Empirical evaluation of South African share analysts' performance

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ABSTRACT

This paper sets out to evaluate whether investment recommendations of South African share analysts provide any value to an investor in the Johannesburg Stock Exchange (JSE). The study focuses on the creation of a portfolio based on the recommendations by analysts between December 2002 and July 2010. The monthly returns and respective risk-adjusted returns of this portfolio are compared to those of the SATRIX Top 40 over the same period of time. The paper also evaluates the effectiveness of the SATRIX Top 40 as a performance benchmark by comparing it to a portfolio for shares of family-controlled or owner-managed companies listed on the JSE.

The study utilises analyst consensus recommendations, with focus on buy and sell recommendations, to create a buy and hold portfolio that is compared to the SATRIX Top 40. The SATRIX Top 40 is further compared to ten-share portfolio of family-owned or owner-managed companies.

The study finds that analysts' recommendations lead to higher risk-adjusted returns for an investor when compared to the SATRIX Top 40. The returns are even better in a bear market environment when compared the benchmark SATRIX Top 40. It is also found that a portfolio of shares of family-controlled or owner-managed companies performs better than the SATRIX Top 40 and thus provides a better benchmark for an investor.

KEY WORDS

Shares

Investment Analyst

Returns

Sharpe Ratio

Market

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Masters 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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Peter Vusi Mweli Date

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1 Introduction

Financial analysts have come under fire from law makers, regulators and the general investor public due to their highly optimistic valuation of securities during the period of market bubbles of 2001 and 2008. The perceived failure of analysis and the ratings industry has led to new financial regulations and greater public scepticism in the public of analysts' recommendations. The negative publicity to the analyst industry comes at a time when there is even greater coverage of security analysts' work in the business and general media, both in South Africa and globally.

The *Financial Mail* is one of the publications that do extensive coverage of security analysis research. The publication publishes an annual ranking survey of South Africa security analysts (McNaulty, 2009). This annual survey, covering both fundamental and technical analysts, provides rankings of top performing analysts over the preceding year based on a survey of investment managers from the large financial institutions in the country. This ranking, together with coverage of other share recommendations in the various media sources such as *Business Day*, *Business Report*, *CNBC*, *Summit*, *Sharenet, Moneyweb* and *Finance Week*, indicate the increased availability of previously proprietary research into the general investor public. This allows for small or individual investors to access reports that were previously exclusively available to large institutional investors.

In the same context investment bankers seem to rely on the work of analysts to help land investment banking business for their institutions (Hong and Kubik, 2003). This has led to commission-based compensation and profits for analysts, thus breaking the required Chinese walls between the brokerage and investment banking business. The question that arises from this is whether the recommendations by analysts are based on unbiased research or whether they are driven by compensation from other business within the brokerage or investment bank.

The demand for analysis is driven by the growth in global investment and asset management, which was estimated to be valued at USD 90 trillion in 2009 according to McKinsey & Company (2010). The McKinsey report indicates an accelerated pace of growth in the industry, which has shifted from being driven by the United States, Europe and Japan in the 1970s and 1980s, to a truly global industry that is characterised by emergence of sovereign funds from emerging economies. This growth has spurred the emergence of small and specialised investment and asset management firms that focus on selected assets classes and securities as opposed to traditionally large firms that offer a range of services. This structural change has been facilitated by the decline in barriers for research information, which was traditionally proprietary information, making it easy for smaller firms to enter the asset management industry. Easier information availability as a result of the Internet contributes to the growth of this industry. Company information such as annual reports is now available on-line, whereas hard copies (printed publications) had to be obtained previously for research purposes.

1.1 Research Aim

Previous work by researchers (discussed in the literature review) has focused on finding whether there is value in the analyst recommendations. The previous research has largely focused on various measures that include short-term price reaction, abnormal returns and the use of the analysts' recommendations to forecast performance of individual securities. This paper expands the question around the value of analyst recommendations by looking at whether analyst recommendations can result in a portfolio that outperforms a benchmark index and whether index funds provide an appropriate benchmark for measuring investment success over a longer period of time. The paper finally looks at whether there might be other benchmark portfolios that could be more appropriate for use by investors.

2 Literature Review

2.1 Introduction

The review of previous research into the research topic covers the following areas:

- Investment analysis background: The background to investment analysis, its origins and developments.
- Portfolio management: The modern portfolio theory is discussed with focus on stock selection, risk, optimisation and performance.
- Risk-adjusted returns: The methods for measuring risk adjusted stock returns are discussed with specific focus on the Sharpe Ratio.
- Analyst recommendations and the value to investors: A review of previous research on the value of analysts' buy and sell recommendations is conducted and the factors that influence these decisions.
- Index and exchange-traded funds: Discussion of the theory behind index and exchange-traded funds and their use as a benchmark for investor performance.

2.2 Investment Analysis Background

Investment analysis, share analysis or security analysis is a process of analysing a company (or its share) to determine its true or perceived true value (Morgan and Stocken, 2003). The aim of investment analysis is to allow users of the information (investors and other clients) to benefit from inefficiencies in the market that lead to share prices deviating from their true value (Stickel, 1995). Analyst research builds on factual sources of firm-specific information such as annual reports and earnings announcements, but is also primarily evaluative and predictive (Womack, 1996). Grossman and Stiglitz (1980) argued that a share price cannot perfectly reflect all available information about the share; otherwise researchers would not earn compensation from their analysis work. This is in direct contrast to the weak-form of Efficient Market Hypothesis (EMH) which argues that publicly available information about a security cannot be used to achieve profits from the markets. Previous research on the EMH is discussed under the modern portfolio theory section.

Investment analysis research can be in two forms, namely fundamental analysis and technical analysis. Essop (2006) found that most portfolio managers use fundamental analysis for picking of industry and shares, and then use technical analysis research to identify the point of buying or selling. That study also found that up to 95% of South African portfolio managers utilised fundamental analysis on its own or in combination with technical analysis, while more than 40% of the managers used technical analysis as part of their investment decision.

2.2.1 Fundamental Analysis

Fundamental analysis involves the use of macroeconomic, industry, accounting and management information to predict the current and future returns of securities, future security prices or both (Michou, Mouselli and Stark, 2010). The end goal of performing fundamental analysis is to produce a value that an investor can compare with the security's current price, with the aim of figuring out whether to go long or short on the security. The application of fundamental analysis tools is wider than just in the security market, since the principles are also applicable to private equity, mergers and acquisitions and general business financing (Whisenant, 1998). This makes the fundamental analysis the most widely used analysis method when compared to technical analysis.

Xue and Zang (2008) found that most institutional investors focusing on short term returns use fundamental analysis as a basis for the security valuation. This was in line with similar work of Abarbanell and Bushee (1997), which found that fundamental analysis provides a good prediction of future earnings in the short term.

Two reasons are perceived to cause abnormal returns from a fundamental investment strategy (Lev and Thiagarajan, 2003). The first is that there is a delay in the market pricing of the fundamental information already available in public. The second reason is that the market underutilises the fundamental signals that can be used to predict the future returns of a firm.

2.2.2 Technical Analysis

Technical analysis or charting is a technique which uses patterns of the price history of a financial security (commodity, currency, shares, index or compost average) in order to provide future behaviour of prices (Caginalp and Balenovich, 2003). The philosophical basis for the method is in line with classical economic theory, stating that prices will move in a direction to alleviate a discrepancy between the current price and true value (Caginalp and Balenovich, 2003).

Even though the use of technical analysis has grown in popularity within the investment research industry, there is still opposition to technical analysis from the academia, due to its conflict with the EMH (Cohen, 2002). Technical analysts argue that it is possible to achieve abnormal returns by focusing on the past trends and volume of trade in a particular equity share. This is in contrast to the weak form of EMH which states that the price of a share reflects all past security market information and hence the past prices and trading volume cannot be utilised to profit in the future. Technical analysis's focus on share price trends, rather than underlying share information, has led to some heavy criticism, which peaked during the market bubble of 1999 (Larsen, 2007).

Various studies have found that the use of technical analysis produces mixed results in both equity and foreign exchange markets. Lebron (1999) found that it is possible to achieve abnormal profits in the foreign exchange markets by utilising technical analysis. Marsh (2004) found that forecasters have difficulty in profiting from foreign exchange

rate movements using both fundamental and technical analysis. In her study of firms in the New York Stock Exchange, Peterson (2006) found that technical trading methods could be used to achieve risk adjusted returns that are higher than a reference index.

Besides some reservations from the academic field, the use of technical analysis has grown in South Africa just like in other financial markets. In response to a paper by Cohen (2002), Damat (2002) argues that technical analysis is not so much in contrast to the EMH, but it forms part of the EMH in that it is a tool to ensure efficiency of the markets.

Muller and Ward (2006) found the existence of annual seasonality in the return index of the Johannesburg Stock Exchange (JSE), indicating that the share prices seem to follow a seasonal trend over a year. This leads to the possibility of market players being able to predict the movement in the market based on this past seasonal change allowing users to profit from this information. The above arguments can lead one to conclude that it could be useful for investment to consider technical analysis research on their investment decisions.

The growth of technical analysis is also evident from the daily and weekly business and financial publications that carry some of the research. This allows small investors with no resources for extensive research to be able to utilise this publicly available

information to profit from the market. In a May 2002 article, McNaulty (2002) asks whether financial analysts should be trusted in both bull and bear markets. He argues that analysts have tended to perform in bull markets, but the opposite has been evident in the bear market environment.

2.3 Portfolio Management

The history of portfolio management is adapted from Varian (1993) and Ward and Du Plessis (2009).

The modern portfolio theory (MPT) is an investment theory that focuses on creating a portfolio of securities that should lead to a maximum return for a given risk profile (Mandelbrot and Hudson, 2004). In its simplest form the theory states that a portfolio that will give a minimum variance for a target expected return can be selected from a collection of risky securities. Originally developed from the work of Markowitz (1952), the theory focuses on utilising the correlation of securities to decide on asset allocation in a portfolio. Tobin (1958) also found that it was possible to identify the composition of an optimal portfolio of risky securities, given forecast returns and an appropriate covariance matrix of the securities, thus supporting the Markowitz theory of portfolio construction.

Sharpe (1963) further developed the Markowitz theory by introducing a single factor model linking the performance of a portfolio to that of the market:

$$\mathbf{Rp = \alpha + bRm + \varepsilon p} \qquad \textbf{...(1)}$$

Where

Rp : return of the portfolio

Ep: Error term, expected to be zero

α : Expected return of the portfolio when the market return is expected to be zero.

b: Linear coefficient linking the portfolio (or share) return to the return in the market.

The single factor model led to the development of the Capital Asset Pricing Model (CAPM) by Sharpe (1963):

$$\mathbf{E(Ri) = Rf + \beta i\,[E(Rm) - Rf]} \qquad \textbf{...(2)}$$

Where

E(Ri) : Expected return of security i

Rf : Risk free rate of return

E(Rm) : Expected return of the market

Bi : beta coefficient of the security i.

The performance of a portfolio can be represented by the formula (Ward and Du Plessis, 2009):

$$\mathrm{E}(R_p) = \sum_i w_i \mathrm{E}(R_i) \qquad \text{...(3)}$$

Where:

E(Rp): Expected return on the portfolio

Wi: Weighted composition of i-th stock in the portfolio consisting on N number shares.

E(Ri): Expected return on the i-th stock in the portfolio

The risk of a portfolio can be derived from the variances of the securities forming part of the portfolio with the formula (Ward and Du Plessis, 2009):

$$\sigma_p^2 = \sum_i w_i^2 \sigma_i^2 + \sum_i \sum_{j \neq i} w_i w_j \sigma_i \sigma_j \rho_{ij}, \qquad \text{...(4)}$$

Where

δp : Standard Deviation of the portfolio returns

δi : Standard deviation of the i-th security in the portfolio

ρij : Correlation coefficient between the i-th and the j-th securities.

There has been further research that has both supported and not supported the modern portfolio theory in the past. Affleck-Graves and Money (1976) tested the Markowitz and Sharpe theories and found that the Sharpe model approaches the Markowitz theory as more securities are added to a portfolio.

Critics of the Markowitz theory argue that the model does not produce portfolios that are properly diversified (McLoed, 1998). Also the large volumes of data required by the model and the difficulties associated with estimation of covariance has led to doubts about its application and reliability (Bowen, 1984)

Mandelbrot and Hudson (2004) further gave reasons for the criticism of the MPT based on the two assumptions, amongst others, that form the basis of the portfolio theory. The first is that the portfolio theory assumes there only exist normal distribution of returns in a portfolio. It has been shown that there is possibility for large swings in standard deviations of portfolios that lead to returns that are not normally distributed. The second is that the correlations between shares in a portfolio are fixed. This has been found not to be always true.

Besides the criticism, research has found that investors can achieve returns that beat the market by using the Markowitz theory. Ward and Du Plessis (2009) found evidence that a passive investment of a Markowitz optimal portfolio can outperform the FTSE/JSE Top 40 index.

2.4 Performance Measures

Performance measures are used to compare the performance of one stock or portfolio in some time period relative to performance of another stock or portfolio or other benchmark index or fund over same period or performance of same stock/portfolio in a different period (Jobson and Korkie, 1981). The fundamental measure of performance of a security or portfolio is the return of that security or portfolio over a particular period. Ward and Du Plessis (2009) provided an explicit application of performance measures that factor specific decision situations. The study concludes that investors need to utilise the mean-variance portfolio theory, where an investor chooses a security that has a specific return (Ri) and a specific standard deviation (δ_i) and these variable should be utilised in comparing different investment options.

The evaluation of portfolio performance based on basic-risk adjusted performance measures utilises either the Sharpe ratio or the Treynor ratio (Scholz and Wilkens, 2005). The two performance measures differ principally in their use of total risk (Sharpe) or systematic risk (Treynor). The Sharpe ratio, Sh_i of a portfolio is defined as the

expected excess return over the risk-free rate ($R_i - R_f$) to its standard deviation (δ_i). This is represented by the formula:

$$S = \frac{E[R] - R_f}{\sigma} \quad \text{...(5)}$$

The Treynor ration (T_i) of a portfolio is the expected excess return per unit of systematic risk (βi). This can also be shown by the formula:

$$T = \frac{r_i - r_f}{\beta_i} \quad \text{...(6)}$$

The Sharpe ratio enjoys widespread popularity as a measure of risk adjusted return in portfolio management theory (McLeod and van Vuuren, 2004). The use of the Sharpe ratio is generally accepted if the following conditions can be met (Malkiel and Saha, 2005):

- Distribution on one period portfolio returns is normal
- The mean and standard deviation of the portfolio return distribution are sufficient statistics to describe the inherent risk in a portfolio.

Work by Hodges (1998) and later by Zakamouline and Koekebakker (2008), showed that a generalised Sharpe ratio can be utilised in both normal and non-normal distributions situations to measure performance. This makes it possible for Sharpe ratio to be widely utilised for highly volatile and non parametric returns that are especially evident in hedge funds (Zakamouline and Koekebakker, 2008).

2.5 Value of Analyst Recommendations – International Evidence

Previous studies have shown that individual investors can achieve abnormal gross (of transaction fees) returns on trading analyst recommendations (Barber, Lehavy, McNichols and Trueman, 2001). That research paper found that investors on the New York Stock Exchange that followed analyst recommendations could have earned a return that is 102 basis points above those of shares which are least favoured by analysts. Other studies by Stickel (1995) and Womack (1996) also found that favourable (unfavourable) recommendations by analysts are accompanied by positive (negative) returns at the time of the announcements.

There have been some cases where the recommendations by analysts have shown bias towards most popular or even expensive shares (Jegadeesh, Kim, Krische and Lee, 2004). The same paper found that naive adherence to these recommendations tended to result in worse returns for investors.

The recommendations of shares by analysts are mainly based on their earnings forecast that utilises one or more of the following models (Bradshaw, 2004):

- Residual income model
- Price-earnings-to-growth (PEG) model
- Analyst projections of long term earnings growth.

Bradshaw (2004) found that most recommendations by analysts are a result of their projections of long term earnings growth. While the study found that the use of these projections add value to investors, it also argued that investors could achieve better returns if discounted present value valuation models are utilised.

Desai, Liang and Singh (2000) analysed the Wall Street Journal All-Star Analyst and found that single industry analysts tend to outperform multi-industry analysts in their recommendations of shares. This result was found to be true for both small and large capitalised companies listed on the New York Stock Exchange (NYSE).

Analysts from sell-side firms generally recommend “glamour” (ie. high growth, high volume, expensive and positive momentum) shares (Jegadeesh, Kim, Krische and Lee, 2004). This leads to biasness in the buy and sell recommendations of shares. The study

further argued that due to a variety of predictive variables utilised by different analysts, the general analyst consensus tends to yield positive results.

