operating profit margins were more stable than that of the industry.

Table 5-35: Descriptive statistics on the Financial industry net profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	29.54	29.43	50.93
DISCOVERY	16.07	14.91	4.43
HCI	7.06	15.31	52.40
PERGRIN	23.53	24.20	20.35

Looking at the data points, DISCOVERY had five of the fifteen data points (33%) above the industry portfolio and HCL had five of the fifteen data points (33%) above the industry portfolio, and PERGRIN had six of the fifteen data points (40%) above the industry portfolio. Thus, the operating profit margins for DISCOVERY, HCL and PERGRIN were not higher than that of the industry over the period 2003 to 2017.

5.2.9.3 Return on Assets (ROA) (%)

The null hypothesis was that the ROAs for the multi-bagger companies would be higher than that of the industry portfolio (average). The ROAs for the multi-bagger companies, DISCOVERY, HCL, PERGRIN and the industry portfolio are displayed in Figure 33.

Figure 33 shows the ROAs for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. DISCOVERY's ROA was above the industry portfolio from 2003 until 2013. In the following year (2014), the ROA dropped below the industry portfolio. In 2015, the ROA rose above the industry portfolio. In the following two years (2016 and 2017), the ROA was below the industry portfolio. HCL's ROA was below the industry portfolio for the first two years (2004 and 2004), and in 2005 the ROA for HCL was above the industry portfolio. In the following year (2006), the ROA dropped below the industry portfolio. From 2007 until 2017, the ROA for HCL was greater than that of the industry portfolio. PERGRIN's ROA was below the industry portfolio for all the years in the period with the exception of the year 2008, where the ROA was greater than the industry portfolio.

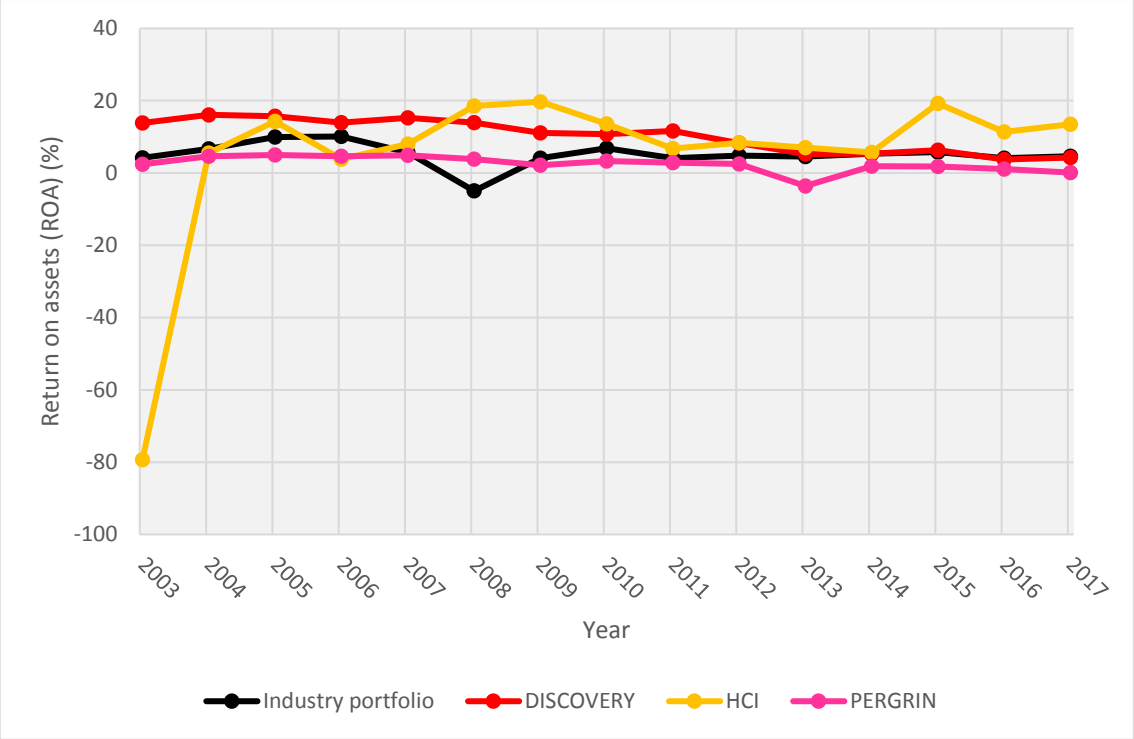

Figure 33: Return on assets for the Financial industry portfolio and multi-bagger companies, DISCOVERY, HCL and PERGRIN, plotted over the period 2003 to 2017

Descriptive statistics performed on the ROA for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are shown in Table 5-36. The average ROA for the industry portfolio was less than that of the multi-bagger companies. The median ROAs for the multi-bagger companies were greater than that of the industry portfolio. The standard deviations for the multi-bagger companies was greater than that of the industry. This suggests that the ROA for the multi-bagger companies was more volatile than that of the industry.

Table 5-36: Descriptive statistics on the Financial industry return on assets for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	5.02	4.81	3.46
DISCOVERY	10.34	11.07	4.46
HCI	5.07	8.36	23.93
PERGRIN	2.50	2.52	2.23

Looking at the data points, DISCOVERY had twelve of the fifteen data points (80%) above the industry portfolio, HCL had twelve of the fifteen data points (80%) above the industry portfolio, and PERGRIN had one of the fifteen data points (7%) above the

industry portfolio. Thus, the ROAs for DISCOVERY and HCL were higher than that of the industry portfolio while PERGRIN was lower than the industry portfolio over the period 2003 to 2017.

5.2.9.4 Growth

The results comparing whether the Financial industry index grew at a faster rate than that of the ALSI over the period 2003 to 2017, are shown graphically in Figure 34. Figure 34 shows that over that period, the Financial industry index had not grown at a faster rate than that of the ALSI. From 2003 until the start of 2007, the Financial industry index tracked that of the ALSI. In 2007 and 2008, the Financial industry index contracted to a lower rate than that of the ALSI. From 2009 to the end of the period, the Financial industry index tracked that of the ALSI. At the end of the period, the ALSI was found to have increased to 6.42 times the value at the start of the period, while the Financial industry index had increased by 5.73 times. Thus, the Financial industry index had not grown at a faster rate than that of the ALSI over that period.

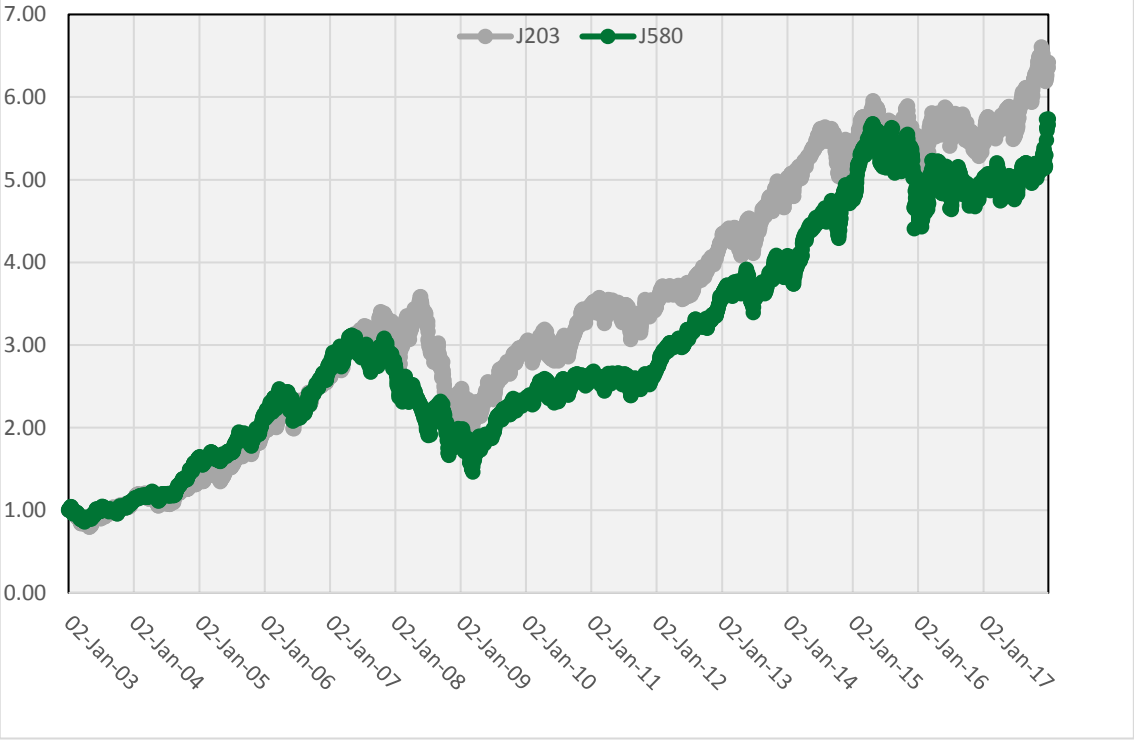

Figure 34: Financial industry index (J580) growth versus the ALSI (J203) growth over the period 3 January 2003 to 31 December 2017

5.2.10 Technology industry (ICB code 9000)

There were ten companies in the sample for the Technology industry. Within the sample for the Technology industry, five multi-bagger companies were found. The multi-baggers included ADAPTIT, ALVIVA, COGNITION, EOH and ISA.

ADAPTIT started the period with a size ranking of 4 and ended the period with a size ranking of 6, in other words, the company grew in size (market capitalisation) compared to the rest of the companies in the industry. ALVIVA started the period with a size ranking of 5 grew in size (market capitalisation) compared to the rest of the companies in the industry. COGNITION started the period with a size ranking of 3 and ended the period with a size ranking of 3. This shows that the company had not changed its size ranking relative to the other companies in the industry. However, the size (market capitalisation) of the company had grown. EOH started the period with a size ranking of 7 and ended the period with a size ranking of 9, in other words, the company had grown in size (market capitalisation) compared to the rest of the companies in the industry. ISA started the period with a size ranking of 1 and ended the period with a size ranking of 4, in other words, the company had grown in size (market capitalisation) compared to the rest of the companies in the industry.