Most analysts that cover in-house underwritten shares tends to provide more optimistic recommendations for those shares (Hong and Kubik, 2003). This is caused by the link between the recommendations and the career progression of the analysts involved. Hong and Kubik (2003) used a sample of 619 US brokerage houses that include over 12 000 analyst between 1983 and 2000, leads to scepticism about the value that analyst provide since most are also within brokerage houses.

2.6 Value of Analyst Recommendations – South African Perspective

Hall and Millard (2002) found evidence that buy recommendations resulted in excess returns, hold recommendations resulted in returns similar to market and sell recommendations resulted in returns that are less than the JSE All Share index. This was true when no adjustment for risk was done. With risk adjustment, both the buy and hold recommendations resulted in returns higher than both the JSE All Share and the Industrial Indices. The results of this study, which is based on data of between 1994 and 1998, show that an investor can earn higher returns from the JSE by following analyst recommendations.

Research by Prayag and Van Rensburg (2006) further provided support to the findings by Hall and Millard (2002). The study found that analyst recommendation on JSE listed shares provided mixed results where the buy recommendations resulted in a significant alpha, while hold and sell recommendation showed no real value to investors. The study argues that there might be some consistent value for investors to act on recurring recommendations (over a two month period) and this leads to achievement of alpha for sell, hold and buy recommendations.

2.7 Index Funds as Performance Benchmarks

Index funds are those funds that represent a specific market and are used as an indicator of the general or sector market performance (Bogle, 2005). Some of the common examples of general market indices include the S&P 500, Nikkei 200, JSE ALSI, FTSE/JSE Top 40 and the various MSCI indices. Indices can represent the general performance of a country's shares or can also be global as evident from the S&P Global 100 amongst others (Haslem, 2004).

The use of indices has evolved from focus on market and sector to that of the requirements by investors. Viviers, Bosch, Smith and Buijs (2008) highlight a few reasons that lead to creation of new indices, namely (1) target investing, (2) shareholder activism (3) best of sector and (4) inclusionary and exclusionary screening. This has led to creation of new kind of indices in the JSE of which some examples are the Social Responsibility Index (SRI) and Sustainability Index. These new kind of industries have

moved from the fringe investment strategies into the mainstream global investment arena (Knoll, 2002).

The Vanguard 500 index fund was the first retail index fund and was formed in 1976 (Haslem, 2004). With an initial allocation of US$ 11 million, the fund only achieved an asset value of US$ 10 billion 20 year later, due to the negative perception of index funds at the time. Since that period, index funds have become widespread and are used as performance benchmarks by most fund managers (Haslem, 2004). The growth in the use of index funds has resulted in depressed security prices for companies that do not form part of the widely benchmarked indices (Brealey, 2000). It is argued that this has been caused largely by the investment decisions of fund managers, who utilise indices as performance benchmarks.

Bogle (2005) found that market indices outperform 79% of all other equity funds over a 20 year period. This is one of the reasons that have led to index funds being used as a benchmark for performance of fund managers in the stock market (Haslem, 2004). The costs associated with investing in index funds have been found to be relatively lower than normal investment into equities (Haslem, Baker and Smith, 2006). This study also found that fees associated with index funds tend to be an indicator of the future performance of the fund. The commoditisation of the funds then leads to most index funds outperforming most fund managers due to their low cost (Haslem, Baker and Smith, 2008).

There is limited coverage of SATRIX Top 40 analysis by the academic research. The only independent analysis available is that of Rusconi (2008). The discussion of the SATRIX Top 40 and its subsequent sector funds is taken from the Rusconi (2008) paper.

The SATRIX Top 40 is an exchange traded fund (ETF) that combines the efficiency of an index tracker and the convenience of a listed security. The SATRIX and other ETFs can be different from typical index tracking funds in terms of:

1. Dividends are declared and paid quarterly and not as they become available from the underlying shares.
2. Leverage is hardly permitted and if so, to a very limited extent. This prohibits the manager from taking additional risk associated with borrowing.

The SATRIX has to be continuously be re-weighted due to the delay is its declaring of dividends which results in changing share weighting in the fund. To achieve this, the fund has to hold some amount of cash at a point before it can declare its quarterly dividends. This allows the fund to re-weight the portfolio, and this negatively affects the return on the fund. Other findings of Rusconi's analysis include the following:

1. SATRIX Top 40 has performed well: The 5 year period up to May 2008 indicates that the ETF has on average delivered better returns than other peer group ETFs.
2. Consistent performance: SATRIX performance has been consistent over a five year period.

3. Costs: The ETF provide efficiency due to its relative low management and transaction costs relative to peers.

The three reasons, mentioned above, are the primary justification for choosing the SATRIX Top 40 as a benchmark portfolio for this research paper.

It has been suggested that other ways to create a benchmark portfolio might be to look at a portfolio of shares of owner-managed or family-controlled businesses (Shung, Stadler and Affleck-Graves, 1987). This is based on the widely familiar topic in literature (and the media) that family controlled businesses eliminate the agency-principal problem, thus performing better than other companies (Jones 2007). Studies on JSE listed companies have come up with contrasting results. The study by Shung, Stadler and Affleck-Graves (1987) found that shares of family-controlled businesses tended to perform better than other shares in the JSE. In contrast, Jones (2007) found no statistical evidence of this from a shareholder's point of view. What he found was that the source of returns between family-owned companies differs from other companies in that there are less dividend payments from family-controlled businesses, thus making share appreciation the main source of return.

3 Research Hypothesis

The purpose of the research is to determine whether an investor that heeds the recommendations of security analysts can construct a portfolio that outperforms the market, as represented by a market index like the SATRIX Top 40. The availability of analyst recommendations historical data is the main determining factor informing the length of the research period.

The research focuses on returns and risk adjusted returns as represented by the Sharpe ratio. The choice of using the Sharpe ratio is based on its wide use and popularity within the investment community. The monthly returns incorporate all dividends paid during the period when the stock is held in the portfolio.

The period of research focuses on the performance of the research portfolio during a bull market as well as during a bear market. The first six research hypotheses focus on the question whether the research portfolio outperforms the SATRIX Top 40 over based on its monthly returns and Sharpe ratios. The seventh and the eighth hypotheses focus on the index used, to check whether it performs better than another potential benchmark portfolio that is constructed from family controlled shares in the JSE.

Hypothesis 1:

The null hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is equal to or less that of the SATRIX Top 40. The alternative hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is higher than that of the SATRIX Top 40.

H_{1o}: $R_p - R_{satrix} =< 0$

H_{1a}: $R_p - R_{satrix} > 0$

Hypothesis 2:

The null hypothesis states that the monthly Sharpe ratio of a portfolio constructed from analyst recommendations is equal to or less that of the SATRIX Top 40. The alternative hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is higher than that of the SATRIX Top 40.

H_{2o}: $Sh_p - Sh_{satrix} =< 0$

H_{2a}: $Sh_p - Sh_{satrix} > 0$

Hypothesis 3:

The null hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is equal to or less that of the SATRIX Top 40 during a period of increasing stock prices in the market (bull market period). The alternative hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is higher than that of the SATRIX Top 40 during a bull market period.

H_{3o}: $R_p - R_{satrix} =< 0$

H_{3a}: $R_p - R_{satrix} > 0$

Hypothesis 4:

The null hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is equal to or less that of the SATRIX Top 40 during a bull market period. The alternative hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is higher than that of the SATRIX Top 40 during a bull market period.

H_{4o}: $Sh_p - Sh_{satrix} =< 0$

H_{4a}: $Sh_p - Sh_{satrix} > 0$

Hypothesis 5:

The null hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is equal to or less that of the SATRIX Top 40 during a period of decreasing stock prices in the market (bear market period). The alternative hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is higher than that of the SATRIX Top 40 during a bear market period.

H_{5o}: $R_p - R_{satrix} =< 0$

H_{5a}: $R_p - R_{satrix} > 0$

Hypothesis 6:

The null hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is equal to or less that of the SATRIX Top 40 during a bear market period. The alternative hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is higher than that of the SATRIX Top 40 during a bear market period.

H_{6o}: $Sh_p - Sh_{satrix} =< 0$

H_{6a}: $Sh_p - Sh_{satrix} > 0$

Hypothesis 7:

The null hypothesis states that the monthly return from a portfolio of family controlled company shares is less than the monthly return from the SATRIX Top 40. The alternative hypothesis states that the monthly return from a portfolio of family controlled company shares is equal to or greater than the monthly return from the SATRIX Top 40.

H_{7o}: $R_{pfamily} - R_{satrix} =< 0$

H_{7a}: $R_{pfamily} - R_{satrix} > 0$

Hypothesis 8:

The null hypothesis states that the Sharpe ratio from a portfolio of family controlled company shares is less than the Sharpe ratio from the SATRIX Top 40. The alternative hypothesis states that the Sharpe ratio from a portfolio of family controlled company shares is equal to or greater than the Sharpe ratio from the SATRIX Top 40.

H_{8o}: $Sh_{pfamily} – Sh_{satrix} =< 0$

H_{8a}: $Sh_{pfamily} - Sh_{satrix} > 0$

4 Methodology

The research is time series empirical in nature with a focus on historical risk-adjusted returns of a selected portfolio of shares recommended by analysts.

4.1 Research Design

The research focuses on buy and sell recommendations by South African share analysts between 2002 and 2010 for shares listed on the JSE over the same period. The source of the data is analyst consensus data from I-Net Bridge, which covers the analyst recommendations of the top 10 ranked brokerage houses in the country. Being one of the premier sources of financial information in South Africa, I-Net Bridge is widely used in the both academic research and investment community (Hall and Millard, 2002). Hall and Millard (2002) further recommend that choice sample of covered companies for the research portfolios should focus on companies that appear in the Financial Mail Top 100 companies.

The period 2002 to 2010 covers both bull markets (2002 – 2008 and 2009 - 2010) and bear markets (2008-2009), allowing for sufficient data to test the performance under different market conditions.

The research portfolio is constructed from shares that received buy and/or sell recommendations from the analyst consensus data over the mentioned period. The portfolio consist of between 30 and 40 listed shares selected from the recommendation data, and for companies that are part of the Financial Mail Top 200 (appendix A), also called South African giants, in any of the years from 2002 to 2010. The choice of companies in the SA giants is mainly due to two reasons: (1) most analyst coverage tends to be focus on large and glamorous companies compared to smaller companies (Jegadeesh, Kim, Krische and Lee, 2004); and (2) the list provides a large enough sample of companies that survive the entire period of research.

Literature review has identified the following constructs as a measure of the performance of analyst recommendations:

- Returns on the individual shares that form part of the research portfolio. These returns are used to calculate the portfolio returns over the different period and the relevant portfolio risk (measures as standard deviation of the returns over the same period). The individual returns are assumed to be calculated using the formula (Prayag and Van Rensburg, 2006):

$$\mathbf{Rit} = \frac{Pit - Pi(t-1) + Dit}{Pi(t-1)} \qquad \textbf{...(6)}$$

  From the individual returns of shares the portfolio return is calculated using equation (3) mentioned earlier.

- The SATRIX Top 40 provides a good benchmark for portfolio performance as discussed in literature review section. For this reason, the SATRIX Top 40 will be the used as a benchmark portfolio for this paper.

These constructs are converted to Sharpe ratio values to measure the risk-adjusted returns of both the portfolio and the benchmark SATRIX Top 40 for the chosen periods.

4.2 Unit of Analysis

The unit of analysis for the research is monthly returns and monthly risk-adjusted returns of the research portfolio, of which the latter is represented by Sharpe ratios of the portfolio over the chosen periods of time.

4.3 Population and sample

The population consists of all analyst-covered shares that were listed on the Johannesburg Stock Exchange at any point in time between 2002 and 2010. The sample frame for the research is all the shares covered by analysts, with specific shares that received buy and sell recommendations in the 2002 to 2010 period

4.4 Sampling

A non-probability convenient sampling is applicable in this case due to the following reasons:

- Focus is on those shares covered by analysts from the top ranked brokerage and research houses.
- Access to all research work from different research houses might be impossible; therefore consensus analyst data from I-NET Bridge is the main source of the analyst recommendations.
- The choice of shares in the Financial Mail Top 200 (SA Giants) provides a well defined sample of companies that receive good analyst coverage compared to other smaller companies.

4.5 Data Collection Process

4.5.1 Analyst Recommendations

The I-NET Bridge financial database is the primary source of analyst consensus data for the research. The database compiles recommendations from analyst from some of the leading brokerage and research houses. These individual buy, hold and sell recommendations are used to develop consensus recommendations which are then published by I-Net Bridge. The data is available for individual shares at specific dates of the consensus recommendations.

4.5.2 Share Prices and Dividends

McGregor BFA financial database is the source of share price data and dividends required for the results and analysis. Daily share prices are collected for each of the shares from the day of the buy recommendation, which is when the share is included in the research portfolio.

4.6 Data Analysis Approach

The data analysis begins with the allocation of an arbitrary rand amount (R 1 000 000.00 or R 25 000.00 for each share) to an equal weighted portfolio of shares that are recommended for buy by analysts consensus data. The large amount per share to be invested is to ensure that the transaction costs are relatively small when compared to the transactions. The portfolio weighting then varies over the perceived investment period and dividends are not reinvested into the portfolio, but are catered for in the portfolio returns. Some of the other analysis characteristics include:

1 The share prices to be utilised for the monthly returns are the closing prices of the last Friday of the month (in the case the month ends between Friday and following Tuesday) and first Friday of the month (in the case where the month ends on Wednesday or Thursday).

2 The volatility of the portfolio will be based on weekly closing prices of the shares.

3 Transactions are assumed to occur on the week of the sell or buy recommendation based on the closing price of the shares.

4 The portfolio construction follows an equal weighting at construction and thereafter no rebalancing is done for the portfolio.

5 On sale of one company shares, the proceeds are assumed to be reinvested in another company shares that is on the buy list at the week of the sell. The new weighting then varies according to the performance of the different shares in terms of capital gains.

6 The dividends for the shares are paid on the same week as they are due (based on the ex-dividend date) and are not reinvested into the portfolio. This contrasts with the quarterly dividend payments from the SATRIX Top 40.

4.7 Research Limitation

The research has various limitations, which include:

1. The availability of only 9 years of analyst data limits the research to mainly bullish market conditions (the share prices were generally in a growth rally between 2002 and 2010), while the bearish market conditions were only between 2008 and 2009. Various attempts to access older data than 2002 proved fruitless, which then limited the length of the research period to the conditions explained above. It was ascertained that most of the historical analyst consensus data is not kept by the JSE or by financial data companies such as I-NET Bridge, BFA-McGregor and Bloomberg.

2. The consensus data was found to exclude all delisted shares. This results in a survivor bias in the data and results and leaving out some of the companies that received positive analyst recommendations but eventually failed. Some of these include Tigon Ltd, Tiger Wheels and Saambou, amongst others. This aspect might favour index funds from an investor perspective, as only “survivors” are retained over time. This aspect was not considered in this research paper.

3. The research period is dominated by buy rather than sell recommendations. This is partly due to the largely bull nature of the research period, when share prices were largely expected to increase. This might be an indication that analysts are reluctant to alienate the management of companies by means of sell recommendations. However, this matter is outside the scope of this research paper.

5 Research Results

5.1 Description of Research Sample

As described in the methodology section, the Financial Mail Top 200 companies list provides the sample frame for the research. Companies that featured in the list tend to receive the most coverage by analysts and thus provided a good sample for the research. The criteria for the choice of companies from the sample frame was (1) the companies had analysts coverage data from the I-NET Bridge database, (2) the companies did not undergo any corporate activity that resulted in the main company delisting from the JSE and (3) in the instance of companies that had undergone unbundling, any special dividends and new listings (for unbundled companies) is reflected is the research. Some of the companies that had such transactions include Remgro (REM), which resulted in the listing of British American Tobacco (BAT) and Reinet Investment (REI) on the JSE, and the unbundling of Telkom (TKG) resulting in Vodacom (VOD) listing on the JSE.

Available analysts' consensus data covers the period from 4 December 2002 to 30 July 2010. At the start of the period, there are only 18 shares with buy recommendations out of the total of 80 shares included in the sample. To avoid holding a large cash amount in the portfolio (which might lead to cash-biased-return influencing the research), the research period commences on 4 July 2003, when 30 shares had buy recommendations. From that date the portfolio is built up from 30 shares with an initial

25% of the assets held as cash. The cash accumulates interest at the prevailing money market rates, and on new buy recommendations, the remaining cash is divided equally amongst the number of shares that would bring the portfolio to 40 shares, which is similar to the SATRIX Top 40 benchmark. The research portfolio finally gets to 40 shares on 21 October 2005 and from that date trades are only done in the case of a new sell recommendation, which is then matched with the closest buy recommendation. A summary of the transactions for the research portfolio from 4 July 2003 to 30 July 2010 is provided in Table 1. It is remarkable to note that buy recommendations exceed sell recommendations by a considerable margin during the research period.