Figure 35 illustrates the graphical comparison of the multi-bagger financial metrics to the sample portfolios and a graphical comparison of the growth within the industry compared to that of the market.

5.2.10.1 Operating profit margin (%)

The null hypothesis was that the operating profit margin for multi-bagger companies would be higher than that of the industry portfolio (average). The operating profit margins for the multi-bagger companies, ADAPTIT, ALVIVA, COGNITION, EOH, ISA, and the portfolio are displayed in Figure 35.

Figure 35 shows the operating profit margin for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. ADAPTIT and EOH's operating profit margins were above the industry portfolio for all the years in the period. ALVIVA's operating profit margin was below the industry portfolio for the first

year. In the following three years, the operating profit margin was above that of the industry portfolio. For the years 2007 and 2008, the operating profit margin was below the industry portfolio. From 2009 to 2013, the operating profit margin was above the industry portfolio. From 2014 to the end of the period (2017), ALVIVA's operating profit margin was above the industry portfolio. COGNITION's operating profit margin was below the industry portfolio for the first three years (2003 to 2005); thereafter, the operating profit margin was above the industry portfolio. ISA's operating profit margin was below the industry portfolio for the first two years (2003 and 2004); thereafter, the operating profit margin was above the industry portfolio.

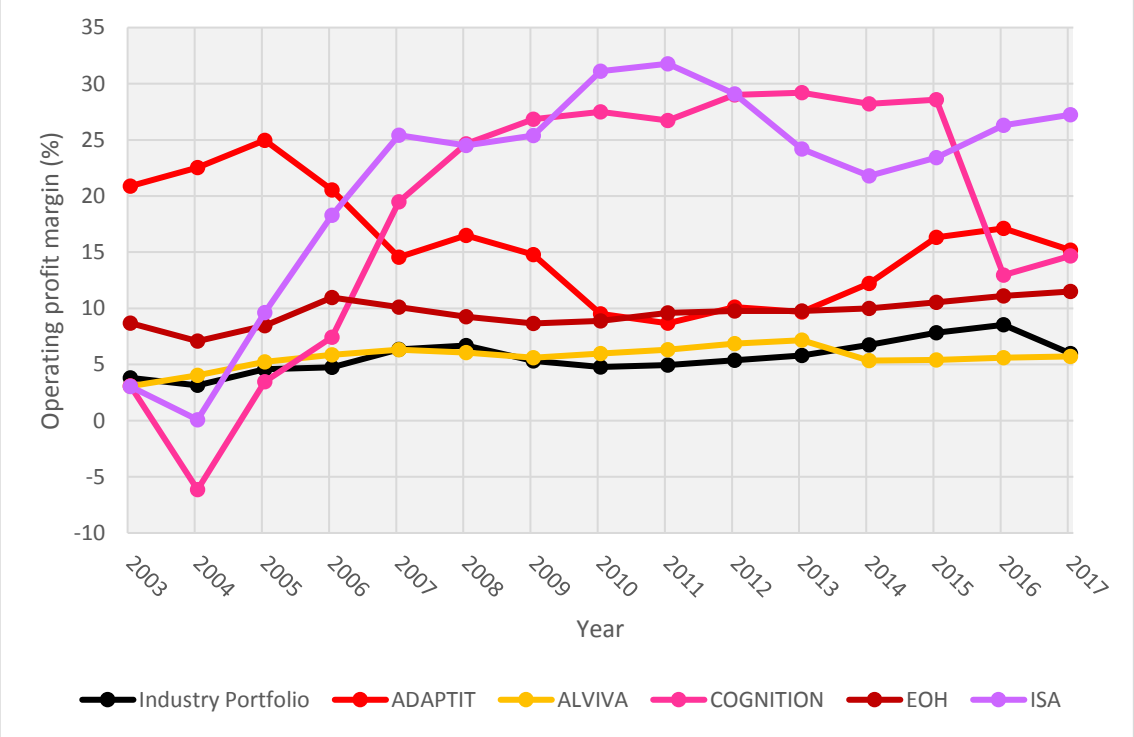

Figure 35: Operating profit margin for the Technology industry portfolio and multi-bagger companies, ADAPTIT, ALVIVA, COGNITION, EOH and ISA, plotted over the period 2003 to 2017

Descriptive statistics performed on the operating profit margins for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are shown in Table 5-37. The average operating profit margins for ADAPTIT (same as the industry portfolio), ALVIVA, COGNITION, EOH and ISA were higher than that of the industry portfolio. The medians for ADAPTIT, ALVIVA, COGNITION, EOH and ISA were higher than that of the industry portfolio. The standard deviations for ADAPTIT, COGNITION and ISA were greater than that of the industry portfolio but not for ALVIVA and EOH. The multi-bagger companies

with higher standard deviations suggest that their operating profit margin was more volatile than that of the industry.

Table 5-37: Descriptive statistics on the Technology industry operating profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	5.64	5.39	1.44
ADAPTIT	15.58	15.19	5.04
ALVIVA	5.64	5.73	1.02
COGNITION	18.38	24.66	11.70
EOH	9.62	9.76	1.17
ISA	21.41	24.50	9.68

Looking at the data points; ADAPTIT had fifteen of the fifteen data points (100%) above the industry portfolio, ALVIVA had eight of the fifteen data points (53%) above the industry portfolio, COGNITION had twelve of the fifteen data points (80%) above the industry portfolio, EOH had fifteen of the fifteen data points (100%) above the industry portfolio and ISA had thirteen of the fifteen data points (87%) above the industry portfolio. Thus, the operating profit margins for ADAPTIT, ALVIVA, COGNITION, EOH and ISA were higher than that of the industry over the period 2003 to 2017.

5.2.10.2 Net profit margin (%)

The null hypothesis was that the net profit margins for the multi-bagger companies would be higher than that of the industry portfolio (average). The net profit margins for the multi-bagger companies, ADAPTIT, ALVIVA, COGNITION, EOH, ISA and the industry portfolio are displayed in Figure 36.

Figure 36 shows the net profit margin for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. ADAPTIT and EOH's net profit margins were above the industry portfolio for all the years. ALVIVA's operating profit margin was below the industry average for the years 2003, 2008, 2014, 2015 and 2016. For the remainder of the years in the period, the net profit margins were above that of the industry portfolio. COGNITION's net profit margin was above the industry portfolio for all the years in the period except for the year 2004. ISA's net profit margin was below the industry average for the first two years. For the remainder of the years in the period, the net profit margin was above that of the industry portfolio.

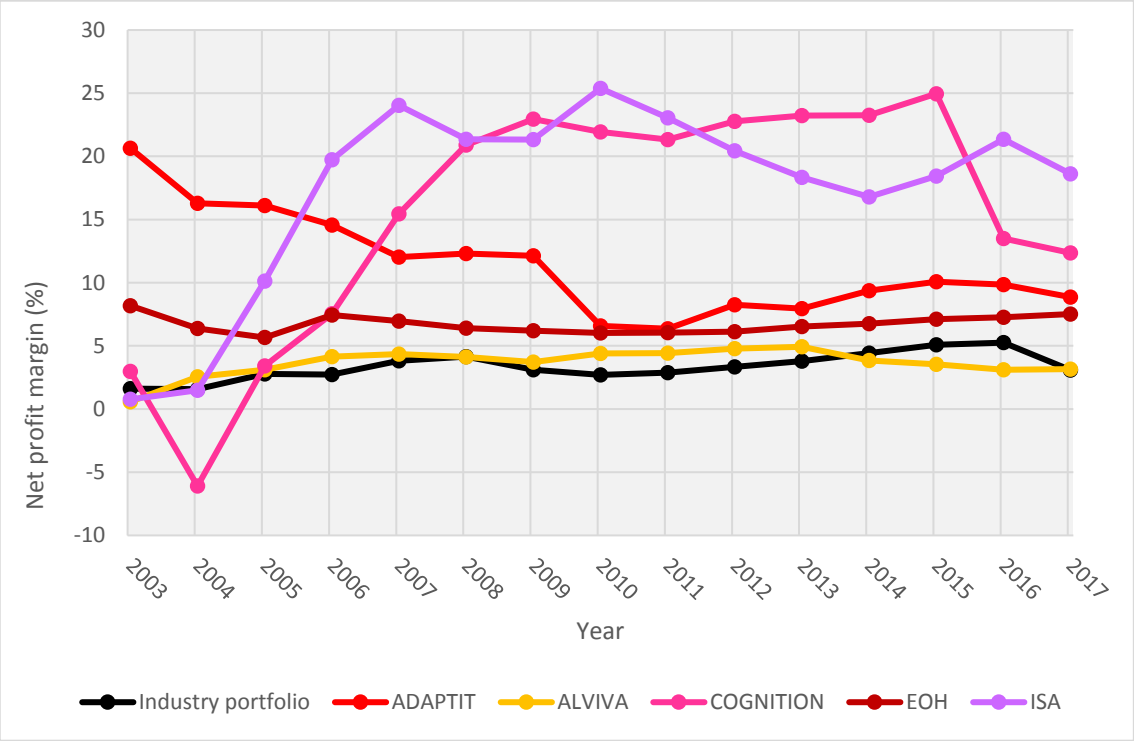

Figure 36: Net profit margins for the Technology industry portfolio and multi-bagger companies, ADAPTIT, ALVIVA, COGNITION, EOH and ISA, plotted over the period 2003 to 2017

Descriptive statistics performed on the net profit margins for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-38. The average net profit margins for the multi-bagger companies, ADAPTIT, ALVIVA, COGNITION, EOH and ISA were higher than that of the industry portfolio. The medians for the multi-bagger companies, ADAPTIT, ALVIVA, COGNITION, EOH and ISA were higher than that of the industry portfolio. The standard deviations for the multi-bagger companies, ADAPTIT, ALVIVA (the same as the industry portfolio), COGNITION, and ISA were greater than that of the industry portfolio but not for EOH. The multi-bagger companies with higher standard deviation suggest that their net profit margin was more volatile than that of the industry.

Table 5-38: Descriptive statistics on the Technology industry net profit margin for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	3.36	3.12	1.09
ADAPTIT	11.42	10.07	4.04
ALVIVA	3.65	3.84	1.09
COGNITION	15.37	20.91	9.52
EOH	6.71	6.54	0.69
ISA	17.42	19.72	7.50

Looking at the data points; ADAPTIT had fifteen of the fifteen data points (100%) above the industry portfolio, ALVIVA had ten of the fifteen data points (67%) above the industry portfolio, COGNITION had fourteen of the fifteen data points (93%) above the industry portfolio, EOH had fifteen of the fifteen data points (100%) above the industry portfolio, and ISA had thirteen of the fifteen data points (87%) above the industry portfolio. Thus, the operating profit margin for ADAPTIT, ALVIVA, COGNITION, EOH, ISA were higher than that of the industry over the period 2003 to 2017.

5.2.10.3 Return on Assets (ROA) (%)

The null hypothesis was that the ROAs for the multi-bagger companies would be higher than that of the industry portfolio (average). The ROAs for the multi-bagger companies, ADAPTIT, ALVIVA, COGNITION, EOH, ISA, and the portfolio are displayed in Figure 37.

Figure 37 shows the ROAs for the industry portfolio (average) and the multi-bagger companies in the industry over the period 2003 to 2017. ADAPTIT and EOH's ROAs were above the industry portfolio for all the years in the period. ALVIVA's ROA was below the industry portfolio from 2003 until 2013. From 2014 to the end of the period, the ROA was below the industry portfolio. COGNITION's ROA was below the industry portfolio for the first three years (2003 to 2005). From 2006 until 2013, the ROA was above the industry portfolio. In 2104, there is a drop in the ROA and it fell below the industry portfolio. For the rest of the period, the ROA for COGNITION was greater than that of the industry portfolio. ISA's ROA was below the industry portfolio for the year 2014. For all the other years in the period, the ROA for ISA was greater than that of the industry portfolio.

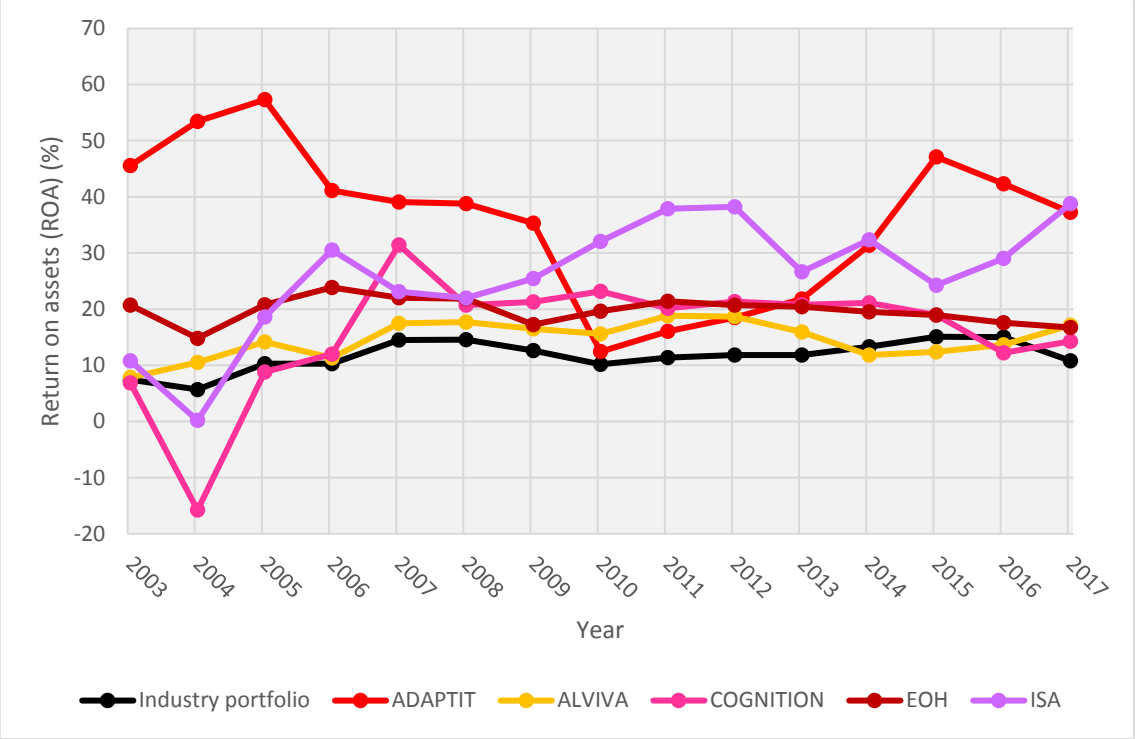

Figure 37: Return on assets for the Technology industry portfolio and multi-bagger companies, ADAPTIT, ALVIVA, COGNITION, EOH and ISA, plotted over the period 2003 to 2017

Descriptive statistics performed on the ROAs for the industry portfolio and multi-bagger companies over the period 2003 to 2017 are displayed in Table 5-39. The average ROAs for ADAPTIT, ALVIVA, COGNITION, EOH and ISA were higher than that of the industry portfolio. The median ROAs for ADAPTIT, ALVIVA, COGNITION, EOH, ISA were higher than that of the industry portfolio. The standard deviations for ALVIVA, COGNITION, and ISA were greater than that of the industry portfolio but not for EOH. The multi-bagger companies with higher standard deviations suggests that their net profit margin was more volatile than that of the industry.

Table 5-39: Descriptive statistics on the Technology industry ROA for the period 2003 to 2017

	Average	Median	Standard deviation
Industry portfolio	11.65	11.81	2.72
ADAPTIT	35.84	38.81	13.47
ALVIVA	14.64	15.61	3.29
COGNITION	15.83	20.17	10.77
EOH	19.77	20.44	2.36
ISA	25.99	26.67	10.49

Looking at the data points; ADAPTIT had fifteen of the fifteen data points (100%) above the industry portfolio, ALVIVA had twelve of the fifteen data points (80%) above the industry portfolio, COGNITION had eleven of the ten data points (73%) above the industry portfolio, EOH had fifteen of the fifteen data points (100%) above the industry portfolio, and ISA had fourteen of the fifteen data points (93%) above the industry portfolio. Thus, the ROAs for ADAPTIT, ALVIVA, COGNITION, EOH and ISA were higher than that of the industry over the period 2003 to 2017.

5.2.10.4 Growth

The results for comparing whether the Technology industry index grew at a faster rate than that of the ALSI over the period 2003 to 2017 are shown graphically in Figure 38. Figure 38 shows that over that period, the Technology industry index grew at a faster rate than that of the ALSI. From 2003 until 2007, the Technology industry index tracked the ALSI. In 2008, the Technology industry index contracted to bring the growth rate below that of the ALSI. From 2009 to the beginning of 2015, the Technology industry index grew at a faster rate than that of the ALSI. Thereafter, the Technology industry index contracted. At the end of the period, the ALSI was found to have increased to 6.42 times the value at the start of the period, while the Technology industry index had increased by 8.03 times. Thus, the Technology industry index had grown at a faster rate than that of the ALSI over the period.

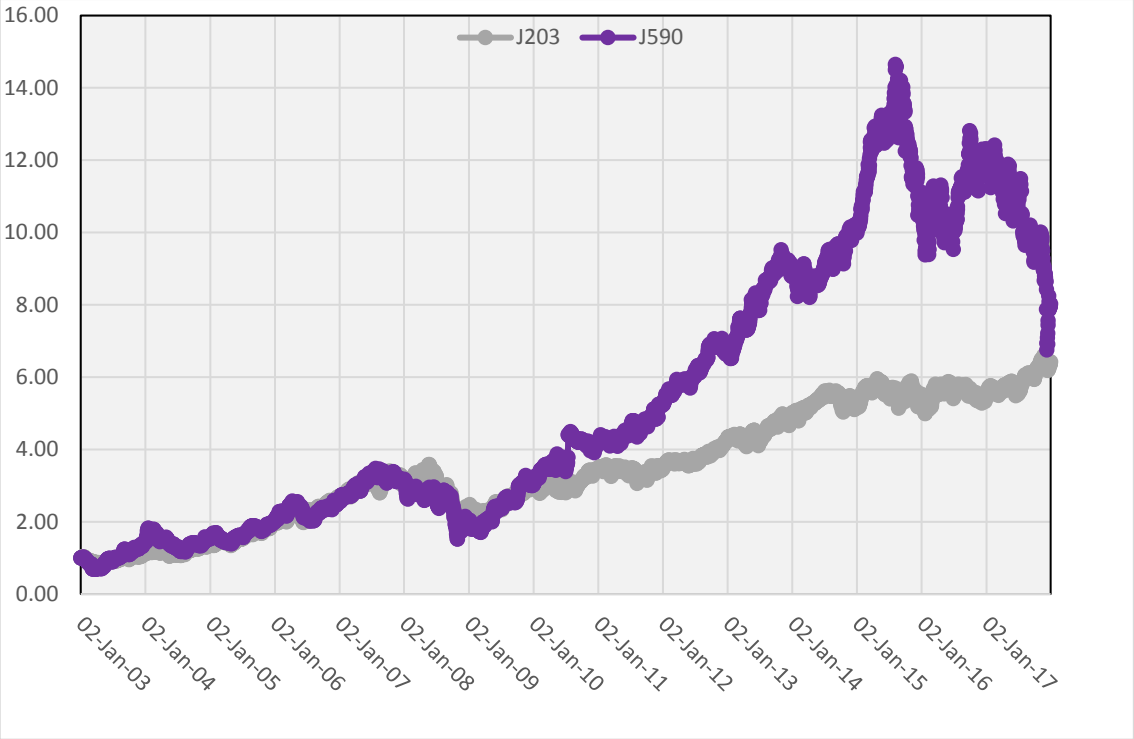

Figure 38: Technology industry index (J590) growth versus the ALSI (J203) growth over the period 3 January 2003 to 31 December 2017

5.3 Summary of results

The summary of the results from the previous three sections will be presented below in the same format as that they were presented above. The results from Hypothesis 1 and hypothesis 2 are summarised below.