Table 1: Buy and sell recommendations for shares in the research portfolio

Date	Analyst Consensus	Company Shares
04 July 2003	Buy	First Rand; Tiger Brands; Massmart; Naspers; Murray & Roberts; Steinhoff International; Remgro; AVI; Netcare; Discovery Holdings; Astral Foods; Mustek; Aspen Pharmacare; Ceramic Industries; ABIL; Lonmin; Santam; WBHO; Foshini; Imperial Holdings; Reunert; Anglo American; Sasol; Sanlam; SAB Miller; Sappi; Standard Bank; Bidvest; Telkom; Illovo
29 Jul 2003	Buy	Shoprite
19 Sep 2003	Buy	JD Group
11 Oct 2003	Buy	AECI
07 Nov 2003	Sell	Illovo
26 Dec 2003	Sell	Ceramic Industries
09 Jan 2003	Buy	Metropolitan
14 May 2004	Buy	PPC
18 Jun 2004	Buy	African Rainbow Minerals
23 Jul 2004	Buy	Growth Point Properties
03 Sept 2004	Buy	Sun International
24 Sept 2004	Buy	Group 5
28 Jan 2005	Sell	Lonmin
11 Mar 2005	Sell	African Rainbow Minerals
20 May 2005	Buy	Datatec
22 July 2005	Buy	Rainbow Chickens
29 Jul 2005	Buy	Lonmin
16 Sept 2005	Buy	Omnia
21 Oct 2005	Buy	Mr. Price
06 Oct 2006	Sell	Sappi
	Buy	MTN
12 Dec 2008	Sell	Lonmin
	Buy	Gijima AST
06 Nov 2009	Sell	Massmart
	Buy	Harmony
05 Mar 2010	Sell	Shoprite
	Buy	Clicks

(Source: I-NET Bridge analyst consensus data from 02 Dec 2002 to 30 July 2010)

Two shares that form part of the research portfolio underwent corporate activity during the research period. These shares are:

Telkom (TKG): On 22 May 2009, Telkom disposed of its stake in Vodacom (VOD), resulting in Telkom shareholders receiving a special dividend and Vodacom shares (one Vodacom share per Telkom share owned). After the unbundling, the Vodacom shares are included in the portfolio, thus resulting in the portfolio holding more than 40 shares.

Remgro (REM): In October 2008, Remgro underwent an unbundling which resulted in shareholders receiving 40.6054 shares of British American Tobacco (BAT) and 63.6977 depository receipts of Reinet Investments (REI) per 100 shares of Remgro held. This transaction is factored in the portfolio on 24 October 2008 for Reinet and 31 October 2008 for BAT. Subsequent further unbundling by Remgro (ie Transhex) falls outside the period covered by this study.

To evaluate whether the SATRIX Top 40 is an appropriate benchmark, a portfolio consisting of ten family-controlled or owner-managed businesses (referred to as the family portfolio) listed on the JSE is utilised to compare the performance of this portfolio to the SATRIX Top 40. The family portfolio comprises shares that form part of the research portfolio, resulting in the new benchmark consisting of only ten shares that is held for the duration of the research period. In his research on family-controlled or

owner-controlled businesses Jones (2007) included the following companies, which are then used to create the family portfolio for this research:

- Remgro
- Gijima AST
- Shoprite
- Steinhof International
- The Bidvest Group
- Ceramic Industries
- Mustek
- Naspers
- WBHO and
- Altron

5.2 Descriptive Results – Monthly Returns

5.2.1 Research Portfolio vs SATRIX Top 40

The monthly returns for the research portfolio and the SATRIX Top 40 are illustrated in terms of an index that starts at 100 on 4 July 2003 in figure 1.

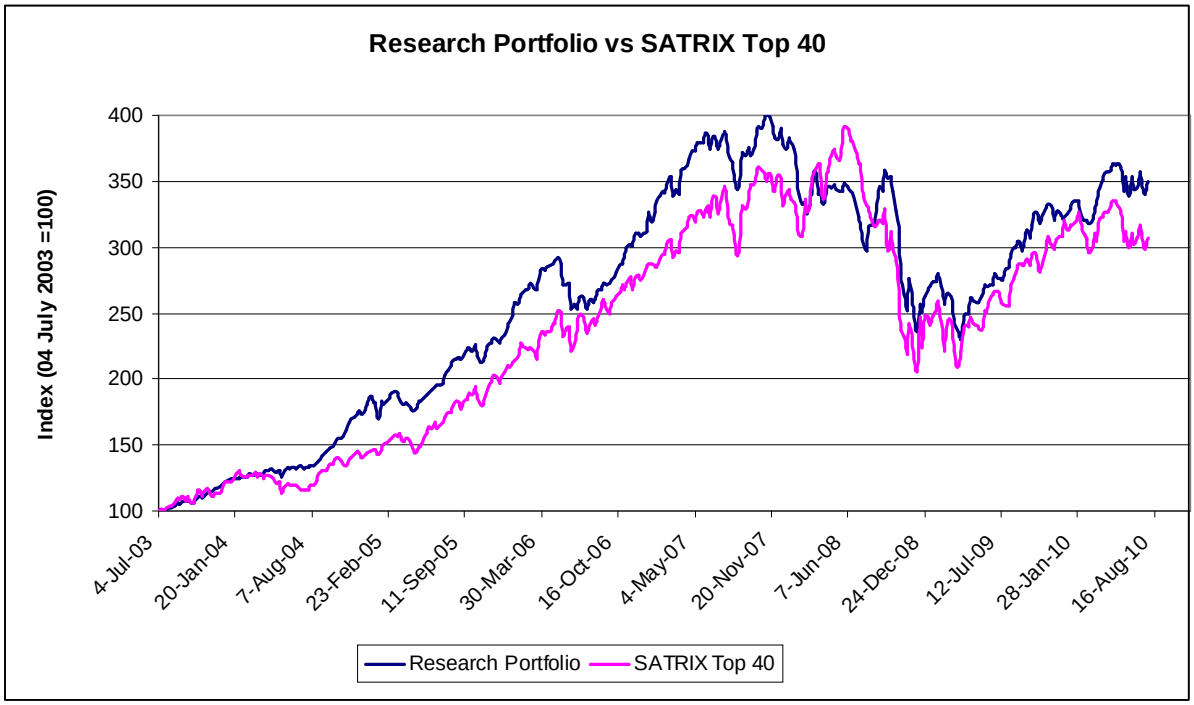

Figure 1: Index of Research Portfolio and SATRIX Top 40. (source: own research)

As evident from the figure 1, the portfolio seems to outperform the SATRIX Top 40 during most of the bull market period of May 2004 to November 2007 and the same is evident from March 2009 to July 2010. When dividends are taken out of the returns, the picture remains similar as evident in Figure 2, indicating that since the dividends are not reinvested into the portfolio, the major source of returns for both the portfolio and the SATRIX Top 40 is the share price performance.

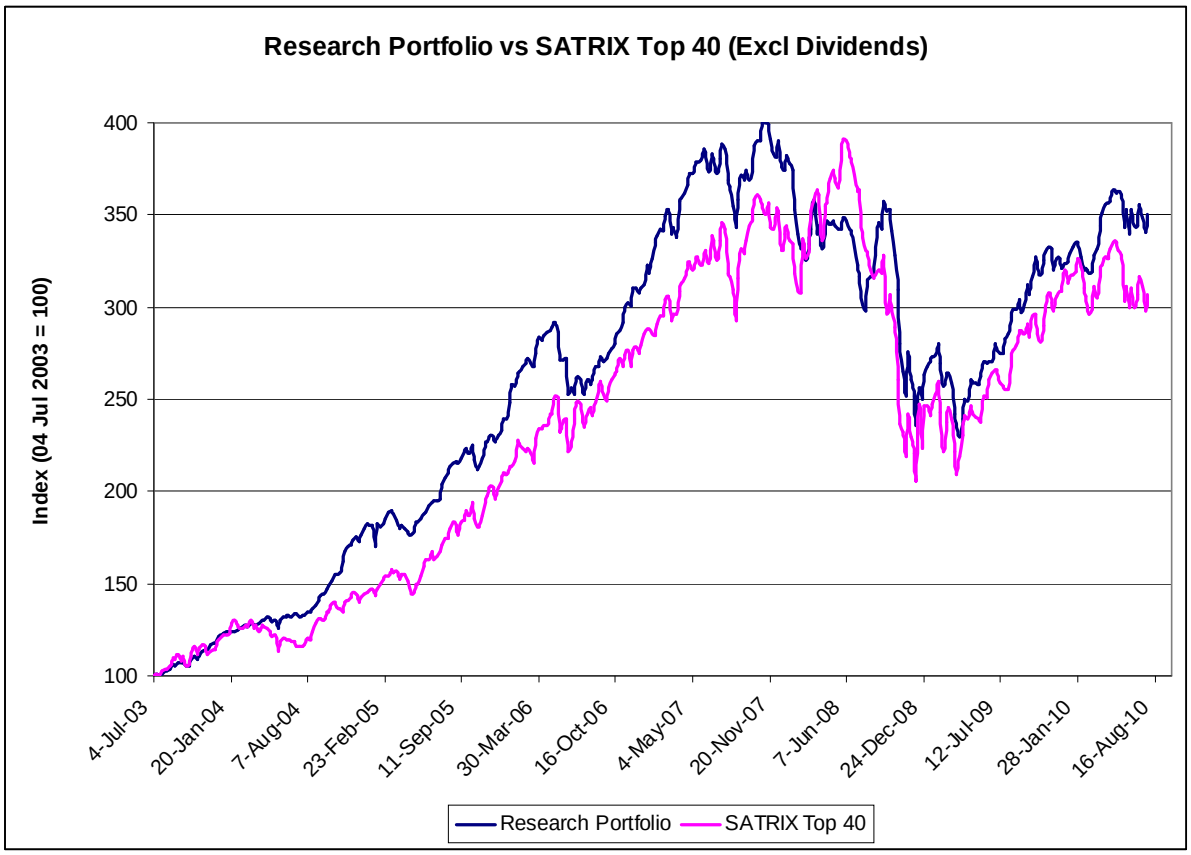

Figure 2: Index of Research Portfolio and SATRIX Top 40 excluding dividend payouts (source: own research)

Test of difference of the returns

A test for difference of the monthly returns yields the following results (detailed NCSS results in appendix B):

Table 2: Descriptive statistics for monthly returns of the research portfolio and the SATRIX Top 40

Item	Portfolio Monthly Returns	SATRIX 40 Monthly Returns
Count	85	85
Mean	2.0494	1.8642
Variance	25.103	27.143

The histograms for the monthly returns for the research portfolio (C1) and the SATRIX Top 40 (C2) are illustrated in figure 3 below:

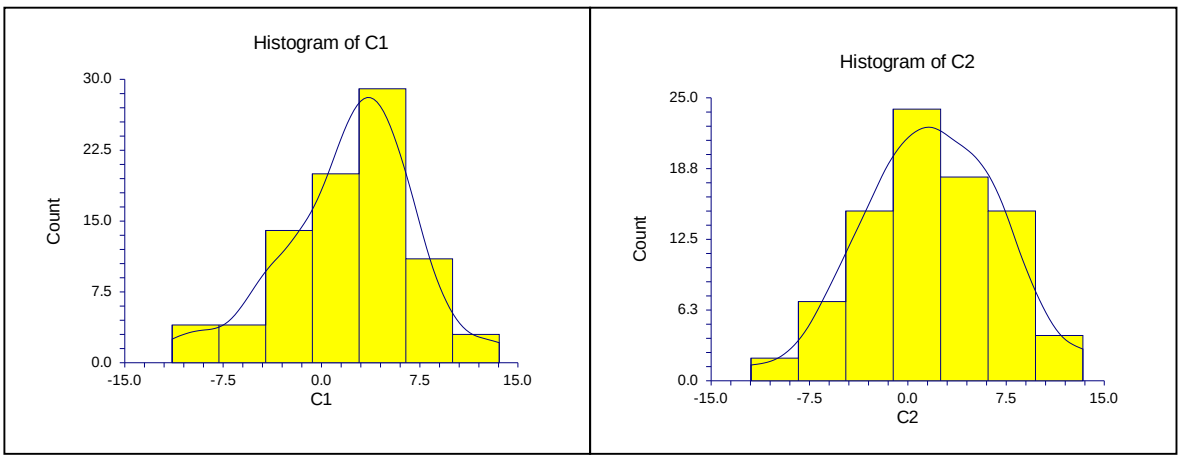

Figure 3: Histogram of returns for the Research Portfolio (C1) and the SATRIX Top 40 (C2).

5.2.2 Bull Market Period

The bull market period consists of the months when the market, as represented by the JSE All Share index, had positive returns on a month-to-month basis. The descriptive statistics for the bull period are provided by Table 3 below:

Table 3: Descriptive statistics for the monthly returns during a bull market period.

Item	Portfolio Monthly Returns	SATRIX 40 Monthly Returns
Count	53	53
Mean	3.797	5.035
Variance	20.05	11.32

The histograms for the distribution of returns during the bull period are illustrated by figure 4 below:

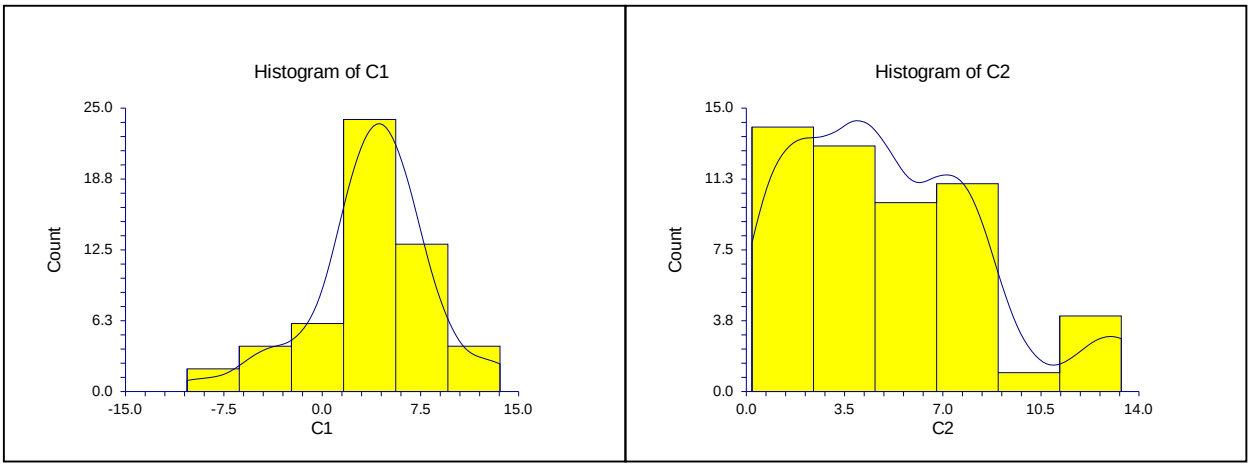

Figure 4: Distribution of monthly returns during a bull market period for the Research Portfolio (C1) and the SATRIX Top 40 (C2).

5.2.3 Bear Market Period

The bear market period consists of months when the market had negative returns on a month to month basis. The descriptive statistics for the bear period are provided by Table 4 below:

Table 4: Descriptive statistics for the monthly returns during a bear market period.

Item	Portfolio Monthly Returns	SATRIX 40 Monthly Returns
Count	32	32
Mean	-0.8447	-3.3872
Variance	20.529	8.904

The histograms for the distribution of returns during a bear market period are illustrated by figure 5 below:

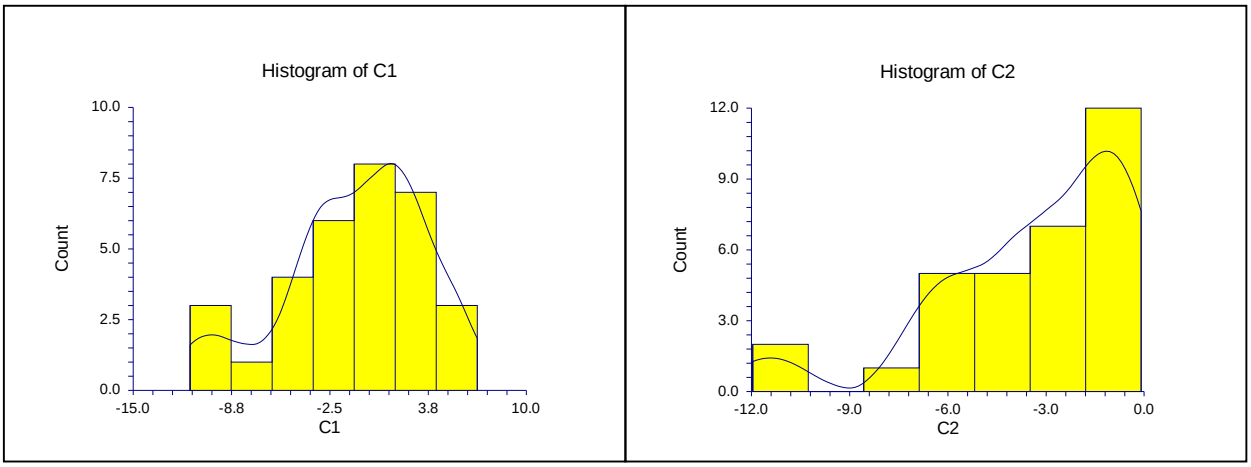

Figure 5: Distribution of monthly returns during a bear market period for the Research Portfolio (C1) and the SATRIX Top 40 (C2).

5.2.4 SATRIX Top 40 vs Family Companies Portfolio

Figure 6 below shows the performance of the SATRIX Top 40 against a portfolio of family-controlled or owner-managed companies listed on the JSE.

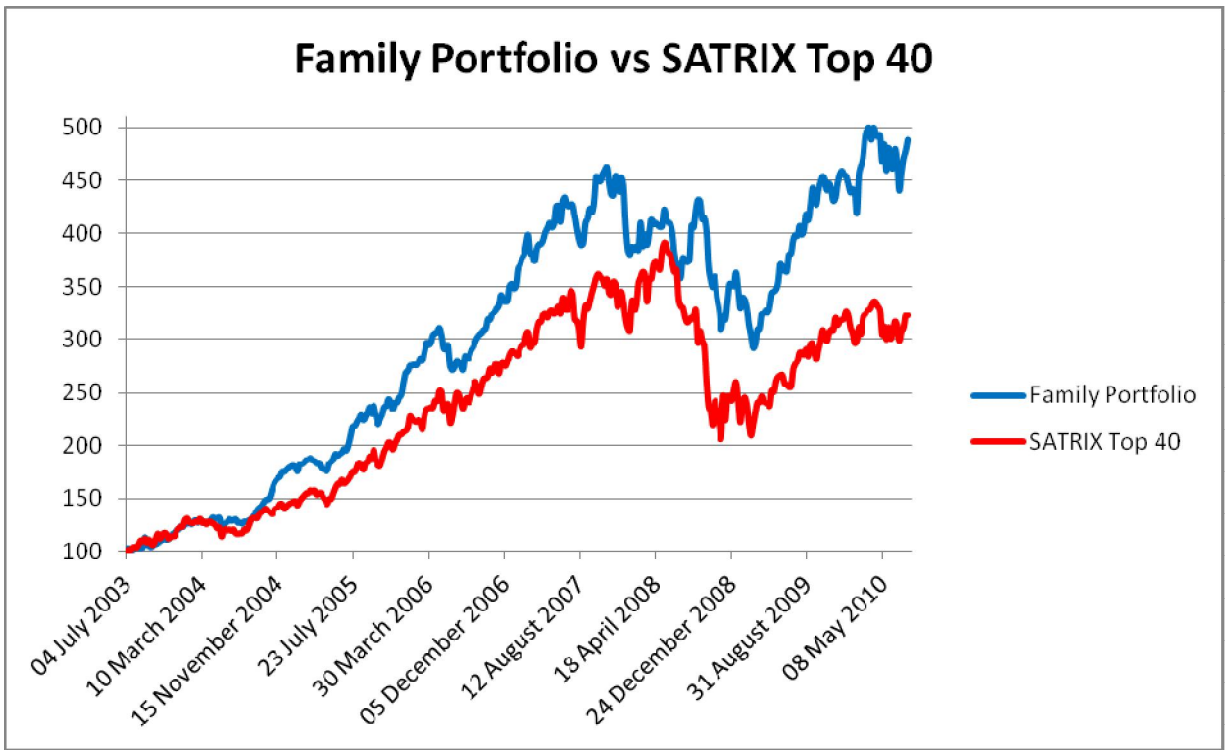

Figure 6: Performance of family-controlled-companies portfolio against the SATRIX Top 40 (source: own research).

As evident from the figure above, the family-controlled or owner-managed company share portfolio seems to outperform the SATRIX Top 40 over the research period. The difference is even more significant than in the case of the research portfolio. Hypothesis 7 in a later section of the document tests the significance of the difference in the returns for the two portfolios (family portfolio and SATRIX Top 40)

A test for difference of the monthly returns yields the following results (detailed NCSS results in appendix B):

Table 5: Descriptive statistics for monthly returns of the family portfolio and the SATRIX Top 40

Item	**Family Portfolio Monthly Returns**	**SATRIX 40 Monthly Returns**
Count	85	85
Mean	2.1775	1.8642
Variance	29.093	27.143

The histograms for the monthly returns for the family portfolio (C1) and the SATRIX Top 40 (C2) are illustrated in figure 7 below:

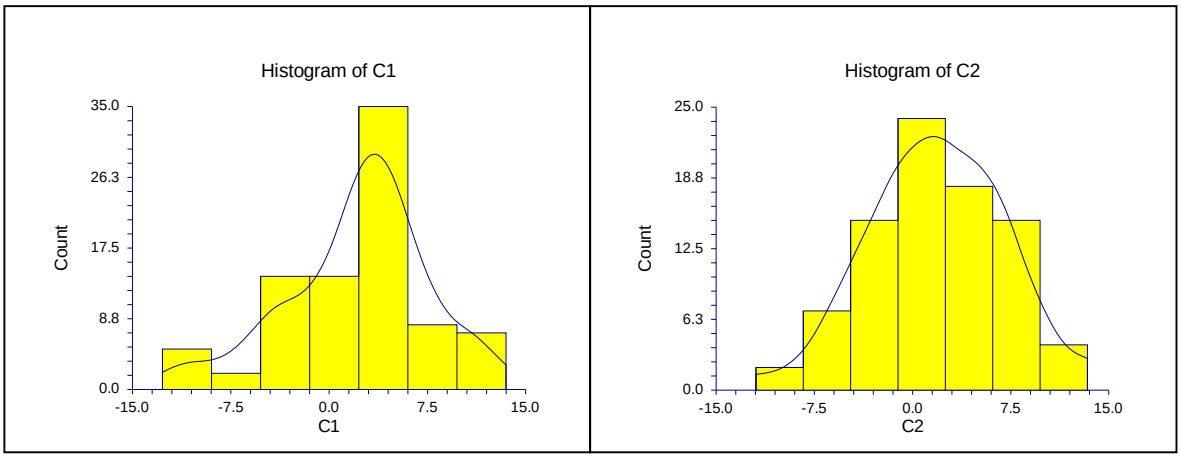

Figure 7: Histogram of returns for the Family Portfolio (C1) and the SATRIX Top 40 (C2).

5.3 Descriptive Results – Sharpe Ratios

In this section, the descriptive results of the Sharpe ratio for the various hypotheses are presented.

5.3.1 Research Portfolio vs SATRIX Top 40

Table 6 provides a summary of the descriptive statistics of the Sharpe ratio of the portfolio and the SATRIX Top 40 based on the monthly returns.

Table 6: Descriptive statistics of the Sharpe ratio for the duration of the research period.

Item	Portfolio Monthly Returns	SATRIX 40 Monthly Returns
Count	85	85
Mean	1.8894	0.9156
Variance	10.5674	8.1288

The histograms of the research portfolio (C1) and the SATRIX Top 40 (C2) are provided in figure 8 below:

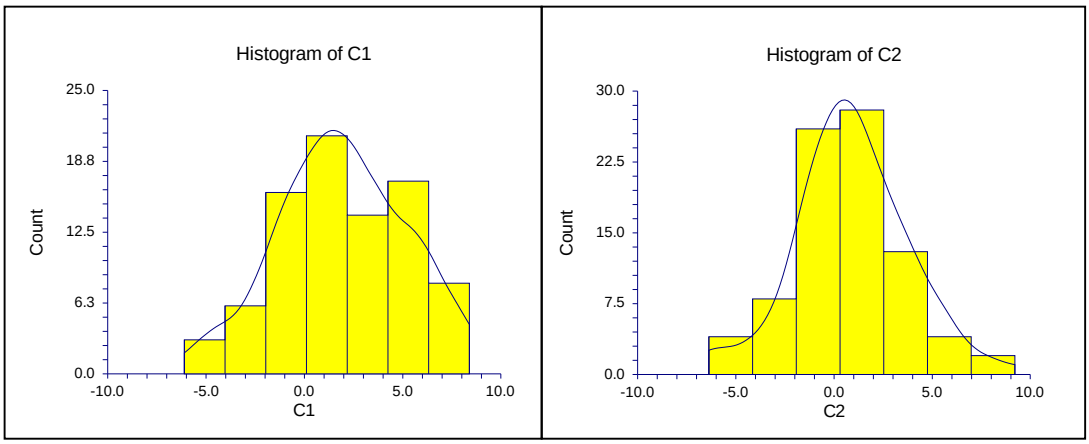

Figure 8: Histogram of the monthly Sharpe ratio for the Research Portfolio (C1) and the SATRIX Top 40 (C2).

5.3.2 Bull Market Sharpe Ratios

Table 7 provides a summary of the descriptive statistics for the Sharpe ratio of the portfolio and the SATRIX Top 40 based on the monthly returns for a bull market period.

Table 7: Descriptive statistics for the Sharpe ratio during a bull market period.

Item	Portfolio Monthly Returns	SATRIX 40 Monthly Returns
Count	53	53
Mean	2.9887	2.5232
Variance	9.106	4.1893

The histograms for the Sharpe ratio for the research portfolio (C1) and the SATRIX Top 40 (C2) during a bull market are provided in figure 9 below:

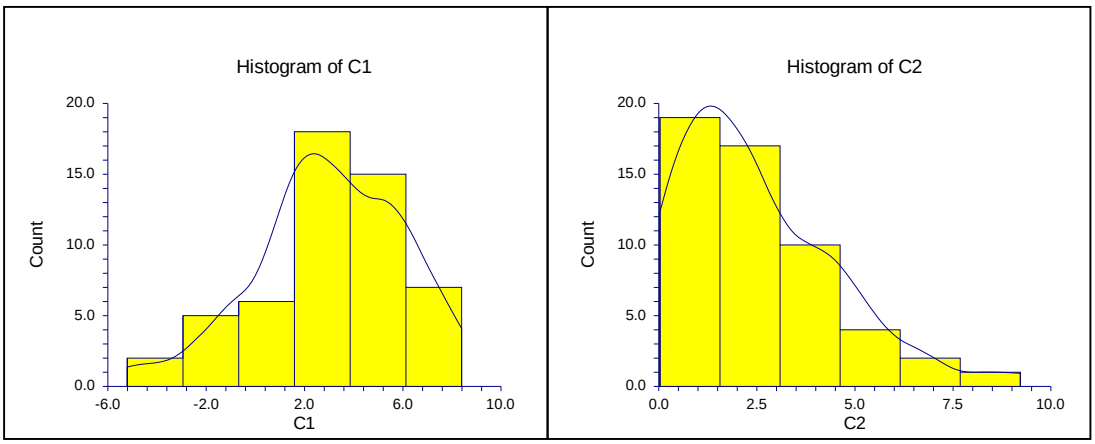

Figure 9: Histogram of the monthly Sharpe ratio for the Research Portfolio (C1) and SATRIX Top 40 (C2) during a bull market period.

5.3.3 Bear Market Sharpe Ratios

Table 8 provides a summary of the descriptive statistics for the Sharpe ratio of the portfolio and the SATRIX Top 40 based on the monthly returns for a bear market period.

Table 8: Descriptive statistics for the Sharpe ratio during a bear market period.

Item	Portfolio Monthly Returns	SATRIX 40 Monthly Returns
Count	32	32
Mean	0.06875	-1.7467
variance	7.8725	3.2634

The histograms for the Sharpe ratio for the research portfolio (C1) and the SATRIX Top 40 (C2) during a bull market are provided in figure 10 below:

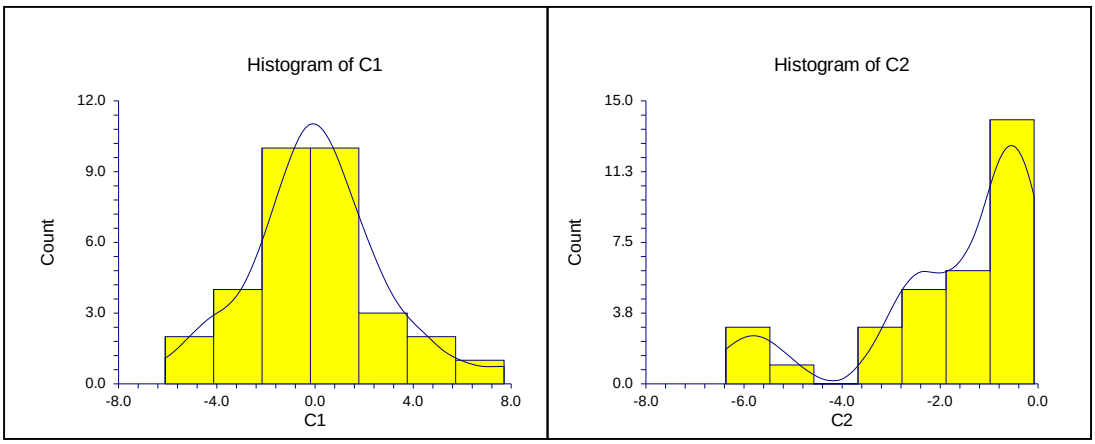

Figure 10: Histogram of the monthly Sharpe ratio for the Research Portfolio (C1) and SATRIX Top 40 (C2) during a bear market.

5.3.4 SATRIX Top 40 vs Family Companies Portfolio

Table 9 provides a summary of the descriptive statistics for the Sharpe ratio of the SATRIX Top 40 and a portfolio of family portfolio based on the monthly returns over the research period.

Table 9: Descriptive statistics for the Sharpe ratio for the family control company portfolio and the SATRIX Top 40.

Item	**Family Portfolio Monthly Returns**	**SATRIX 40 Monthly Returns**
Count	85	85
Mean	2.0432	0.9156
variance	16.691	8.129

The histograms of the Sharpe ratio of the family control portfolio (C1) and the SATRIX Top 40 (C2) during a bull market are provided in figure 11 below:

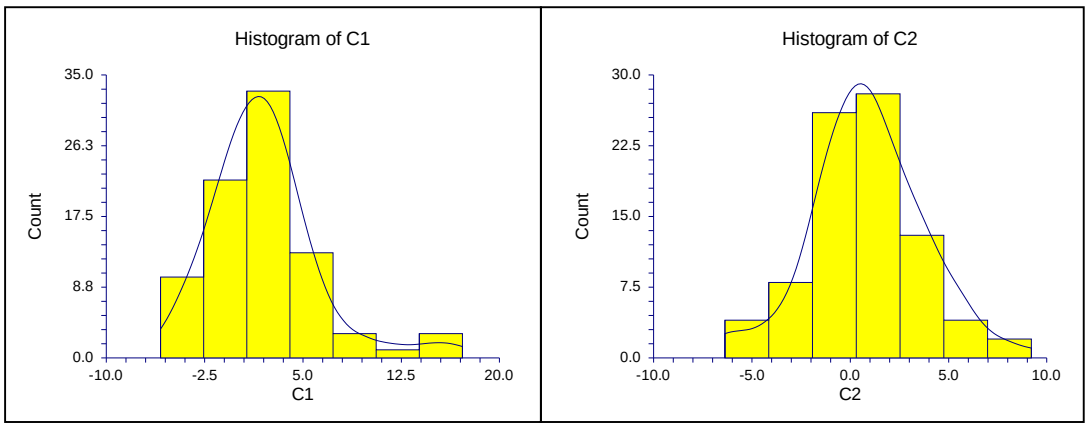

Figure 11: Histogram of monthly Sharpe rations for the Family controlled company portfolio (C1) and SATRIX Top 40 (C2).

5.4 Hypothesis Test

The NCSS statistical software was the tool used for the t-test and the following procedure was followed in all the hypothesis tests:

1. The One Sample t-test is the utilised method for all the hypothesis tests (which makes it equivalent to a paired sample-test). This used for the difference in the Research Portfolio returns (or Sharpe ratio) to that of the SATRIX Top 40.
2. The significant level is set at 5% (representing 95% confidence level for all the tests)
3. Assumptions Tests:
    a. The check for normality is determined from the output section of the NCSS.
    b. Table 10 indicates the chosen tests depending on the results of the assumptions tests:

Table 10: Tests for difference procedure

	Test utilised
Normality not rejected	T-test for Difference of Means
Normality rejected	Wilcoxon Signed-Rank Sum Test

4. The Power of the test is determined from NCSS readings to determine the probability of a Type II Error. A Type II Error relates the failure to reject the null hypothesis, when it should actually be rejected.
5. The NCSS output can be found in appendix E.

5.4.1 Hypothesis 1

The null hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is equal to or less that of a SATRIX Top 40. The alternative hypothesis states that the monthly returns of a portfolio constructed from analyst recommendations is higher than that of a SATRIX Top 40.