5.3.1 Hypothesis 1

The results from Hypothesis 1 of the different styles of the multi-bagger companies in the different industries are shown in Table 5-40. Table 5-40 also compares whether the industry was growing at a faster rate than that of the market (defined as the ALSI). Where the multi-bagger company did not meet the criteria for the null hypothesis in hypothesis 1, the cell is highlighted yellow in the table.

Table 5-40: Summary of Hypothesis 1 results for the different industries

Industry index	Multi-bagger	P/E	Size	Leverage	Growth
Oil & Gas					No
Basic Materials	ASSORE	Value	Small	Low	Yes
Industrial	HOWDEN	Growth	Small	Low	Yes
	METROFILE	Value	Small	High	
	ONELOGIX	Growth	Small	High	
Consumer Goods					No
Healthcare	ASPEN	Growth	Small	High	Yes
Consumer Services	ADVTECH	Value	Small	High	No
	CASHBIL	Value	Small	High	
	CLICKS	Growth	Large	High	
	FAMBRANDS	Value	Small	High	
	MR PRICE	Value	Large	Low	
	NASPERS	Value	Large	High	
	SHOPRITE	Growth	Large	High	
Telecommunications					No
Utilities					No
Financials	DISCOVERY	Growth	Large	Low	No
	HCI	Value	Large	Low	
	PERGRIN	Value	Small	High	
Technology	ADAPTIT	Growth	Small	Low	No
	ALVIVA	Value	Small	Low	
	COGNITION	Value	Small	High	
	EOH	Growth	Large	High	
	ISA	Value	Small	High	

5.3.2 Hypothesis 2

The results from hypothesis 2 of whether the multi-bagger companies in the different industries outperformed the industry portfolio for each of the styles, are captured in Table 5-41. Table 5-41 also compares whether the industry was growing at a faster rate than that of the market (defined as the ALSI) over the period 2003 until the end of 2017.

Where the multi-bagger company did not meet the criteria for the null hypothesis in hypothesis 2, the cell is highlighted yellow in the table.

Table 5-41: Summary of Hypothesis 2 results for the different industries

Industrial index	Multi-bagger	Operating profit margin	Net profit margin	Return on assets	Growth
Oil & gas	-	-	-	-	Yes
Basic Materials	ASSORE	Yes	Yes	Yes	No
Industrial	HOWDEN	Yes	Yes	Yes	Yes
	METROFILE	Yes	Yes	Yes	
	ONELOGIX	Yes	Yes	Yes	
Consumer goods	-	-	-	-	Yes
Healthcare	ASPEN	Yes	Yes	Yes	Yes
Consumer services	ADVTECH	Yes	No	Yes	Yes
	CASHBIL	No	No	Yes	
	CLICKS	No	No	Yes	
	FAMBRANDS	Yes	No	Yes	
	MR PRICE	No	No	Yes	
	NASPERS	Yes	Yes	No	
	SHOPRITE	No	No	No	
Telecommunications	-	-	-	-	Yes
Utilities	-	-	-	-	-
Financials	DISCOVERY	No	No	Yes	No
	HCI	No	No	Yes	
	PERGRIN	No	No	No	
Technology	ADAPTIT	Yes	Yes	Yes	Yes
	ALVIVA	Yes	Yes	Yes	
	COGNITION	Yes	Yes	Yes	
	EOH	Yes	Yes	Yes	
	ISA	Yes	Yes	Yes	

6 Discussion of results

The purpose of this retrospective research comparing multi-bagger companies to their markets was to provide an improved understanding of whether previously proposed metrics for identifying multi-bagger value companies were valid. The research also aimed to evaluate which of the factors defined in the literature were driving multi-bagger companies in the different markets.

The results from this research, presented in the previous section, will now be discussed in this section of the report. This will be done using the same structure used for reporting of the results, where the discussion will look at the sample, hypothesis 1 and then hypothesis 2.

For each of the sections below, the discussion will focus on the results themselves, any anomalies that occurred in the results, and how the results compare findings from previous work in this field. Each section will also discuss how some of the methods could be improved upon and recommendations for future work.

6.1 Sample

As noted in the results section, the data collected from IRESS (except for the financial ratios collected by industry index) did not contain any companies that survived over the defined period (2003 to 2017). Companies that were started during the multi-bagger period or had missing data were removed from the sample frame. The following section will discuss why data was missing for some companies and the effect of the judgemental sampling method on the results.

Companies that were missing all or part of their data were represented by a #N/A in the data. Checks were performed to determine if the company was not operating during the defined period. However, it was found that the market capitalisation for such companies was still being reported, in other words, the companies were still listed and operating. A query was submitted to IRESS as to why there was data missing in the data collected. More specifically, it was queried why the gold companies did not have any data, why some companies had a year of missing data, and why some of the metrics that were being collected, were missing from the data set. An emailed response received from

IRESS stated that there was no data from the gold companies because IRESS had not converted the gold ratios to non-gold ratios when the gold format was discontinued. As to why companies were missing data for an entire year, IRESS explained that there was no data for that year because companies had changed their yearend (for example a December year end was changed to February). In the year that this occurred, there was no published annual report. With no annual report published, the information could not be captured. As to why there was no data for some of the metrics, the reasoning was that there was either no data or there was a problem with their system (the calculation method was not correct) (IRESS Support - Kaamiela Job, 2018).

The effect of excluding the data that was missing caused a decrease in the sample size. The removal of companies from the sample affected the following industries: 1) Oil and Gas, 2) Basic Materials, 3) Industrial, 4) Consumer goods, 5) Consumer services, 6) Telecommunications, and 7) Financials. The removal of companies from each of the industry sample caused the data to be skewed. To illustrate how the data was skewed, the industries that were affected more, by having a large percentage of the sample removed due to missing data or the removal of multi-bagger companies, are discussed below.

In the Basic Materials industry, eight companies, or 29% of the companies that could have made up the sample, were removed from the sample. Of these eight companies that were removed from the sample, five of them were gold companies. Looking at how the gold companies could have affected the size analysis of hypothesis 1, as this data was available, it was found that it would not have changed the outcome of the assessment of the multi-bagger company ASSORE. However, the other styles could have been affected by these companies being left out of the sample. Looking at the Industrial industry, where nine companies, or 26% of the companies that could have made up the sample were removed from the sample, one of the companies removed was a multi-bagger company MICROMEGA.

Another industry that was negatively affected by the removal of companies from the sample was the Financial industry. In the Financial industry, 24 or 67% of the companies that could have made up the sample, were removed from the sample. Eight of the companies removed were multi-bagger companies ADRENNA, CAPITEC, CONDUIT, CORONAT, PSG, RESILIENT, SABVSET and SABVSET -N-. This means that only 27%

of the multi-baggers in the industry were analysed as the other 73% had missing data. Two of these multi-baggers will be discussed as to whether leaving them out of the sample was the best solution. The first multi-bagger, ADRENNA, did not have any data for the year 2002, a period during which the companies were being analysed for hypothesis 1. The alternative to excluding this company would have been to include the company but to use preliminary or unpublished data. This could have led to the use of potentially inaccurate data which could bring into question the validity and reliability of the data collected. CAPITEC had missing data for the operating profit margin and net profit margin for most (there were data for three of the years) of the multi-bagger period being analysed.

To evaluate whether excluding these companies was the best option, the discussion will now focus on ways in which other investigators have dealt with this problem. Muller and Ward (2013) used data from INET in their research. In their methodology, they stated that if there was an error in the data, they excluded the data by setting that day's data point to zero. This was also done for companies whose returns were less than 40% or greater than 40% (Muller & Ward, 2013). In contrast, Truong (2009) used a different method for analysing P/E ratios. Truong excluded any company from their sample that made a loss. Their reasoning was that this would create a negative P/E ratio, which Truong be considered to be meaningless (Truong, 2009). It must be noted that the works performed by Truong (2009) and Muller and Ward (2013) each included samples of over 160 companies. A large number of companies in their samples suggests that the removal of outlier values would have had less of an effect on their results than if there had only been 20 companies in the sample. However, both methods removed pertinent data that had been collected. If the data were not available, the best option would have been to exclude it from the sample as the data could have been positive or negative. By adjusting the data or removing it, the reliability and validity of the data could have been compromised. A better method of decreasing the number of companies with missing data is to use two sources for the data (Kempff, 2013). An example of this is shown in the paper by Kempff (2013), who used the McFas database and the JSE bulletin database.

6.2 Hypothesis 1

Hypothesis 1 proposed a null hypothesis that all multi-bagger companies would meet the defined style metrics, and the alternate hypothesis was that they would not all meet the style metrics. In this section, the discussion of the results from hypothesis 1 will look at four factors that were described in hypothesis 1. The first factor related to which industries were growth industries and if the multi-bagger companies were in an industry that was growing at a faster rate than that of the market. The second factor related to whether the multi-bagger company had a lower P/E ratio value than that of the industry average, in other word, the multi-bagger needed to be classified as a value investment as it had a low intrinsic value. The third factor related to whether the multi-bagger was smaller (in market capitalisation) than that of the industry average, and the fourth factor related to whether the company had a higher leverage than that of the industry average this could mean the company was distressed. The final discussion point for hypothesis 1 will be to look at whether the metrics of hypothesis 1 were met for all multi-bagger companies in an industry and how many of the multi-bagger companies could have been identified using the metrics specified in hypothesis 1.

The following industries were found not to contain multi-bagger companies: Oil and gas, Consumer goods, Telecommunications and Utilities. None of these industries was found to be growing at a faster rate than that of the market. Of the six remaining industries, three (50%) of them were growing at a faster rate than that of the market. The industries that were growing at a faster rate than that of the market contained five of the 20 (25%) multi-bagger companies. It is interesting to note that the industries that had the two lowest growth rates, had the largest number of multi-bagger companies in their samples. The Consumer Services industry and the Technology industry had 12 of the 20 multi-bagger companies in them.

The next factor that was explored was the suitability of the P/E ratio for identifying the multi-bagger companies. The null hypothesis was that the P/E ratio of the multi-bagger company would be smaller than that of the industry average. The industry effect described by Kasilingam and Ramasundaram (2011) was not a factor in this research because the multi-bagger companies had been evaluated against that of the industry average. However, of the 20 multi-bagger companies identified, 11 (60%) of them had a lower P/E ratio than that of the market; put differently, 60% of the multi-bagger companies were classified as value investments. When only the financial metrics are

evaluated as a combination, in other words the growth component is excluded, 35% of the multi-bagger companies then met the criteria. However, when growth is included, this decreases to a five percent of the multi-bagger companies meeting the criteria. The results show that the null hypothesis was not met for all the multi-bagger companies. While there is extensive imperial work that has demonstrated that stocks with low P/E ratios can offer higher stock returns (Kyriazis & Christou, 2013), this does not mean that growth (high P/E ratio) stock cannot give high returns. The premise for the selection of value stocks was that they were undervalued due to momentum or investors' incorrect extrapolation of the companies past performances (Truong, 2009). Another opinion is that the P/E ratio does not consider growth (Padley, 2017). It could also mean that some of the multi-bagger stocks have not met the contrarian methodology but rather have been closer to the efficient market hypothesis. Another explanation comes from the work of Nezlobin, Rajan and Reichelsteil (2016), where they found that periods of higher future company growth would lead to an increased P/E ratio if the companies were not in a completive industry. If the companies were in a competitive industry then the economic benefits would be zero irrespective of the growth opportunities (Nezlobin, Rajan, & Reichelstein, 2016). Extrapolating their work to the industry and to the multi-bagger companies would mean that the multi-bagger companies that are growth investments have considered future growth in the industry and that the multi-bagger companies that are not growth investments, but value investments, have competition in the industry and they are operating in a competitive market. This would mean that each of the multi-bagger companies would then need to have an industry analysis and an exploration of the drivers of future growth in the industry. This inference may be correct; however, it was beyond the scope of this paper to explore this further. It may be useful for this to be examined in future research.

The next financial metric to be discussed is the size of a company. The null hypothesis was that the size of a multi-bagger company would be smaller than that of the industry average. However, of the 20 multi-bagger companies identified, 13 (65%) of them were smaller than that of the market. In other words, 65% of the multi-bagger companies were classified as small by market capitalisation. The results demonstrated that the null hypothesis for the size of the company was not met for all the multi-bagger companies. It was expected that the smaller companies would grow at a much faster rate than that of the bigger companies. However, in the multi-bagger assessment period (2002), NASPERS in the Consumer Services industry, was the largest company in the industry.

The next financial metric to be discussed is the leverage of the company. The null hypothesis was that the leverage of the multi-bagger company would be higher than that of the industry average. However, of the 20 multi-bagger companies identified, 13 (65%) of them were higher than that of the market. In other words, 65% of the multi-bagger companies were classified as highly leveraged. The results demonstrated that the null hypothesis for leverage of the company was not met for all the multi-bagger companies. The expectation was that highly leveraged companies would be undervalued as they had been incorrectly assumed to be distressed by the market (Piotroski, 2000). In the multi-bagger assessment period (2002), ASSORE, in the Basic Materials industry, had the third lowest leveraged company in the industry. HCL, in the Financial industry, is another example of a multi-bagger company with a very low leverage. This suggests that companies do not need to be financially distressed to be able to grow. The discussion now moves on to look at whether hypothesis 1 was met for each industry and how many multi-bagger companies met all the metrics for hypothesis 1.

Analysis of whether the industry had more multi-baggers that met the identification metrics specified in hypothesis 1 was inconclusive. The individual metrics for identifying multi-bagger companies produced reasonable results. Sixty-percent of the multi-bagger companies met the metric for having a low P/E ratio (value stock). Sixty-five percent of the multi-bagger companies met the size metric. For the final financial metric, leverage, 65% of the multi-bagger companies met the metric requirement. Growth prior to the multi-bagger period was not conclusive, as only 30% of the industries were high growth industries. Further to this, the industries with the lowest growth produced the largest number of multi-bagger companies. When the metrics were evaluated as a combination of the 20 multi-bagger companies, one multi-bagger company (METROFILE) met the specified identification criteria in hypothesis 1. This study did not consider how many of the, approximately, 400 companies on the JSE at the time of identifying the multi-bagger companies, also met the criteria in hypothesis 1. There were 816 companies in the sample frame, of these 665 were removed from the sample as they did not survive over the period or were started in the period. Forty-seven companies (including 10 multi-baggers) were removed from the sample as they had missing data. It is interesting to note that if an investor had been able to identify the companies that would exist over the 15-year period, 20% of these companies would have become multi-bagger companies.

It can be concluded that the null hypothesis was rejected, and the alternate hypothesis was accepted for 19 of the 20 multi-bagger companies. When analysed by the industry as specified in hypothesis 1, there were no industries for which all the multi-baggers met the Null Hypothesis. Thus, the null hypothesis for hypothesis 1 was rejected and the alternative hypothesis accepted. This shows that Martelli (2017) was accurate in stating that the metrics for the identification of multi-bagger companies did not hold true for all multi-bagger companies (Martelli, 2017)

6.3 Hypothesis 2

Hypothesis 2 explored whether the multi-bagger companies in the different industries outperformed the industry portfolio for each of the defined styles. In this section, the discussion of the results from hypothesis 2 will look at four factors that were described in the hypothesis 2. The first factor related to which industries were growth industries and if the multi-bagger companies were in an industry that was growing at a faster rate than that of the market. The second factor related to whether the multi-bagger company had a higher operating profit margin than that of the industry average. The third factor related to whether the multi-bagger had a higher net profit margin than that of the industry average, and the fourth related to whether the multi-bagger company had a higher return of assets than that of the industry average. The final discussion point for the hypothesis 2 will be to look at how many of the multi-bagger companies exceeded the metrics specified in hypothesis 2 on a company level and at an industry level.

The results exploring the first factor mentioned above indicated that the following industries did not contain multi-bagger companies: Oil and gas, Consumer goods, Telecommunications and Utilities. All these industries, except for the Utilities industry as there was no data, were growing at a faster rate than that of the market. This left six markets containing multi-bagger companies. Of the six industries that contained multi-bagger companies, four (67%) of them were growing at a faster rate than that of the market. The industries that were growing at a faster rate than that of the market contained 16 of the 20 (80%) multi-bagger companies. It is interesting to note that the industries that were growth industries in hypothesis 1 were not growth industries for hypothesis 2, and the industries that were not growth industries in hypothesis 1, were growth industries in hypothesis 2. There were exceptions to this, relating to the Industrial, Healthcare and Financial industries, where if they were growth/contracting industries in hypothesis 1 they remained growth/contracting industries. Where the growth rates at the end of the period were ranked, the industry with the highest growth rate, Consumer services, contained the highest number of multi-bagger companies. The next two, Oil and Gas industry and the Consumer Goods industry, high growth industries did not have any multi-bagger companies. Of the five industries with the highest growth, only two (Consumer services and Healthcare) of them contained multi-bagger companies. This could mean that these industries may have companies that will be classified as multi-bagger companies in the future. However, exploring this inference is beyond the scope of this paper but may be something useful to be examined in future work.

The second factor explored how effective operating profit margin was for monitoring the performance of multi-bagger companies. The null hypothesis was that the operating profit margin was greater than the industry average. The results indicated that 13 (68%) of the 20 multi-bagger companies met this metric. The six multi-bagger companies that did not meet the metric occurred in two industries, namely, the Consumer Services and Financial industries. In the Financial industry, the multi-bagger companies were below the industry portfolio for the whole period, except for two or three points. The reason that the two/three points were not below the industry portfolio was that the largest companies in the industry portfolio made a loss that year. The three largest companies in the industry, in 2008, made up 61% of the portfolio's market share. This suggests that the industry was heavily skewed to the negative. In the Consumer Services industry, four of the seven multi-bagger companies did not have an operating profit margins greater than that of the industry portfolio. This suggests that this is not an effective metric for measuring the financial performance of multi-bagger companies in the Consumer service and Financial industries. In the Basic Materials, Industrial, Healthcare and Technology industries, the operating profit margins were an effective metric for the monitoring of the multi-bagger companies, as all the multi-baggers in these industries met the criteria of having a greater operating profit margin than that of the industry portfolio. Thus, the null hypothesis for operating profit margin was accepted for these industries.