H_{1o}: $R_p - R_{satrix} =< 0$

H_{1a}: $R_p - R_{satrix} > 0$

NCSS Readings

Check for normality: *Cannot reject normality*

Test method: *T-Test*

Reject H_o at 0.05: *No*

Power of Test: 0.110175 (when significant level is increased to 0.1, the null hypothesis is still rejected and the Power of the test increases to 0.335)

Results

The null hypothesis cannot be rejected, meaning that the monthly return from the research portfolio is not found to be statistically higher than that of the SATRIX Top 40 over the research period.

5.4.2 Hypothesis 2

The null hypothesis states that the monthly Sharpe ratio of a portfolio constructed from analyst recommendations is equal to or less that of a SATRIX Top 40. The alternative hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is higher than that of a SATRIX Top 40.

H_{2o}: $Sh_p - Sh_{satrix} =< 0$

H_{2a}: $Sh_p - Sh_{satrix} > 0$

NCSS Readings

Check for normality: Cannot r*eject normality*

Test method: *T-test*

Reject Ho at 0.05: *Yes*

Power of Test: *0.926075*

Result

The null hypothesis is rejected, meaning that the monthly Sharpe ratio for the research portfolio is statistically higher than that of the SATRIX Top 40 over the research period.

5.4.3 Hypothesis 3

The null hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is equal to or less that of a SATRIX Top 40 during a period of increasing stock prices in the market (bull market period). The alternative hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is higher than that of a SATRIX Top 40 during a bull market period.

H_{3o}: $R_p - R_{satrix} =< 0$

H_{3a}: $R_p - R_{satrix} > 0$

NCSS Readings

Check for normality: Cannot r*eject normality*

Test method: *T-Test*

Reject Ho at 0.05: *No*

Power of Test: 0.000020 (when significant level is increased to 0.1, the null hypothesis still cannot be rejected.

Result

From the NCSS reading the result proves to be inconclusive due to the higher probability of a Type II error. When expanding the test using other statistical tools (i.e. Microsoft Excel), the null hypothesis cannot be rejected.

5.4.4 Hypothesis 4

The null hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is equal to or less that of a SATRIX Top 40 during a period of increasing stock prices in the market (bull market period). The alternative hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is higher than that of a SATRIX Top 40 during a bull market period.

H_{4o}: $Sh_p - Sh_{satrix} =< 0$

H_{4a}: $Sh_p - Sh_{satrix} > 0$

NCSS Readings

Check for normality: Cannot r*eject normality*

Test method: *T-test*

Reject Ho at 0.05: *No*

Power of Test: *0.354189*

Result

The null hypothesis cannot be rejected, meaning that the Sharpe ratios for the research portfolio statistically not higher than those of the SATRIX Top 40 during a period of increasing stock prices.

5.4.5 Hypothesis 5

The null hypothesis states that the monthly return of a portfolio constructed from analyst recommendations is equal to or less that of a SATRIX Top 40 during a period of decreasing stock prices in the market (bear market period). The alternative hypothesis states that the return of a portfolio constructed from analyst recommendations is higher than that of a SATRIX Top 40 during a bear market period.

H_{5o}: $R_p - R_{satrix} =< 0$

H_{5a}: $R_p - R_{satrix} > 0$

NCSS Readings

Check for normality: Cannot r*eject normality*

Test method: *T-Test*

Reject Ho at 0.05: *Yes*

Power of Test: 0.988564

Result

The null hypothesis is rejected meaning that the returns of the research portfolio during the period of declining share prices are statistically higher than those of the SATRIX Top 40.

5.4.6 Hypothesis 6

The null hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is equal to or less that of a SATRIX Top 40 during a period of decreasing stock prices in the market (bear market period). The alternative hypothesis states that the Sharpe ratio of a portfolio constructed from analyst recommendations is higher than that of a SATRIX Top 40 during a bear market period.

H_{6o}: $Sh_p - Sh_{satrix} =< 0$

H_{6a}: $Sh_p - Sh_{satrix} > 0$

NCSS Readings

Check for normality: Cannot r*eject normality*

Test method: *T-test*

Reject Ho at 0.05: *Yes*

Power of Test: *0.943164*

Result

The null hypothesis is rejected at 95% confidence level. This means that the Sharpe ratio of the research portfolio is statistically higher than that of the SATRIX Top 40 during periods of decline share prices.

5.4.7 Hypothesis 7

The null hypothesis states that the monthly return from a portfolio of family controlled company shares is less than the monthly returns from the SATRIX Top 40. The alternative hypothesis states that the monthly return from a portfolio of family controlled company shares is equal to or greater than the monthly return from the SATRIX Top 40.

H_{7o}: $R_{pfamily} - R_{satrix} =< 0$

H_{7a}: $R_{pfamily} - R_{satrix} > 0$

NCSS Readings

Check for normality: Cannot r*eject normality*

Test method: *T-Test*

Reject Ho at 0.05: Yes

Power of Test: 0.755632 (at 0.05)

Result

The null hypothesis is rejected, meaning that the family portfolio has higher monthly returns when compared to the SATRIX Top 40.

5.4.8 Hypothesis 8

The null hypothesis states that the Sharpe ratio from a portfolio of family controlled company shares is less or equal to the Sharpe ratio from the SATRIX Top 40. The alternative hypothesis states that the Sharpe ratio from a portfolio of family controlled company shares is greater than the Sharpe ratio from the SATRIX Top 40.

H_{8o}: $Sh_{pfamily} - Sh_{satrix} =< 0$

H_{8a}: $Sh_{pfamily} - Sh_{satrix} > 0$

NCSS Readings

Check for normality: Cannot r*eject normality*

Test method: *T-Tests*

Reject Ho at 0.5: *Yes*

Power of Test: *0.87644*

Result

The null hypothesis is rejected at 95% confidence level. This means that the Sharpe ratio from a portfolio of family controlled shares is statistically higher than that of the SATRIX Top 40 over the research period.

6 Discussion of the Results

6.1 Introduction

This chapter discusses the results of the research in accordance with the research questions and hypotheses tested. The findings are explained in terms of their consistency with the literature review and the general portfolio and investment theory. The discussion is structured to follow on from Chapter 5 by focusing on (1) performance of the research portfolio against the SATRIX Top 40 benchmark portfolio in terms of actual returns and the Sharpe ratio, (2) performance of the portfolio against the SATRIX Top 40 benchmark during times of increasing share prices, (3) performance of the portfolio against the SATRIX Top 40 benchmark during times of decreasing share prices, (4) testing if the SATRIX Top 40 benchmark can outperform a portfolio of family controlled company shares, and lastly (5) the common findings from the different research questions.

6.2 Research Portfolio Performance

6.2.1 Returns

As evident from Chapter 5, it is found that a R100 investment into the research portfolio on 4 July 2003 grows to R369 by 30 July 2010, while the same investment grows to R322 when invested in the SATRIX Top 40. By testing for differences of monthly returns for the two portfolios, it is found that the difference is not statistically significant.

This indicates that the monthly returns from the research portfolio are found to be not statistically higher than those from the SATRIX Top 40 index over the research period.

Since the research portfolio acts on both buy and sell recommendations, the findings seems to be in line with those by Hall and Millard (2002) in that only buy recommendations yield excess returns, while hold and sell recommendations lead to returns that are lower than the market. These findings are in contrast to international studies by Stickel (1995), Womack (1996) as well as Barber, Mc Nichols and Trueman (2001), which found that investors could benefit from analysts recommendations, leading to returns that are higher than the general market. The difference between the previous studies and this paper can be attributed to the length of research time. Whilst this paper focuses on the long-term returns and performance of the shares, the previous studies focus on short term excess returns resulting from the recommendations of analysts.

Figure 1 in Chapter 5 provides some indication of the difference in the performance of the research portfolio and the SATRIX Top 40. The SATRIX Top 40 seems to have a delayed reaction for both increases and decreases when compared to the research portfolio. This can be best explained from the research by Rusconi (2008), who found that mainly two reasons lead to the delayed reaction of the SATRIX Top 40:

1. The delay of dividend payments, to end of quarter, leads to a loss in monthly returns that are equivalent to two basis points for the SATRIX Top 40.

2. The SATRIX Top 40, even though mimicking the JSE Top 40 index, does not provide a perfect match to that index. At any point in time there is small difference in the composition of the SATRIX Top 40 and the JSE Top 40 index. This indicates the delay in the rebalancing of the SATRIX Top 40 as it tries to follow the JSE Top 40 index.

6.2.2 Impact of Transaction Costs

The research portfolio disregards the transaction costs associated with constructing the portfolio. The assumption can be considered to be reasonable for two reasons. Firstly, the large amount of money involved in the initial buy transactions results in low transaction costs, relative to the transactions. Secondly, the research portfolio is largely a buy and hold portfolio with very limited number of sell recommendations and has no rebalancing involved, which then minimises the number of transactions during the research period. In contrast the SATRIX Top 40, due to its frequent rebalancing to track the JSE Top 40 index, has transaction costs for purchasing the underlying shares. These two reasons explain the small difference in the performance of the research portfolio and the SATRIX Top 40 indicated by figure 1.

6.2.3 Risk Adjusted Returns

The risk adjusted returns for the research portfolio, represented by the Sharpe ratios, are found to outperform the SATRIX Top 40 as shown by hypothesis 2 in Chapter 5. This means that when adjusted for volatility, the monthly returns from the research

portfolio exceed those of the SATRIX Top 40 over the research period. This is again aligned to the research findings of Hall and Millard (2002) and Prayag and Van Rensburg (2006), who found that acting on the buy and sell recommendations can lead to higher returns for investors when adjusting for risk.

The different findings on the monthly returns and monthly Sharpe ratios indicate the different levels of volatility between the research portfolio and the SATRIX Top 40. The results indicate the SATRIX Top 40 has tended to be more volatile over the research period when compared to the research portfolio. The volatility issue of the SATRIX Top 40 index is discussed later in this chapter.

Previous research has shown that shares of companies with small capitalisation tend to outperform those of companies with large capitalisation in the long term (Bauman, Conover and Miller, 1998). This can be used to explain the better performance of the research portfolio, which contains smaller capitalised shares that do not form part of the SATRIX Top 40.

6.2.4 Buy Bias in Recommendations

Based on the number of new buy and sell recommendations, it is evident that analysts seem to issue more buy recommendations, compared to sell recommendations. These buy recommendations seem to happen largely during bull market periods and do not

seem to be matched by sell recommendations during bear market periods. Over the 85 months covered by the research period, 53 months (or 62%) represent a period when the JSE All Share index had positive returns. While bear market conditions were prevalent for 38% of the research period, sell recommendations only represent 20% of all buy and sell recommendations over the period. During the financial crisis of 2008 to mid-2009, there was still limited sell recommendations from analysts and in some cases buy recommendations were issued for resources shares; the prices of which had been hard hit by the decline in commodity prices.

This observation again raises the issue of motivation for analyst recommendations as discussed in the literature review section (Chapter 2). Hong and Kubik (2003) highlighted the fact that in-house underwritten shares tend to get more favourable recommendations from analysts. The South African analyst consensus data consists of data from some of the large brokerage houses in the country, who also provide underwriting services. This brings into question the existence of “Chinese walls” within the financial institutions as recommended by ethical standards within the industry.

Another explanation might be the origination or reasons for the buy and sell recommendations by analysts. Bradshow (2004) highlighted the fact that analysts tend to focus on long term earnings projections of companies, rather than perceived short term bear market factors when deciding on recommendations.

6.3 Performance in Bull Markets

When comparing the performance of the research portfolio to the SATRIX Top 40 during the months where the general market had positive returns, it is found that the portfolio returns were not statistically higher than those of the SATRIX Top 40 index. The hypothesis test results are still found to yield the same results in the case where the significance level is increased from 0.05 to 0.1. Taking into consideration the fact that of the 85 months covered by the research period, the bull market period represented 53 months or 62% of the time, the results of the bull market period can be expected to be more in line with the results of the total research period as discussed in the previous section.

When considering the risk-adjusted returns, the Sharpe ratio of the research portfolio is found to be statistically higher than that of the SATRIX Top 40 in the bull market period. This further supports the argument of the bull market being the dominant period during the research period, thus leading to the alignment of bull market results and the overall results for the research period. This again indicates the high volatility of the SATRIX Top 40 when compared to the research portfolio.

6.4 Performance in Bear Markets

The results of hypothesis 5 in Chapter 5 indicate that during the months of declining share prices, as represented by the JSE All Share index, the research portfolio statistically outperforms the SATRIX Top 40 in terms of both normal and risk-adjusted

returns. Previous research has shown that on a normal day the JSE Top 40 represents over 80% of the trades in the JSE market (Rusconi, 2008). This being true, it can be concluded that the highly traded shares that form part of the SATRIX Top 40 would face the largest movement in the direction of the market during the bull and bear market conditions when compared to less traded shares that are part of the research portfolio.

In line with the returns, the risk adjusted returns, or Sharpe ratios, of the research portfolio are found to be statistically higher than the SATRIX Top 40 during the bear market period. The results are also aligned to the Sharpe ratios for the total period as well as the bull market period, indicating that high volatility of the SATRIX Top 40 can be expected to hold during the bear market period.

The findings from this paper contradicts research by Barber, Lehavy, McNichols and Treman (2003) and McNaulty (2002) which found that analysts tend to perform better during bull market periods and worse during the bear market periods.

6.5 SATRIX Top 40 Benchmark

The test of the SATRIX Top 40 as an appropriate benchmark for the research is done by comparing the SATRIX Top 40 to a portfolio consisting of family-controlled or owner-managed company shares listed on the JSE. The descriptive statistics and figure 6 (in chapter 5) show that the returns from the family-controlled portfolio should be higher

than those from SATRIX Top 40. Figure 6 shows that R 100 invested in each of the family portfolio and the SATRIX Top 40 on 4 July 2003 should result in R 488 for the family portfolio and R 322 for the SATRIX Top 40 by 30 July 2010.

The better performance of the family controlled portfolio is a result of a few shares that far outperformed the market over the research period. Figure 12 shows the top 3 performing shares in the family portfolio.

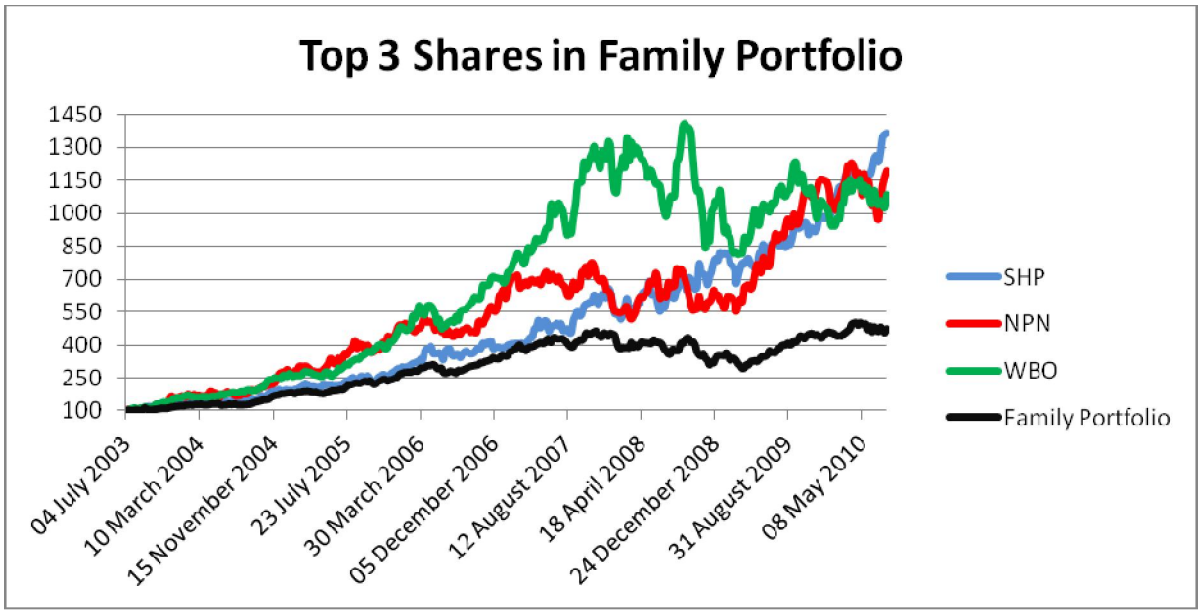

Figure 12: The Top 3 performing shares in the family portfolio. (source: own research)

The top performing shares in the family portfolio (namely, Shoprite (SHP), Naspers (NPN) and WBHO (WBO)) each returned over R 1000 on 30 July 2010 for a R 100 investment on 4 July 2003.

The worst performing shares are indicated in figure 13 below and are compared to the family portfolio.

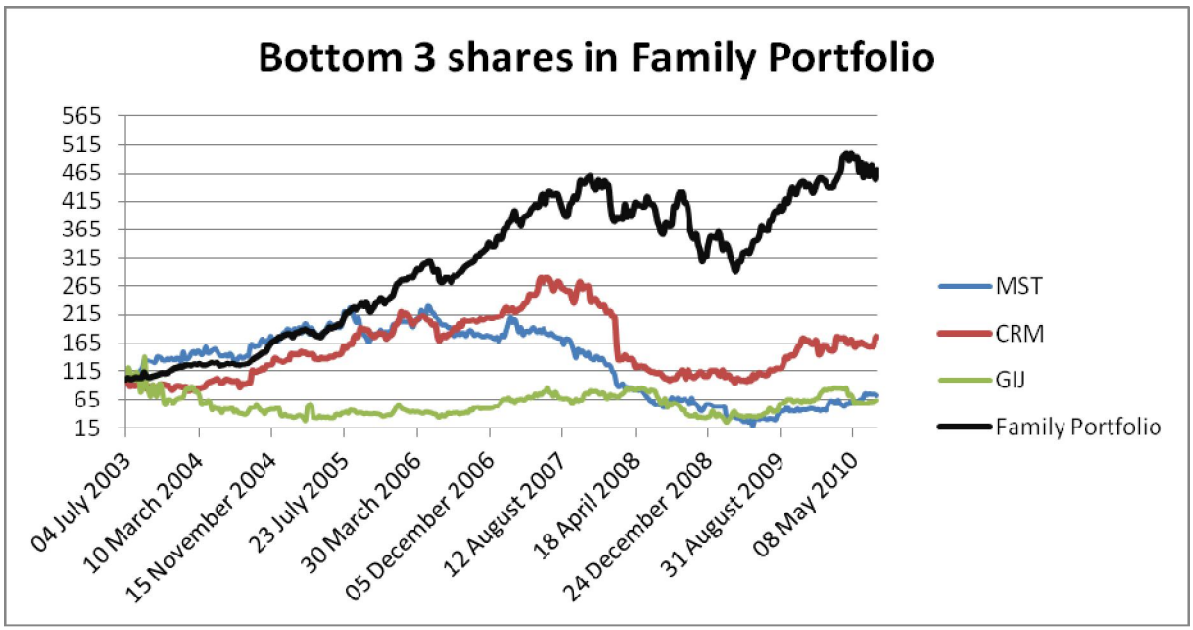

Figure 13: The worst 3 performing shares in the family portfolio. (source: own research)

The worst performing shares in the family portfolio provide a return that ranges from R64 to R170 for every R 100 invested in them over the same period. These shares are Mustek (MST), Ceramic Industries (CRM) and Gijima AST (GIJ).

The reasons for the performance of the research portfolio as well as why some shares perform better is beyond the scope of this research. It should also be noted that the results of the family portfolio represent a sample of only ten shares, which cannot be said to represent a good sample of the family controlled shares, and therefore its comparison to the SATRIX Top 40 might need further investigation.

The research found that the family-controlled or owner-managed company shares produced better risk-adjusted returns than the SATRIX Top 40 over the research period. This again provides further support for the earlier results that showed that the SATRIX Top 40 is more volatile than the research portfolios and the family-controlled or owner-managed company share portfolio.

6.6 Volatility of the SATRIX Top 40

The results of the various hypotheses tested for differences indicate a higher level of volatility for the SATRIX Top 40 when compared to the various portfolios. This is in contract to previous research in that index funds and exchange-traded-funds should generally be less volatile than other generally constructed portfolios (Brealey, 2000). An unpublished report by Rusconi (2008) provides some possible reasons for the behaviour of this exchange traded fund (ETF) and these include:

1. The SATRIX Top 40 index is composed of large shares that dominate the analyst coverage and daily trades on the JSE. This means that these shares experience the higher levels of volatility when compared to smaller capitalised shares.

2. The rebalancing activity of the SATRIX Top 40 in its quest to mimic the JSE Top 40 index as closely as possible leads to a high frequency of transactions, which impacts on the volatility of the fund.

3. Due to the quarterly divided distributions and its holding of cash, the SATRIX Top 40 tends to be more volatile than a direct holding of the underlying shares.

Rusconi (2008) suggests that to create a proper performance benchmark for the index, it is required that adjustments be made to the control portfolio to account for the quarterly dividend distributions.

The composition of the SATRIX Top 40 over the research period could provide another explanation for the observed volatility. From the 40 shares that formed the SATRIX Top 40 03 January 2005, only 22 still remain in the index on 30 June 2010, after taking consideration of unbundling, mergers and acquisitions. A total of 15 from the remaining shares are still listed on the JSE, but do not form part of the SATRIX Top 40. This is an indication of the varying holding that the SATRIX has of individual shares on a quarter to quarter bases that leads to high volume of transactions when compared to a buy and hold portfolio.

7 Conclusions

7.1 Introduction

This paper investigated the value of recommendations of investment analysts to an investor by focusing on South African analysts that covered JSE listed shares between the period 2002 and 2010. By utilising analyst consensus data for the research, the research investigated whether the results are consistent under different market conditions and whether the benchmark used provides an appropriate measure of the performance of analysts.

7.2 Analyst Consensus

The research period for this research was limited to nine years due to older information on recommendations of analysts not being available from the major information retailers, wholesalers and the JSE. The consensus information was also found to exclude de-listed shares and those of companies that were liquidated. This creates a survival bias in the research data as discussed in the earlier chapters. The researcher will in future keep record of the recommendations and will store new consensus data as it becomes available. This will allow for future more long-term research opportunities in this research field, thus contributing to academia in the financial sector.

7.3 Performance of Analyst

Analyst recommendations from the top-ranked analysts in South Africa have been found to yield higher risk-adjusted returns for investors in the JSE. The test of normal returns found that the analyst recommendations do not lead to better performance in the long term. When considering different market conditions, it was found that during bear market conditions, analyst recommendations carry more value in terms of both normal returns and risk-adjusted returns.

During bull market periods, the analyst information prove to be less valuable for investors in terms of normal returns, while being more valuable for risk-adjusted returns under bull market conditions.

7.4 Performance Benchmarks

This paper briefly investigated the use of the SATRIX Top 40 as a performance benchmark for investors. A comparison of the SATRIX Top 40 to a portfolio of family-controlled or owner-managed company shares is done. The paper found that the SATRIX Top 40 grossly underperforms the family portfolio over the research period. While this research had some limitations due to its use of only ten shares in the family portfolio, the question still arises whether investors and fund managers should focus more attention on index and exchange traded funds as a benchmark for their performance. A related question that requires more attention is whether investment returns can be enhanced with a focus on family-controlled and/or owner-managed

companies. This might imply that room exists for the establishment of a traded index fund comprising such companies.

7.5 Recommendation for Investors

Based on the results of the research covered in this paper the following recommendations are made for consideration by investors in the quest to enhance investment returns:

1. Analyst recommendations from share analysts are more useful during bearish market conditions. This means that when markets are falling, investors should rather focus on long-term analyst recommendation to be able to create portfolios that outperform the general market.

2. During periods of bullish market conditions, an investor is better served by investing in exchange traded funds (ETF) like the SATRIX Top 40, since it will take less research effort and give results that are statistically not different from the returns that are from analyst recommended shares.

3. For risk-averse investors, the recommendations by share analysts provide value that result into higher risk-adjusted returns when compared to the general market.

4. Probably the most important finding of this paper is the performance of family-controlled or owner-managed portfolio against the SATRIX Top 40. The research found that the investing in shares of companies that are owner-managed or family

controlled provides the best return when compared to both the SATRIX Top 40 and a portfolio created from acting on analyst recommendations.

7.6 Future Research

The limitations of this study and the results indicate the need for further research into certain aspects of the question whether recommendations of analysts provide value to long term investors. The possible research areas include the following:

- The current research utilises data for nine years only, which is a relatively short time for long term investors. The collection and storage of analyst data provides an opportunity for further research into the topic. This will be possible once data has been collected, e.g. for 10 or 20 years.
- The research period of this paper is dominated by bullish market conditions that presided over the nine year research period. Conducting the research under different market conditions or in conditions that are balanced in terms of the bull and bear market conditions, could provide a different result to this paper, and result in different conclusions and recommendations.
- The consensus data used for this research excludes all shares that had been delisted from the JSE during the period covered by the research. The inclusion of recommendations for these shares could remove the survival bias to the research, thus further providing an evaluation of the value of analyst recommendations.

- This paper found that a portfolio of family-controlled or owner-managed company shares listed on the JSE far outperforms the JSE Top 40. This result is in line with findings by Shung, Stadle and Affleck-Graves (1987), but contradicts findings by Jones (2007). These contradictions could provide a new research topic by expanding the family portfolio as defined in this paper and contrasting its performance with the findings from the previous research papers.

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APPENDIX A: South African Giants

SA GIANTS 2008							
Ranked by		Turnover	Total assets	Market	Equity funds	Net profit	Financial
turnover	Company	Rm	Rm	cap Rm	Rm	Rm	year end
1	BHP Billiton Plc	278154	385514	533260	178120	94331	Jun-07
2	Anglo American Plc	232901	306845	645270	170176	39654.9	Dec-06
3	SABMiller Plc	135912	84562	266481	13037	13591	Mar-07
4	Sasol	98127	117010	245293	64251	17665	Jun-07
5	The Bidvest Group	95656	28658	37044	5953	2842	Jun-07
6	Sanlam	83686	331793	43999	25581	4069	Dec-06
7	Standard Bank Group	69262	965038	134589	43791	10621	Dec-06
8	Imperial Holdings	66214	43775	16811	11205	2480	Jun-07
9	Old Mutual Plc	65458	1703292	97367	25500	16597	Dec-06
10	FirstRand	63021	720814	90192	42416	12676	Jun-07
11	Telkom	51619	52922	68910	21875	9675	Mar-07
12	MTN Group	51595	54147	229380	-2910	11217	Dec-06
13	Barloworld	50259	27920	22051	8639	2292	Sep-07
14	Absa Group	49819	494743	68894	31990	8071	Dec-06
15	Anglo American Platinum Corp	46961	54047	281704	31848	14547	Dec-07
16	Richemont Securities AG	46864	370485	235683	345670	12932	Mar-07
17	Pick n Pay Stores	39337	6738	14425	-546	876	Feb-07
18	Pick n Pay Holdings	39337	15194	6501	7573	558	Feb-07
19	Shoprite Holdings	38950	11333	20544	2783	1040	Jun-07
20	Nedbank	37206	419785	53936	20642	6037	Dec-06
21	Steinhoff International Holdings	36650	26520	24430	5422	1507	Jun-07
22	Sappi	35043	38546	21973	11149	-14	Sep-06
23	Massmart Holdings	34808	8688	13439	198	1145	Jun-07
24	Impala Platinum Holdings	31482	48938	197684	32767	6464	Jun-07
25	Liberty Holdings	27901	199059	9327	6807	842	Dec-06
26	Liberty Group	27901	199625	21212	11914	2333	Dec-06
27	Dimension Data Hold	26022	13602	12140	2829	434	Sep-07
28	Investec	25871	373328	13457	14529	4044	Mar-07
29	Investec Plc	25871	373328	22864	14529	4044	Mar-07
30	ArcelorMittal SA	25363	30627	87813	24415	4504	Dec-06
31	Datatec	22955	8591	4636	2389	448	Feb-07
32	Aveng	22093	18253	25187	9541	1357	Jun-07
33	The Spar Group	21704	4797	8241	662	527	Sep-07
34	AngloGold Ashanti	20886	59143	75541	27006	3407	Dec-06
35	Gold Fields	19693	50956	75042	34830	2245	Jun-07
36	Naspers	19508	43707	55219	32209	2790	Mar-07
37	Network Healthcare Holdings	18607	33751	15880	-6801	321	Sep-07

Ranked by turnover	Company	Turnover Rm	Total assets Rm	Market cap Rm	Equity funds Rm	Net profit Rm	Financial year end
38	Murray & Roberts Holdings	18589	11148	31696	3694	860	Jun-07
39	Woolworths Holdings	17377	10063	10889	2578	932	Jun-07
40	Allied Electronics Corp	17126	7433	13135	2211	513	Feb-07
41	Nampak	17014	11877	10775	5175	1237	Sep-07
42	Tiger Brands	16210	9884	23016	3157	2105	Sep-07
43	Exxaro Resources	13746	12648	38979	8441	19411	Dec-06
44	Lonmin Plc	13386	25628	77100	15448	3683	Sep-07
45	Kumba Iron Ore	13026	6869	98144	1073	2874	Dec-06
46	JD Group	12907	9067	6572	5710	1096	Aug-07
47	Santam	12736	16727	10036	6562	1825	Dec-06
48	Grindrod	12504	6835	10524	2249	753	Dec-06
49	Oando	11605	4380	7918	400	252	Dec-06
50	Super Group	11575	7604	2955	605	482	Jun-07
51	New Clicks Holdings	11205	3487	4609	762	358	Aug-07
52	AECI	10212	6632	7728	2309	1092	Dec-06
53	Reunert	9445	8420	11088	5589	1188	Sep-07
54	Harmony Gold Mining Co	9148	32201	39174	25066	-319	Jun-07
55	Combined Motor Holdings	9086	2184	1160	47	178	Feb-07
56	Mutual & Federal	8549	8355	6410	2971	827	Dec-06
57	Wilson Bayly Holmes-Ovcon	8128	4122	8646	796	210	Jun-07
58	Remgro	7877	108117	87973	103786	6774	Mar-07
59	Tongaat Hulett Group	7848	9021	9189	5604	872	Dec-06
60	Liberty International Plc	7817	121531	56165	65301	1821	Dec-06
61	Group Five	7689	6701	6160	1392	195	Jun-07
62	Metropolitan Holdings	7423	65986	7507	5896	1663	Dec-06
63	Foschini	7230	6573	9262	3351	1060	Mar-07
64	Sun International	6937	7736	12016	2131	839	Jun-07
65	Hiveld Steel & Vanadium	6901	4569	16557	1687	1212	Dec-06
66	Allied Technologies	6780	2500	5843	1164	387	Feb-07
67	Afgri	6530	6799	2804	1045	189	Feb-07
68	AVI	6332	3632	5414	1516	510	Jun-07
69	Astral Foods	6329	2708	4077	1230	618	Sep-07
70	Illovo Sugar	6264	5414	10366	2154	696	Mar-07
71	Distell Group	6231	5750	10234	3636	875	Jun-07
72	Mr Price Group	6155	2486	4498	1242	424	Mar-07
73	African Rainbow Minerals	6152	17927	47516	11756	1511	Jun-07
74	Pretoria Portland Cement	5566	4862	21531	1265	1415	Sep-07
75	Omnia Holdings	5537	2684	3208	852	253	Mar-07
76	Medi-Clinic Corporation	5364	4950	11682	1386	568	Mar-07
77	Element1	5359	6198	1817	3888	620	Mar-07
78	Discovery Holdings	5166	8450	14385	5862	1340	Jun-07
79	Aquarius Platinum	4859	6656	30928	3760	1397	Jun-07

Ranked by turnover	Company	Turnover Rm	Total assets Rm	Market cap Rm	Equity funds Rm	Net profit Rm	Financial year end
80	Truworths International	4858	3192	11534	1989	1049	Jun-07
81	Rainbow Chicken	4730	2791	4234	1662	480	Mar-07
82	Hosken Cons Investments	4383	13704	9807	518	684	Mar-07
83	Assore	4293	5320	17276	3794	289	Jun-07
84	Aspen Pharmacare Holdings	4026	6377	12477	886	855	Jun-07
85	Caxton CTP Pub & Print	4006	4853	7187	4038	585	Jun-07
86	Palamin	3982	4368	5631	-785	823	Dec-06
87	African Oxygen	3914	3829	9377	2007	619	Sep-06
88	Zurich SA	3911	4655	2460	1870	342	Dec-06
89	Seardel Investment Corporation	3793	3008	123	1669	45	Jun-07
90	Northam Platinum	3740	3334	16964	2093	1348	Jun-07
91	Tradehold	3725	2176	469	710	-82	Feb-07
92	Business Connexion Group	3551	2050	1366	1047	55	May-07
93	Bell Equipment	3533	2011	4373	902	238	Dec-06
94	KAP International	3495	2265	1006	1058	172	Jun-07
95	Mvelaphanda	3462	7150	3938	5379	50	Jun-07
96	Iliad Africa	3368	1202	1606	294	197	Dec-06
97	Mustek	3355	1778	475	417	82	Jun-07
98	Lewis Group	3324	3297	4155	2313	571	Mar-07
99	African Bank Investments	3268	11596	21123	1669	1339	Sep-07
100	Distr & Warehousing Network	3003	1729	2774	234	190	Jun-07
101	Cashbuild	2710	883	1290	232	89	Jun-06
102	Adcorp Holdings	2700	544	1525	158	107	Dec-06
103	Invicta Holdings	2663	2758	1930	605	188	Mar-07
104	Metair	2642	1619	1829	1150	215	Dec-06
105	Oceana Group	2609	1436	2242	751	165	Sep-07
106	Growthpoint Properties	2362	22957	17510	54	-2007	Jun-07
107	Phumelela Gaming & Leisure	2297	422	1250	266	89	Jul-07
108	Metorex	2287	3465	7528	2337	411	Jun-07
109	Hudaco Industries	2227	3515	2318	669	239	Nov-07
110	Astrapak	2223	1648	973	613	134	Feb-07
111	Comair	2212	1144	966	402	69	Jun-07
112	DRDGold	2210	1947	3106	554	35	Jun-07
113	Trencor	2041	11335	4812	2367	191	Dec-06
114	GijimaAST	2017	752	1109	13	20	Jun-07
115	The Kelly Group	1994	395	770	-6	75	Sep-07
116	Amalgamated Appliance Hold	1980	869	393	513	103	Jun-07
117	Nu-World Holdings	1866	703	340	508	41	Aug-07
118	Pinnacle Technology	1716	618	842	154	67	Jun-07
119	Tourism Investment Corp	1639	1066	1578	120	122	Jun-07