The operating profit margin could have been used to evaluate if the operating profit margin had decreased or increased due to competitors entering or exiting the market. Similarly, the net profit margin could have been used to evaluate if the multi-bagger companies increased in size and the effect on the net profit margin. An increase in company size could cause an increase in overhead cost. Both metrics depend on the operating model and how the companies innovate to improve on the operating model that is being utilised by the company. However, this detail regarding the metrics was not investigated in this paper. The companies entering and exiting the market were removed from the sample and were not evaluated. Refer to section 4.2.3 Sampling method and size for further details on the sampling method.

The third factor related to exploring the efficacy of net profit margin for monitoring the performance of multi-bagger companies. The null hypothesis was that the net profit margin was greater than the industry average. The results showed that 11 (55%) of the

20 multi-bagger companies met this metric. The eight multi-bagger companies that did not meet the metric occurred in two industries, namely, the Consumer Services and Financial industries. In the Financial industry, the multi-bagger companies were below the industry portfolio for the whole period, except for six points. The reason that the six points were not below the industry portfolio was that the largest companies in the industry portfolio made a loss that year or did not make a large profit that year. The three largest companies in the industry, in 2008, made up 59% of the portfolio's market share. By 2012, the three companies' market share had decreased to 54%, decreasing their effect on the industry portfolio results. This suggests that the industry was heavily skewed to the negative. Examining the Consumer services industry, four of the seven multi-bagger companies did not have an operating profit margin greater than that of the industry portfolio. This suggests that this was not an effective metric for measuring the financial performance of multi-bagger companies in the Consumer service and Financial industries. In the Basic Materials, Industrial, Healthcare and Technology industries, the net profit margin was an effective metric for the monitoring of the multi-bagger companies, as all the multi-baggers in these industries met the criteria of having a greater net profit margin than that of the industry portfolio. The null hypothesis for net profit margin was accepted for these industries.

The final metric used in hypothesis 2 for analysing the performance of multi-bagger companies was return on assets. The null hypothesis was that the return on assets would be greater than the industry average. The results demonstrated that 17 (85%) of the 20 multi-bagger companies met this metric. Of the three multi-bagger companies that did not meet the metric, two occurred in the Consumer Services industry and one in the Financials industry. In the Basic Materials, Industrial, Healthcare, and Technology industries, the return on assets was an effective metric for monitoring of the multi-bagger companies, as all the multi-baggers in these industries met the criteria of having a greater net profit margin than that of the industry portfolio. The null hypothesis for return on assets was for these industries.

Evaluating, on the multi-bagger company level, how many of the multi-bagger companies met the null hypothesis for hypothesis 2, nine of the 20 multi-bagger companies met the null hypothesis for hypothesis 2. The industry with the largest growth (approximately three times as much growth as the next highest growing industry), which had the largest number of multi-bagger companies (seven of the 20), had none of the multi-bagger

companies meeting the null hypothesis. One could infer from this that the null hypothesis held more weight when there was growth, but not large amounts of growth. However, this is conjecture and it is recommended that this is tested in future work.

The industries that met all the performance criteria specified in hypothesis 2 were the Industrial, Healthcare, and Technology industries. The null hypothesis for these industries was accepted. The Basic Materials industry met all the criteria except for growth. However, the multi-bagger companies were considered to be representative of the epitome of the selection criteria used in value or contrarian investment strategy. It was for this reason that the hypotheses did not look at the average for the multi-bagger companies but at each of the companies individually. For the Basic Materials industry, the null hypothesis for hypothesis 2 was rejected, as the industry failed on the growth metric. The multi-bagger companies in the Consumer Services and Financial industries fail at least one of the metrics in hypothesis 2. Thus, both industries (Consumer Services and Financial industries) fail the null hypothesis for hypothesis 2. The work done by Piotroski (200), which was the basis for the selection of the metrics for the financial performance, was effective for the Industrial, Healthcare, and Technology industries. However, there were industries that did not meet the criteria. This concurs with Martelli's (2017) findings that the financial performance of some multi-bagger companies does not exceed that of the industry.

Descriptive statistical analyses were performed on the financial metrics presented in hypothesis 2. The findings presented from these analyses included the average, median and standard deviation, which indicated the stability of the companies' operating profit margins, net profit margins, and return on assets. However, the statistical significance of these data was explored. To test whether this could have affected the results, a paired two-sample for means t-test was performed for the operating profit margin, net profit margin and return on assets for the Consumer Services industry. The results of that test can be found in section 9.3 Appendix 3 – Statistical analysis of hypothesis 2 financial metrics. When looking at the significance of comparison of the means of the multi-baggers to the industry portfolio, the results indicated that for some of the comparisons the results were not significant (when testing the one tail comparison at a 95% confidence level). This would mean that the acceptance or rejection of the null hypothesis was not valid. The result of the hypothesis test was to fail to reject the null hypothesis. This could represent a limitation of the analysis method that was used.

Such a limitation may lead to questioning why a paired two-sample from means t-test was not performed for testing the hypothesis. This was not used because the data presented by the companies had been validated by the JSE. The fluctuations in the metrics were the fluctuations that naturally occur in business. An example of this can be seen in the Basic Materials industry, where if there is a shortage of material causing the price to increase or the exchange rate changes are favourable, this will increase the profit of the company as they are price takers and not price setters. To ensure that all the "industry factor", that is described by Kasilingam and Ramasundaram (2011), has been removed, it would have been more beneficial to look at the fourth level of the ICB. Exploring this level of detail was beyond the scope of this work but it is recommended that this is tested in future work on a larger sample.

7 Conclusion

Value investing is an investment style that aims to gain abnormal returns based on the prices of stocks being lower than their intrinsic value (Truong, 2009), due to past poor performances (Kyriazis & Christou, 2013). These stocks are usually distressed stocks that then recover (Johnson, 2017). The stocks are bought at a low price and held on to until they have met their intrinsic value. The intrinsic value of the stocks can sometimes become multiples of the starting investment share price. Martelli (2017) examined how easy it was to identify stocks that met the value or contrarian investment strategy. Martelli (2017) defined a multi-bagger stock as a company whose value had increased by more than ten times in a fifteen-year period.

This research study compared multi-bagger companies to their markets to provide an improved understanding of whether previously proposed metrics for identifying multi-bagger value companies were valid. This study also evaluated which of the factors defined in the literature were driving multi-bagger companies in the different markets. The section below refers to the principle findings of this study. These findings are discussed in relation to the sample, and in relation to the two hypotheses that were generated from the work that was done by Martelli (2017) and the review of the literature that indicated which metrics should be analysed. Following this, the implications of this research for investors is discussed. Finally, the limitations of this study, those not mentioned in the Methodology section, are discussed, and recommendations regarding similar future research are provided.

7.1 Principle findings

The original sample frame contained a total of 816 companies. After a process of systematic elimination based on the criteria specified in the Methodology section, 104 companies remained in the sample for analysis. As noted in the discussion section, the effect of the judgemental sampling method on the results provided insight into how this method could have skewed the results. While there were cases that could be identified in the discussion section regarding how some of the results could have been skewed, the extent to which the results were skewed was not examined. Section 7.4 Recommendations for future work provides suggestions for testing the extent of such an effect on the findings.

The first hypothesis explored the comparison of industry growth to the market for. Of the industries examined, none of them, that did not have a multi-bagger, were found to be growing at a faster rate than that of the market. Of the six remaining industries, three (50%) of them were growing at a faster rate than that of the market. The industries with the lowest growth produced the largest number of multi-bagger companies. This suggests that the inverse metric would have been a better selection criterion than what was specified in hypothesis 1. The individual financial metrics for identifying multi-bagger companies produced reasonable results. Each of the financial metrics were met by more than 60% of the multi-bagger companies. When evaluated as a combination of the financial metrics, this decreased to 35% of the multi-baggers meeting the criteria. However, as a combination specified in hypothesis 1, only one company met the criteria. When analysed as a combination of the metrics for hypothesis 1, it can be concluded that the null hypothesis was rejected and the alternate hypothesis for 19 of the 20 multi-bagger companies was accepted. This suggests that Martelli (2017) was correct in stating that the metrics for the identification of multi-bagger companies did not hold true for all multi-bagger companies (Martelli, 2017). The findings from this study suggest that either the method for valuing multi-bagger companies is incorrect or that multi-bagger companies do not epitomise value investments.

Hypothesis 2 related to the performance metrics for evaluating multi-bagger companies. The industries that were growing at a faster rate than that of the industry contained 80% of the multi-bagger companies. Of the financial metrics (operating profit margin, net profit margin, and return on assets), the return on assets was the best metric as there were three multi-bagger companies that did not meet the metric. As a combination, there were three industries (Industrial, Healthcare, and Technology industries) that met the performance monitoring criteria specified in hypothesis 2; thus, the null hypothesis was accepted for these industries and it was rejected for the remaining industries. However, there were industries that did not meet the criteria. This corresponds with Martelli's (2017) findings that some multi-bagger companies do not have a financial performance that exceeds that of the industry.

7.2 Implications for investors

The implications of these research findings for investors, are that multi-bagger companies do not seem to epitomise value or contrarian investment strategies, or that multi-bagger companies cannot be accurately identified using value or contrarian investment strategies. If either of these statements is valid then this means that there is no one method that can be used to identify multi-bagger companies. In other words, the section criteria used in hypothesis 1 has not decreased the risk out of the selection methodology for finding multi-bagger companies. Rather, the results suggest that, like all investment strategies, selecting styles will have a high probability of return on investment. The method would still require selecting a spread of companies to decrease the risks involved with selecting a few companies.

The results that are the most beneficial to the investor are the results from the performance monitoring, which were explored in hypothesis 2. The performance monitoring results suggest that in certain industries all of the metrics were effective. The implication of this is that once the potential multi-bagger companies have been selected, these performance metrics could be used to determine whether the company will continue to grow in value to become a multi-bagger company. It must be noted that this research did not test whether companies that did not become multi-bagger companies also met this metric. It is recommended that prior to this method being used, these metrics should be tested on the rest of the companies in the sample. The value in carrying out this test may then show the investor whether this is a good metric for indicating that the company's value has long term growth potential.