Ranked by turnover	Company	Turnover Rm	Total assets Rm	Market cap Rm	Equity funds Rm	Net profit Rm	Financial year end
120	Gold Reef Casino Resorts	1517	1675	6979	709	191	Dec-06
121	Italtile	1477	1337	2366	888	270	Jun-07
122	Ceramic Industries	1375	1373	1708	1021	211	Jul-07
123	Sentula Mining	1369	2040	4170	817	187	Mar-07
124	PSG	1344	5075	3337	2049	761	Feb-07
125	Country Foods	1309	645	92	261	87	Jun-07
126	Argent Industrial	1296	1112	1597	647	135	Mar-07
127	Santova Logistics	1245	305	137	8	4	Feb-07
128	ApexHi A Properties	1210	9748	10092	3694	42	Jun-07
129	Datacentrix Holdings	1202	426	821	190	80	Feb-07
130	Raubex Group	1191	718	6211	337	103	Feb-07
131	Basil Read Holdings	1162	592	2231	137	48	Dec-06
132	AG Industries	1151	870	364	273	-14	Jun-07
133	Capitec Bank Holdings	1138	2135	2990	857	174	Feb-07
134	UCS Group	1071	511	870	32	97	Sep-07
135	House of Busby	1062	522	1224	268	61	Jun-07
136	Conduit Capital	1044	1104	203	95	10	Aug-07
137	Trans Hex Group	1036	1465	1114	1045	50	Mar-07
138	Value Group	1034	838	360	433	31	Feb-07
139	Merafe Resources	1031	2079	7765	1077	140	Dec-06
140	Voxtelecom	990	494	2287	9	56	Aug-07
141	ELB Group	983	544	525	181	35	Jun-07
142	Dorbyl	962	743	273	474	-2	Mar-07
143	Coronation Fund Managers	962	18879	2021	-194	295	Sep-07
144	Winhold	917	619	149	183	28	Sep-07
145	Enviroserv Holdings	874	841	1567	307	89	Jun-07
146	Famous Brands	872	451	1393	73	98	Feb-07
147	Workforce	861	282	276	121	21	Dec-06
148	Faritec Holdings	858	240	232	19	19	Jun-07
149	ADvTech	831	486	1555	255	89	Dec-06
150	Paracon Holdings	792	209	784	103	66	Sep-07
151	Enaleni	790	457	1481	-411	114	Dec-06
152	Peregrine Holdings	779	10952	3422	728	403	Mar-07
153	Control Instruments Group	772	630	208	145	24	Dec-06
154	Kagiso Media	738	398	1629	-103	146	Jun-07
155	Eastern Platinum	713	7103	16814	6680	-73	Jun-07
156	Mercantile Lisbon Bank	709	4682	1142	816	169	Dec-07
157	Enterprise Outsourcing Holdings	704	310	586	81	45	Jul-07
158	Emira Property Fund	631	7411	4854	5866	374	Jun-07
159	Hyprop Investments	630	7891	6686	3949	52	Dec-06
160	Monteagle Societé Anonyme	624	789	331	446	5	Sep-07

Ranked by turnover	Company	Turnover Rm	Total assets Rm	Market cap Rm	Equity funds Rm	Net profit Rm	Financial year end
161	Clientele Life Assurance	624	1270	2619	81	111	Jun-07
162	Fountainhead Prop Trust	607	7098	6026	6315	435	Sep-07
163	Pangbourne Properties	606	6218	4169	2165	434	Jun-07
164	Simmer & Jack Mines	603	2028	5523	1300	-82	Mar-07
165	Sasfin Holdings	596	2536	1231	495	137	Jun-07
166	Alert	566	206	204	97	23	Jun-07
167	Celcom Group	555	93	120	13	5	Jun-07
168	Vukile Property Fund	554	4151	2973	1168	-4	Mar-07
169	Transpaco	542	358	197	116	21	Jun-07
170	Glenrand MIB	517	6030	336	60	102	Jun-07
171	Howden Africa Holdings	511	274	822	-29	13	Dec-06
172	City Lodge Hotels	510	746	3190	596	185	Jun-07
173	Excellerate Holdings	495	245	244	83	16	Jun-07
174	Redefine Income Fund	489	9835	6114	4912	980	Aug-07
175	Delta Electrical Indus	486	899	565	678	-32	Dec-07
176	Sovereign Food Investments	459	480	347	286	65	Feb-07
177	Sekunjalo Investments	450	810	317	526	-75	Aug-07
178	Simeka BG	447	156	380	-1	46	May-07
179	Digicore Holdings	441	318	1797	129	87	Jun-07
180	Masonite (Africa)	432	345	270	267	22	Dec-06
181	Bowler Metcalf	427	356	367	247	47	Jun-07
182	Cargo Carriers	426	447	220	276	19	Feb-07
183	Setpoint Technology Holdings	408	186	333	65	12	Aug-07
184	Jasco Electronics Holdings	401	176	192	75	29	Feb-07
185	York Timber Organisation	394	229	1767	113	41	Dec-06
186	African & Overseas Enterprises	391	189	80	77	13	Jun-07
187	Rex Trueform Clothing	391	189	196	146	21	Jun-07
188	Petra Mining	382	670	2167	506	25	Jun-07
189	Sanyati Holdings	380	201	703	72	28	Feb-07
190	Barnard Jacobs Mellet	371	6371	447	299	112	Mar-07
191	Cullinan Holdings	354	320	338	36	26	Sep-07
192	Wearne	353	350	495	150	32	Feb-07
193	iFour Properties	352	2939	1704	913	17	Jun-07
194	Afrimat	349	401	890	297	56	Feb-07
195	Brimstone Investment Corp	345	2755	1503	1731	1293	Dec-06
196	Primeserv Group	345	78	111	32	4	Dec-06
197	Micromega	318	157	159	88	34	Dec-06
198	Rare Holdings	318	156	311	82	12	Jun-07
199	Metrofile Holdings	300	285	335	-82	25	Jun-07
200	B&W Instrument & Elec	294	133	439	66	27	Aug-07

APPENDIX B: Descriptive Statistics of Monthly Returns

B1: Research Portfolio (C1) vs SATRIX Top 40 (C2)

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	85	2.0494	5.0103	0.5434	0.9687	3.1301
C2	85	1.8642	5.2099	0.5651	0.7405	2.9880

Note: T-alpha (C1) = 1.9886, T-alpha (C2) = 1.9886

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	168	0.1852	5.1111	0.7840	-1.3626	1.7329
Unequal	167.74	0.1852	7.2282	0.7840	-1.3626	1.7330

Note: T-alpha (Equal) = 1.9742, T-alpha (Unequal) = 1.9742

B2: Research Portfolio (C1) vs SATRIX Top 40 (C2) in Bull Markets

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Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	53	3.796793	4.477367	0.615014	2.562677	5.030908
C2	53	5.034905	3.364608	0.462165	4.107505	5.962306

Note: T-alpha (C1) = 2.0066, T-alpha (C2) = 2.0066

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	104	-1.238113	3.960265	0.76931	-2.763684	0.287457
Unequal	96.53	-1.238113	5.600661	0.76931	-2.765074	0.288848

Note: T-alpha (Equal) = 1.9830, T-alpha (Unequal) = 1.9848

B3: Research Portfolio (C1) vs SATRIX Top 40 (C2) in Bear Markets

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Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	32	-0.844688	4.5309	0.800957	-2.478251	0.788876
C2	32	-3.387187	2.983996	0.527501	-4.463033	-2.311342

Note: T-alpha (C1) = 2.0395, T-alpha (C2) = 2.0395

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	62	2.5425	3.836228	0.959057	0.6253725	4.459628
Unequal	53.63	2.5425	5.425245	0.959057	0.6194059	4.465594

Note: T-alpha (Equal) = 1.9990, T-alpha (Unequal) = 2.0052

B4: Family Portfolio (C1) vs SATRIX Top 40 (C2)

Two-Sample Test Report

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Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	85	2.177529	5.393795	0.585039	1.014115	3.340944
C2	85	1.864235	5.209877	0.565091	0.7404909	2.98798

Note: T-alpha (C1) = 1.9886, T-alpha (C2) = 1.9886

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	168	0.3132941	5.302633	0.813387	-1.292482	1.91907
Unequal	167.8	0.3132941	7.499056	0.813387	-1.292496	1.919084

Note: T-alpha (Equal) = 1.9742, T-alpha (Unequal) = 1.9742

APPENDIX C: Descriptive Statistics of Sharpe Ratios

C1: Research Portfolio (C1) vs SATRIX Top 40 (C2)

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Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	85	1.889412	3.250753	0.352594	1.188241	2.590583
C2	85	0.915647	2.851113	0.309247	0.3006763	1.530618

Note: T-alpha (C1) = 1.9886, T-alpha (C2) = 1.9886

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	168	0.9737647	3.05747	0.468994	0.04788287	1.899647
Unequal	165.19	0.9737647	4.323915	0.468994	0.04776859	1.899761

Note: T-alpha (Equal) = 1.9742, T-alpha (Unequal) = 1.9744

C2: Research Portfolio (C1) vs SATRIX Top 40 (C2) in Bull Markets

Two-Sample Test Report

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Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	53	2.988679	3.017561	0.414494	2.156936	3.820422
C2	53	2.523208	2.046782	0.281147	1.959045	3.08737

Note: T-alpha (C1) = 2.0066, T-alpha (C2) = 2.0066

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	104	0.4654717	2.578274	0.500848	-0.527729	1.458672
Unequal	91.49	0.4654717	3.64623	0.500848	-0.52933	1.460273

Note: T-alpha (Equal) = 1.9830, T-alpha (Unequal) = 1.9862

C3: Research Portfolio (C1) vs SATRIX Top 40 (C2) in Bear Markets

Two-Sample Test Report

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Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	32	0.06875	2.805798	0.496	-0.942848	1.080348
C2	32	-1.746875	1.80648	0.319344	-2.39818	-1.095569

Note: T-alpha (C1) = 2.0395, T-alpha (C2) = 2.0395

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	62	1.815625	2.359648	0.589912	0.636408	2.994842
Unequal	52.93	1.815625	3.337045	0.589912	0.6323762	2.998874

Note: T-alpha (Equal) = 1.9990, T-alpha (Unequal) = 2.0058

C4: Family Portfolio (C1) vs SATRIX Top 40 (C2)

Two-Sample Test Report

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Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	85	2.043176	4.085407	0.443125	1.161975	2.924378
C2	85	0.915647	2.851113	0.309247	0.3006763	1.530618

Note: T-alpha (C1) = 1.9886, T-alpha (C2) = 1.9886

Confidence-Limits of Difference Section

Variance Assumption	DF	Mean Difference	Standard Deviation	Standard Error	95.0% LCL Difference	95.0% UCL Difference
Equal	168	1.127529	3.52274	0.540364	6.08E-02	2.194307
Unequal	150.13	1.127529	4.981907	0.540364	5.98E-02	2.195229

Note: T-alpha (Equal) = 1.9742, T-alpha (Unequal) = 1.9759

APPENDIX D: Paired Tests for Difference of Returns

D1: Research Portfolio vs SATRIX Top 40 (C1 = $R_{portfolio}$ - R_{satrix})

One-Sample T-Test Report

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Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	85	0.1845882	4.026522	0.436738	-0.6839125	1.053089

T for Confidence Limits = 1.9886

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality	0.2993	0.76469	Cannot reject normality
Kurtosis Normality	1.3402	0.18019	Cannot reject normality
Omnibus Normality	1.8857	0.38953	Cannot reject normality
Correlation Coefficient			

T-Test For Difference Between Mean and Value Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
C1<>0	0.4227	0.673629	No	0.07023	0.016725
C1<0	0.4227	0.663186	No	0.019503	0.003051
C1>0	0.4227	0.336814	No	0.110175	0.028038

Nonparametric Tests Section

Quantile (Sign) Test

Null Quantile (Q0)	Quantile Proportion	Number Lower	Number Higher	H1:Q<>Q0 Prob Level	H1:Q<Q0 Prob Level	H1:Q>Q0 Prob Level
0	0.5	41	44	0.828423	0.667677	0.414212

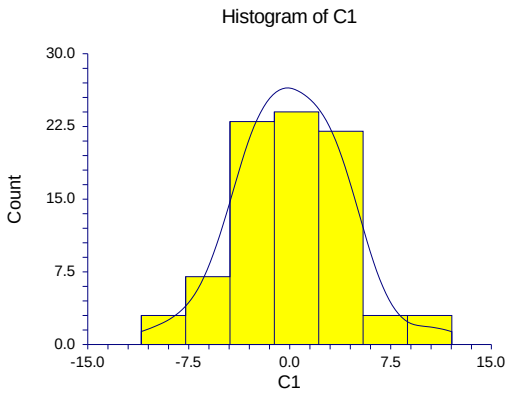
Wilcoxon Signed-Rank Test for Difference in Medians

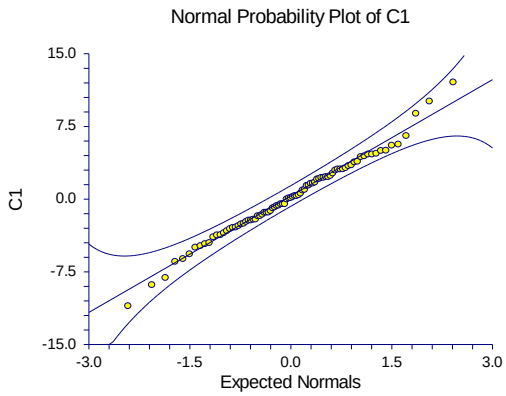
W Sum Ranks	Mean of W	Std Dev of W	Number of Zeros	Number Sets of Ties	Multiplicity Factor
1929	1827.5	228.2162	0	6	54

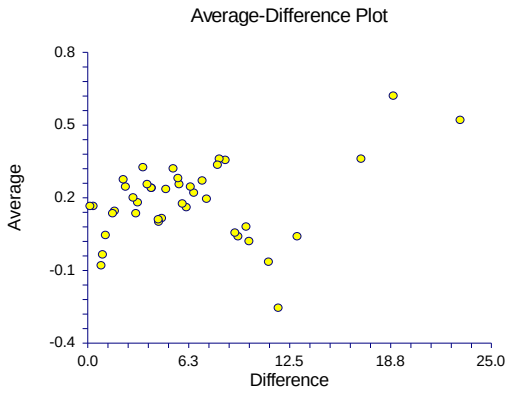
	Exact Probability	Approximation Without Continuity Correction	Approximation With Continuity Correction

Alternative Hypothesis	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value
Median<>0			0.4448	0.656498	No	0.4426
Median<0			0.4448	0.671751	No	0.4469
Median>0			0.4448	0.328249	No	0.4426

Plots Section







D2: Research Portfolio vs SATRIX Top 40 in Bull Markets (C1 = $R_{portfolio}$ - R_{satrix})

One-Sample T-Test Report

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Variable C1

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	53	-1.239245	3.609816	0.495846	-2.234234	-0.244257

T for Confidence Limits = 2.0066

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality	-0.3058	0.759735	Cannot reject normality
Kurtosis Normality	1.4346	0.151411	Cannot reject normality
Omnibus Normality	2.1515	0.34104	Cannot reject normality

Correlation Coefficient

T-Test For Difference Between Mean and Value Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
C1<>0	-2.4993	0.015641	Yes	0.688968	0.437963
C1<0	-2.4993	0.007821	Yes	0.794366	0.542926
C1>0	-2.4993	0.992179	No	0.00002	0.000001

Nonparametric Tests Section

Quantile (Sign) Test

Null Quantile (Q0)	Quantile Proportion	Number Lower	Number Higher	H1:Q<>Q0 Prob Level	H1:Q<Q0 Prob Level	H1:Q>Q0 Prob Level
0	0.5	33	20	0.098371	0.049185	0.973281