7.3 Limitations

This section of the report refers to additional limitations that were discovered during the analysis of the data and not identified during the setup of the research design. Previously identified limitations have been detailed in section 4.2.7 Limitations. Those limitations related to the convenience judgmental sampling method which could have resulted in sample selection bias, data dredging which can arise from performing retrospective analysis, a yearly data collection interval, the potential for a type 1 and type 2 errors, and the lack of using statistical significance testing.

Further limitations of this study that was subsequently identified, was the effect of excluding missing data, which resulted in a smaller sample size. The removal of companies from the sample affected the following industries: i) Oil and Gas, ii) Basic Materials, iii) Industrial, iv) Consumer goods, v) Consumer services, vi) Telecommunications, and vii) Financials. The removal of companies from each of the industry samples may have caused the data to be skewed. If there had been no companies with missing data, there would have been 50% more companies in the sample. This could have been avoided if data was collected from multiple sources; in other words, not just from the McGregor BFA database. A review of the work carried out has identified that additional work with use of additional databases, is required. This is listed as one of the recommendations in the section below which provides several recommendations for future work.

7.4 Recommendations for future work

This section refers to suggested recommendations for future research in this topic area. Such recommendations are considered to provide an opportunity to build on this research and contribute additional findings to the field.

It is recommended that similar work be performed using a larger sample. For instance, such a sample could include a large stock exchange or a combination of stock exchanges. The purpose of using a larger sample would be to increase the final sample size in each of the industries, to allow for greater reliability and generalizability of results. Furthermore, it is recommended that similar work be performed that includes companies that start up during the research evaluation period or those that are not yet trading on the JSE. The value of this will be to remove the potential for survivorship bias and to provide a more representative sample. It would be useful for future research to minimise the inclusion of companies with missing data. This could be done by collecting data from two (or more) sources. For example, Kempff (2013) used both the McFas database and the JSE bulletin database as sources of data which yielded a larger sample size. Another recommendation would be for future research to select a different time period for evaluation, to the time period selected in this study. This would then allow for the results from future research to be compared with the results from this study. Future research could also use the operating profit margin to evaluate if the operating profit margin increases or decreases due to competitors entering or exiting the market. Similarly, the net profit margin could be used to evaluate the effect on the net profit margin, if the multi-

bagger companies increase in size. An increase in company size could cause an increase in overhead costs. Both metrics depend on the operating model and how the companies innovate to improve on the operating model that is being utilised by the company. A final recommendation is that the metrics used for hypothesis 2 in this study, could be tested on the rest of the sample; in other words, the metrics could be tested not just on the multi-bagger companies, but on all the companies. This might allow for insights to be gained regarding whether these are good metrics for monitoring multi-bagger companies or whether all companies that continue to operate also meet those metrics.

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9 Appendices

9.1 Appendix 1 – Industry classification benchmark for the JSE

Table 9-1: Industry Classification Benchmark for the JSE

Industry Classification Benchmark (ICB) – Changes Effective 30 November 2009

Industry	Super Sector	Sector	Sub-Sector
0001 Oil & Gas	0500 Oil & Gas	0530 Oil & Gas Producers	0533 Exploration & Production
			0537 Integrated Oil & Gas
		0570 Oil Equipment, Services & Distribution	0573 Oil Equipment & Services
			0577 Pipelines
		0580 Alternative Energy	0583 Renewable Energy Equipment
			0587 Alternative Fuels
1000 Basic Materials	1300 Chemicals	1350 Chemicals	1353 Commodity Chemicals
			1357 Specialty Chemicals
	1700 Basic Resources	1730 Forestry & Paper	1733 Forestry
			1737 Paper
		1750 Industrial Metals & Mining	1753 Aluminium
			1755 Nonferrous Metals
			1757 Iron & Steel
		1770 Mining	1771 Coal
			1773 Diamonds & Gemstones
			1775 General Mining
			1777 Gold Mining
			1779 Platinum & Precious Metals
2000 Industrials	2300 Construction & Materials	2350 Construction & Materials	2353 Building Materials & Fixtures
			2357 Heavy Construction
	2700 Industrial Goods & Services	2710 Aerospace & Defence	2713 Aerospace
			2717 Defence
		2720 General Industrials	2723 Containers & Packaging
			2727 Diversified Industrials
		2730 Electronic & Electrical Equipment	2733 Electrical Components & Equipment
			2737 Electronic Equipment
		2750 Industrial Engineering	2753 Commercial Vehicles & Trucks
			2757 Industrial Machinery
		2770 Industrial Transportation	2771 Delivery Services
			2773 Marine Transportation
			2775 Railroads
			2777 Transportation Services
			2779 Trucking
		2790 Support Services	2791 Business Support Services
			2793 Business Training & Employment Agencies
			2795 Financial Administration
			2797 Industrial Suppliers
			2799 Waste & Disposal Services
3000 Consumer Goods	3300 Automobiles & Parts	3350 Automobiles & Parts	3353 Automobiles
			3355 Auto Parts
			3357 Tires
	3500 Food & Beverage	3530 Beverages	3533 Brewers
			3535 Distillers & Vintners
			3537 Soft Drinks
		3570 Food Producers	3573 Farming, Fishing & Plantations
			3577 Food Products
	3700 Personal & Household Goods	3720 Household Goods & Home Construction	3722 Durable Household Products
			3724 Nondurable Household Products
			3726 Furnishings
			3728 Home Construction
		3740 Leisure Goods	3743 Consumer Electronics
			3745 Recreational Products
			3747 Toys
		3760 Personal Goods	3763 Clothing & Accessories
			3765 Footwear
			3767 Personal Products
		3780 Tobacco	3785 Tobacco

Note. Source of information obtained from Johannesburg Stock Exchange, 2018

Table 9-1: Continued

Industry	Super Sector	Sector	Sub-Sector
4000 Health Care	4500 Health Care	4530 Health Care Equipment & Services	4533 Health Care Providers
			4535 Medical Equipment
			4537 Medical Supplies
		4570 Pharmaceuticals & Biotechnology	4573 Biotechnology
			4577 Pharmaceuticals
5000 Consumer Services	5300 Retail	5330 Food & Drug Retailers	5333 Drug Retailers
			5337 Food Retailers & Wholesalers
		5370 General Retailers	5371 Apparel Retailers
			5373 Broadline Retailers
			5375 Home Improvement Retailers
			5377 Specialized Consumer Services
			5379 Specialty Retailers
	5500 Media	5550 Media	5553 Broadcasting & Entertainment
			5555 Media Agencies
			5557 Publishing
	5700 Travel & Leisure	5750 Travel & Leisure	5751 Airlines
			5752 Gambling
			5753 Hotels
			5755 Recreational Services
			5757 Restaurants & Bars
			5759 Travel & Tourism
6000 Telecommunications	6500 Telecommunications	6530 Fixed Line Telecommunications	6535 Fixed Line Telecommunications
		6570 Mobile Telecommunications	6575 Mobile Telecommunications
7000 Utilities	7500 Utilities	7530 Electricity	7535 **Conventional** Electricity
			7537 Alternative Electricity
		7570 Gas, Water & Multi-utilities	7573 Gas Distribution
			7575 Multi-utilities
			7577 Water
8000 Financials	8300 Banks	8350 Banks	8355 Banks
	8500 Insurance	8530 Nonlife Insurance	8532 Full Line Insurance
			8534 Insurance Brokers
			8536 Property & Casualty Insurance
			8538 Reinsurance
		8570 Life Insurance	8575 Life Insurance
	8600 Real Estate	**8630 Real Estate Investment & Services**	**8633 Real Estate Holdings & Development**
			8637 Real Estate Services
		8670 Real Estate Investment Trusts	**8671 Industrial & Office REITs**
			8672 Retail REITs
			8673 Residential REITs
			8674 Diversified REITs
			8675 Specialty REITs
			8676 Mortgage REITs
			8677 Hotel & Lodging REITs
	8700 Financial Services	8770 Financial Services	8771 Asset Managers
			8773 Consumer Finance
			8775 Specialty Finance
			8777 Investment Services
			8779 Mortgage Finance
		8980 Equity Investment Instruments	8985 Equity Investment Instruments
		8990 Non-equity Investment Instruments	8995 Non-equity Investment Instruments
9000 Technology	9500 Technology	9530 Software & Computer Services	9533 Computer Services
			9535 Internet
			9537 Software
		9570 Technology Hardware & Equipment	9572 Computer Hardware
			9574 Electronic Office Equipment
			9576 Semiconductors
			9578 Telecommunications Equipment

** ICB changes effective in 2009 are in Bold*

Note. Source of information obtained from Johannesburg Stock Exchange, 2018

9.2 Appendix 2 – Companies removed from the sample frame

For companies removed from the sample due to missing data by hypothesis metric, refer to Table 9-2 and Table 9-3. For companies removed from the sample for missing data by industry refer to Table 9-4.

Table 9-2: Companies removed from the sample frame for missing data. The categorisation was done using hypothesis 1 style metrics

P/E (the year 2002)	Size (the year 2002)	Leverage (the year 2002)
ADRENNA	CORONAT	ADRENNA
AF & OVR	ECSPONENT	ANGGOLD
ANGGOLD	EMIRA	CORONAT
CORONAT	ORION	DRDGOLD
DRDGOLD	TELKOM	E MEDIA
E MEDIA		ECSPONENT
ECSPONENT		EFORA
EFORA		EMIRA
EMIRA		GFIELDS
GFIELDS		HARMONY
HARMONY		INVPLC
INDEQTY		RANGOLD
INVPLC		RESILIENT
ORION		
RANGOLD		
TELKOM		
TRNPACO		

Table 9-3: Companies removed from the sample frame for missing data. The categorisation was done using hypothesis 2 style metrics

Net profit	Operating profit	Return on assets
ADCORP	ADCORP	ADCORP
AME	AME	AME
PHOENIX	PHOENIX	PHOENIX
ANGGOLD	ANGGOLD	ANGGOLD
B-AFRICA	B-AFRICA	BOWCALF
BAUBA	BAUBA	CAFCA
BOWCALF	BOWCALF	DRDGOLD
BRAIT	BRAIT	E MEDIA
CAFCA	CAFCA	ECSPONENT
CAPITEC	CAPITEC	EMIRA
CONDUIT	CONDUIT	FAIRVEST
DELTA	DELTA	GFIELDS
DRDGOLD	DRDGOLD	HARMONY
E MEDIA	E MEDIA	KAP
ECSPONENT	ECSPONENT	MICROMEGA

Table 9-3*: Continued*

Net profit	Operating profit	Return on assets
EFORA	EFORA	PRIMESERV
EMIRA	EMIRA	RANGOLD
FAIRVEST	FAIRVEST	SANTOVA
FIRSTRAND	FIRSTRAND	STEIN NV
GFIELDS	GFIELDS	TONGAAT
HARMONY	HARMONY	TRENCOR
INGENUITY	INGENUITY	YORK
INVLTD	INVLTD	
INVPLC	INVPLC	
KAP	KAP	
LONFIN	LONFIN	
MICROMEGA	MICROMEGA	
NEDBANK	NEDBANK	
PRIMESERV	PRIMESERV	
PSG	PSG	
PURPLE	PURPLE	
RANGOLD	RANGOLD	
RMBH	RMBH	
SABVEST	SA CORP	
SANLAM	SABVEST	
SANTOVA	SANLAM	
SASFIN	SANTOVA	
STANBANK	SASFIN	
STEIN NV	STANBANK	
STELLAR	STEIN NV	
TONGAAT	STELLAR	
TRADEH	TONGAAT	
TREMATON	TRADEH	
TRENCOR	TREMATON	
YORK	TRENCOR	
	YORK	

To be able to see the companies that were removed by industry refer to Table 9-4. The cells in Table 9-4 that are highlighted yellow are classified as multi-bagger companies.

Table 9-4: Companies removed from the sample due to missing data - categorised by industry

Oil & gas	Basic Material	Industrial	Consumer goods	Consumer services	Tele-communication
EFOR A	ANGGOLD	ADCORP	STEIN NV	AF & OVR	TELKOM
	BAUBA	BOWCALF	TONGAAT	AME	
	DELTA	CAFCA			
	DRDGOLD	KAP			
	GFIELDS	MICROMEG A			
	HARMON Y	PRIMESERV			
	RANGOLD	SANTOVA			
	YORK	TRNPACO			
		TRENCOR			

Table 9-4: Continued

Financial
ADRENNA
PHOENIX
B-AFRICA
BRAIT
CAPITEC
CONDUIT
CORONAT
ECSPONENT
EMIRA
FAIRVEST
FIRSTRAND
INDEQTY
INGENUITY
INVLTD
INVPLC
LONFIN
NEDBANK
ORION
PSG
PURPLE
SASFIN
RESILIENT
SABVEST
SABVEST -N-

9.3 Appendix 3 – Statistical analysis of hypothesis 2 financial metrics

Table 9-5: Results of paired two sample from means t-test on the Consumer Services industry operating profit margin

	Industry Portfolio	ADVTECH	Industry Portfolio	CASHBIL	Industry Portfolio	CLICKS
Mean	11.76	14.38	11.76	5.31	11.76	9.56
Variance	19.88	4.98	19.88	0.49	19.88	258.32
Observations	15.00	15.00	15.00	15.00	15.00	15.00
Pearson Correlation	0.17		-0.01		0.57	
Hypothesized Mean Difference	0.00		0.00		0.00	
df	14.00		14.00		14.00	
t Stat	-2.19		5.52		0.61	
P(T<=t) one-tail	0.02		0.00		0.28	
t Critical one-tail	1.76		1.76		1.76	
P(T<=t) two-tail	0.05		0.00		0.55	
t Critical two-tail	2.14		2.14		2.14	
	Industry Portfolio	FAMBRANDS	Industry Portfolio	MR PRICE	Industry Portfolio	NASPERS-N-
Mean	11.76	16.76	11.76	12.43	11.76	11.75
Variance	19.88	11.04	19.88	12.25	19.88	65.12
Observations	15.00	15.00	15.00	15.00	15.00	15.00
Pearson Correlation	-0.16		-0.33		0.96	
Hypothesized Mean Difference	0.00		0.00		0.00	
df	14.00		14.00		14.00	
t Stat	-3.24		-0.40		0.00	
P(T<=t) one-tail	0.00		0.35		0.50	
t Critical one-tail	1.76		1.76		1.76	
P(T<=t) two-tail	0.01		0.70		1.00	
t Critical two-tail	2.14		2.14		2.14	
	Industry Portfolio	SHOPRIT				
Mean	11.76	4.66				
Variance	19.88	1.16				
Observations	15.00	15.00				
Pearson Correlation	-0.11					
Hypothesized Mean Difference	0.00					
df	14.00					
t Stat	5.85					
P(T<=t) one-tail	0.00					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.00					
t Critical two-tail	2.14					

Note. The standard deviation is equal to the square root of the variance.

Table 9-6: Results of paired two sample from means t-test on the Consumer Services industry net profit margin

	Industry Portfolio	ADVTECH	Industry Portfolio	CASHBIL	Industry Portfolio	CLICKS
Mean	12.58	9.83	12.58	3.77	12.58	6.52
Variance	56.44	2.84	56.44	0.52	56.44	131.14
Observations	15.00	15.00	15.00	15.00	15.00	15.00
Pearson Correlation	-0.07		0.48		0.94	
Hypothesized Mean Difference	0.00		0.00		0.00	
df	14.00		14.00		14.00	
t Stat	1.37		4.74		4.66	
P(T<=t) one-tail	0.10		0.00		0.00	
t Critical one-tail	1.76		1.76		1.76	
P(T<=t) two-tail	0.19		0.00		0.00	
t Critical two-tail	2.14		2.14		2.14	
	Industry Portfolio	FAMBRANDS	Industry Portfolio	MR PRICE	Industry Portfolio	NASPERS-N-
Mean	12.58	10.65	12.58	8.93	12.58	15.35
Variance	56.44	6.95	56.44	7.87	56.44	114.47
Observations	15.00	15.00	15.00	15.00	15.00	15.00
Pearson Correlation	-0.17		0.41		0.97	
Hypothesized Mean Difference	0.00		0.00		0.00	
df	14.00		14.00		14.00	
t Stat	0.89		2.06		-2.72	
P(T<=t) one-tail	0.19		0.03		0.01	
t Critical one-tail	1.76		1.76		1.76	
P(T<=t) two-tail	0.39		0.06		0.02	
t Critical two-tail	2.14		2.14		2.14	
	Industry Portfolio	SHOPRIT				
Mean	12.58	3.13				
Variance	56.44	0.54				
Observations	15.00	15.00				
Pearson Correlation	0.39					
Hypothesized Mean Difference	0.00					
df	14.00					
t Stat	5.04					
P(T<=t) one-tail	0.00					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.00					
t Critical two-tail	2.14					

Table 9-7: Results of paired two sample from means t-test on the Consumer Services industry return on assets

	Industry Portfolio	ADVTECH	Industry Portfolio	CASHBIL	Industry Portfolio	CLICKS
Mean	14.73	19.64	14.73	15.45	14.73	17.62
Variance	16.66	24.24	16.66	6.18	16.66	29.85
Observations	15.00	15.00	15.00	15.00	15.00	15.00
Pearson Correlation	0.66		-0.14		-0.22	
Hypothesized Mean Difference	0.00		0.00		0.00	
df	14.00		14.00		14.00	
t Stat	-5.01		-0.55		-1.49	
P(T<=t) one-tail	0.00		0.30		0.08	
t Critical one-tail	1.76		1.76		1.76	
P(T<=t) two-tail	0.00		0.59		0.16	
t Critical two-tail	2.14		2.14		2.14	
	Industry Portfolio	FAMBRANDS	Industry Portfolio	MR PRICE	Industry Portfolio	NASPERS-N-
Mean	14.73	51.20	14.73	31.38	14.73	9.02
Variance	16.66	380.92	16.66	99.77	16.66	50.26
Observations	15.00	15.00	15.00	15.00	15.00	15.00
Pearson Correlation	-0.12		-0.50		0.86	
Hypothesized Mean Difference	0.00		0.00		0.00	
df	14.00		14.00		14.00	
t Stat	-6.92		-5.15		5.34	
P(T<=t) one-tail	0.00		0.00		0.00	
t Critical one-tail	1.76		1.76		1.76	
P(T<=t) two-tail	0.00		0.00		0.00	
t Critical two-tail	2.14		2.14		2.14	
	Industry Portfolio	SHOPRIT				
Mean	14.73	14.65				
Variance	16.66	9.38				
Observations	15.00	15.00				
Pearson Correlation	0.18					
Hypothesized Mean Difference	0.00					
df	14.00					
t Stat	0.07					
P(T<=t) one-tail	0.47					
t Critical one-tail	1.76					
P(T<=t) two-tail	0.95					
t Critical two-tail	2.14					

9.4 Appendix 4 – Ethical Clearance

Gordon Institute of Business Science
University of Pretoria

21 June 2018

Vardy James

Dear James

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

Please note that approval is granted based on the methodology and research instruments provided in the application. If there is any deviation change or addition to the research method or tools, a supplementary application for approval must be obtained

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

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