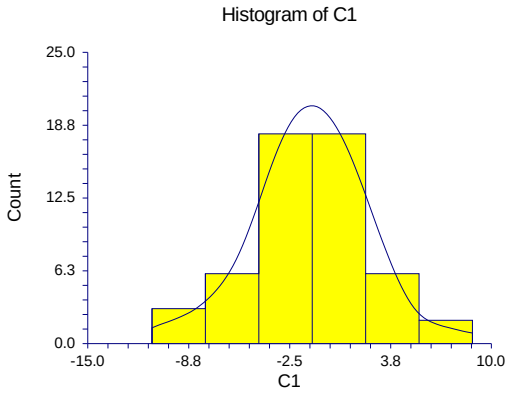
Wilcoxon Signed-Rank Test for Difference in Medians

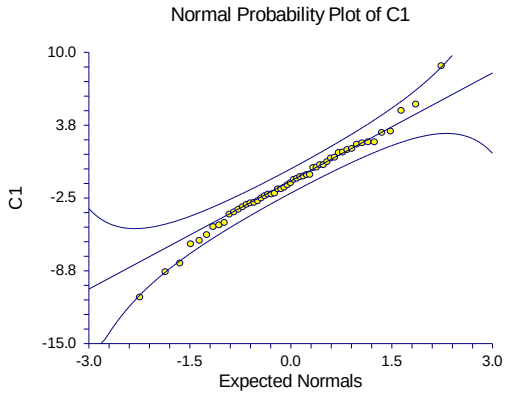
W Sum Ranks	Mean of W	Std Dev of W	Number of Zeros	Number Sets of Ties	Multiplicity Factor
435	715.5	112.9568	0	4	24

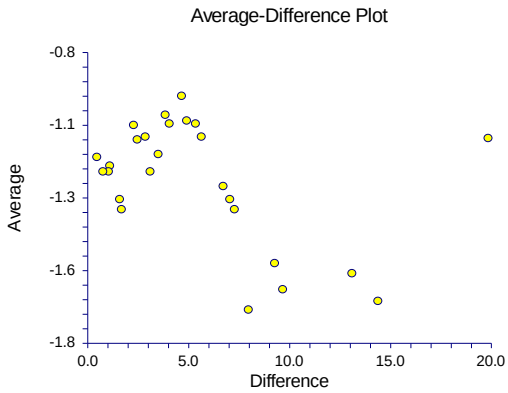
	Exact Probability	Approximation Without Continuity Correction	Approximation With Continuity Correction

Alternative Hypothesis	Prob Level	Reject H0 at .050	Z-Value	Prob Level	Reject H0 at .050	Z-Value
Median<>0			2.4832	0.013019	Yes	2.4788
Median<0			-2.4832	0.00651	Yes	-2.4788
Median>0			-2.4832	0.99349	No	-2.4877

Plots Section







D3: Research Portfolio vs SATRIX Top 40 in Bear Markets (C1 = $R_{portfolio}$ - R_{satrix})

One-Sample T-Test Report

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Database
Variable C1

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	32	2.542813	3.587054	0.634108	1.249542	3.836083

T for Confidence Limits = 2.0395

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality	0.8187	0.412968	Cannot reject normality
Kurtosis Normality	1.1626	0.244998	Cannot reject normality
Omnibus Normality	2.0218	0.363883	Cannot reject normality
Correlation Coefficient			

T-Test For Difference Between Mean and Value Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
C1<>0	4.0101	0.000355	Yes	0.972763	0.888101
C1<0	4.0101	0.999822	No	0	0
C1>0	4.0101	0.000178	Yes	0.988564	0.933891

Nonparametric Tests Section

Quantile (Sign) Test

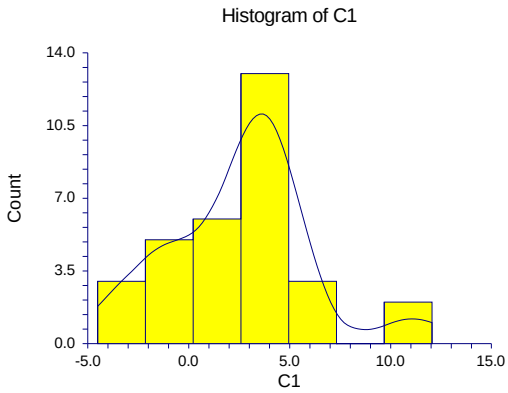
Null Quantile (Q0)	Quantile Proportion	Number Lower	Number Higher	H1:Q<>Q0 Prob Level	H1:Q<Q0 Prob Level	H1:Q>Q0 Prob Level
0	0.5	8	24	0.007	0.998949	0.0035

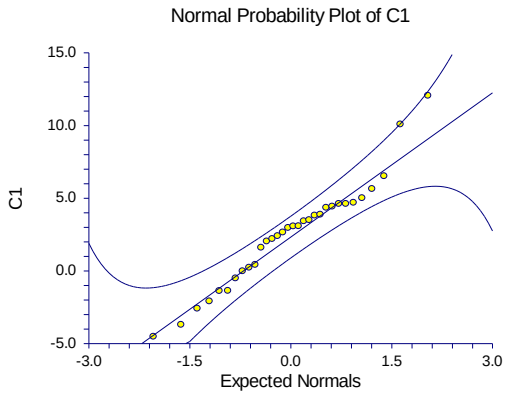
Wilcoxon Signed-Rank Test for Difference in Medians

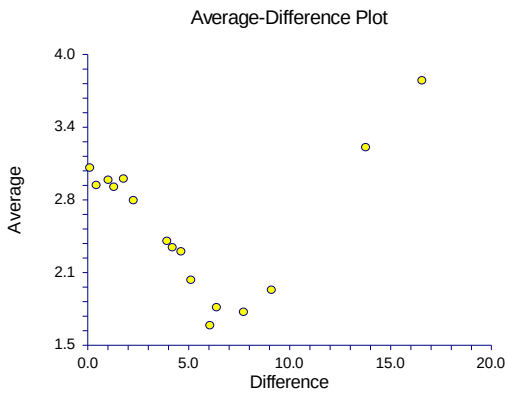
W Sum Ranks	Mean of W	Std Dev of W	Number of Zeros	Number Sets of Ties	Multiplicity Factor
448	264	53.4778	0	1	6

	Exact Probability	Approximation Without Continuity Correction	Approximation With Continuity Correction			
Alternative Hypothesis	**Prob Level**	**Reject H0 at .050**	**Z-Value**	**Prob Level**	**Reject H0 at .050**	**Z-Value**
Median<>0			3.4407	0.00058	Yes	3.4313
Median<0			3.4407	0.99971	No	3.45
Median>0			3.4407	0.00029	Yes	3.4313

Plots Section







D4: Family Portfolio vs SATRIX Top 40 (C1 = $R_{portfolio}$ - R_{satrix})

One-Sample T-Test Report

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Database
Variable C1

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	85	0.1845882	4.026522	0.436738	-0.6839125	1.053089

T for Confidence Limits = 1.9886

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality	0.2993	0.764691	Cannot reject normality
Kurtosis Normality	1.3402	0.18019	Cannot reject normality
Omnibus Normality	1.8857	0.389525	Cannot reject normality

Correlation Coefficient

T-Test For Difference Between Mean and Value Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
C1<>0	0.4227	0.673629	No	0.07023	0.016725
C1<0	0.4227	0.663186	No	0.019503	0.003051
C1>0	0.4227	0.336814	Yes	0.110175	0.028038

Nonparametric Tests Section

Quantile (Sign) Test

Null Quantile (Q0)	Quantile Proportion	Number Lower	Number Higher	H1:Q<>Q0 Prob Level	H1:Q<Q0 Prob Level	H1:Q>Q0 Prob Level
0	0.5	41	44	0.828423	0.667677	0.414212

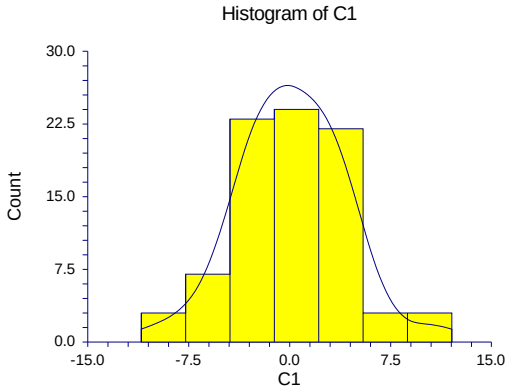
Wilcoxon Signed-Rank Test for Difference in Medians

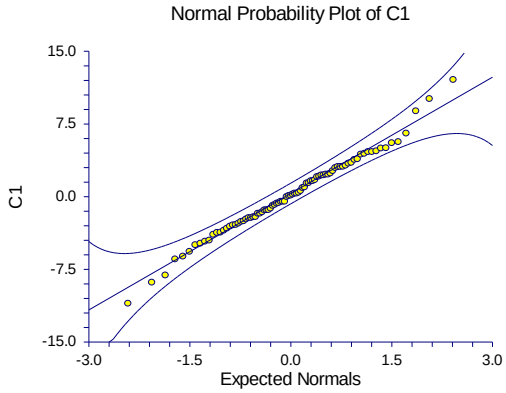
W Sum Ranks	Mean of W	Std Dev of W	Number of Zeros	Number Sets of Ties	Multiplicity Factor
1929	1827.5	228.2162	0	6	54

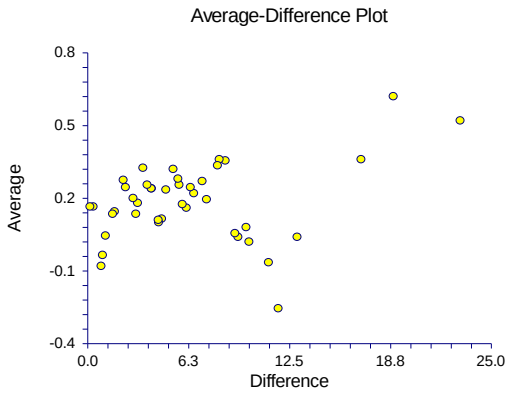
Alternative	Exact Probability Prob	Approximation Without Continuity Correction Reject H0	Approximation With Continuity Correction Prob	Reject H0

Hypothesis	Level	at .050	Z-Value	Level	at .050	Z-Value
Median<>0			0.4448	0.656498	No	0.4426
Median<0			0.4448	0.671751	No	0.4469
Median>0			0.4448	0.328249	No	0.4426

Plots Section







APPENDIX E: Paired Tests for Difference of Sharpe Ratio

E1: Research Portfolio vs SATRIX Top 40 (C1 = $R_{portfolio}$ - R_{satrix})

One-Sample T-Test Report

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Database
Variable C1

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	85	0.9736471	2.879617	0.312338	0.352528	1.594766

T for Confidence Limits = 1.9886

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality	1.3992	0.161744	Cannot reject normality
Kurtosis Normality	0.0987	0.921372	Cannot reject normality
Omnibus Normality	1.9676	0.37389	Cannot reject normality
Correlation Coefficient			

T-Test For Difference Between Mean and Value Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
C1<>0	3.1173	0.002499	Yes	0.86896	0.684306
C1<0	3.1173	0.99875	No	0.000001	0
C1>0	3.1173	0.00125	Yes	0.926075	0.770515

Nonparametric Tests Section

Quantile (Sign) Test

Null Quantile (Q0)	Quantile Proportion	Number Lower	Number Higher	H1:Q<>Q0 Prob Level	H1:Q<Q0 Prob Level	H1:Q>Q0 Prob Level
0	0.5	31	54	0.016509	0.995582	0.008254

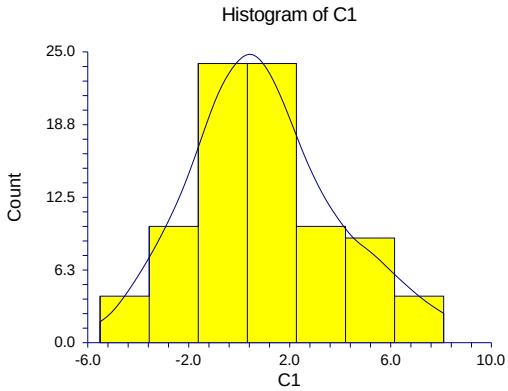
Wilcoxon Signed-Rank Test for Difference in Medians

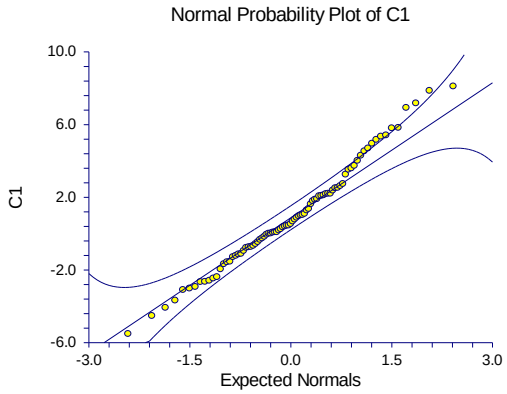
W Sum Ranks	Mean of W	Std Dev of W	Number of Zeros	Number Sets of Ties	Multiplicity Factor
2441.5	1827.5	228.2173	0	5	30

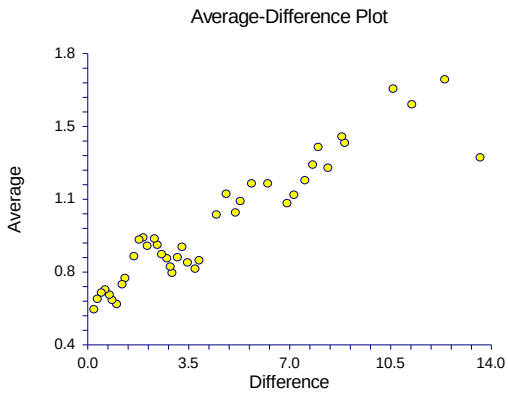
Approximation Without	Approximation With

	Exact Probability	Continuity Correction	Continuity Correction			
Alternative Hypothesis	**Prob Level**	**Reject H0 at .050**	**Z-Value**	**Prob Level**	**Reject H0 at .050**	**Z-Value**
Median<>0			2.6904	0.007136	Yes	2.6882
Median<0			2.6904	0.996432	No	2.6926
Median>0			2.6904	0.003568	Yes	2.6882

Plots Section







E2: Research Portfolio vs SATRIX Top 40 in Bull Markets (C1 = $R_{portfolio}$ - R_{satrix})

One-Sample T-Test Report

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Database
Variable C1

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	53	0.465283	2.630767	0.361364	-0.2598461	1.190412

T for Confidence Limits = 2.0066

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality	-0.1272	0.898789	Cannot reject normality
Kurtosis Normality	-0.3654	0.714813	Cannot reject normality
Omnibus Normality	0.1497	0.927885	Cannot reject normality

Correlation Coefficient

T-Test For Difference Between Mean and Value Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
C1<>0	1.2876	0.203595	No	0.243814	0.092015
C1<0	1.2876	0.898203	No	0.001773	0.000171
C1>0	1.2876	0.101797	No	0.354189	0.141856

Nonparametric Tests Section

Quantile (Sign) Test

Null Quantile (Q0)	Quantile Proportion	Number Lower	Number Higher	H1:Q<>Q0 Prob Level	H1:Q<Q0 Prob Level	H1:Q>Q0 Prob Level
0	0.5	20	33	0.098371	0.973281	0.049185

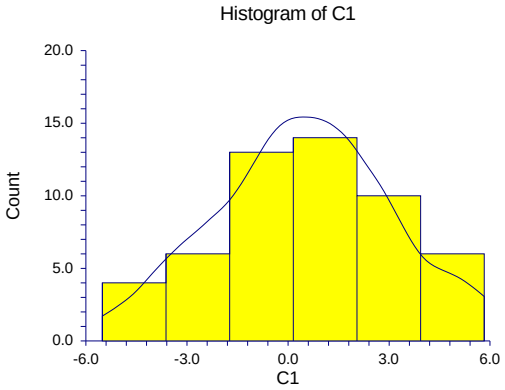
Wilcoxon Signed-Rank Test for Difference in Medians

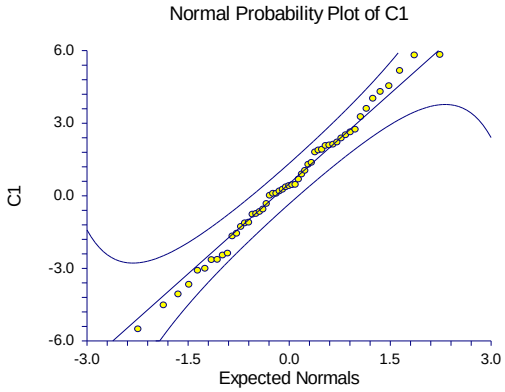
W Sum Ranks	Mean of W	Std Dev of W	Number of Zeros	Number Sets of Ties	Multiplicity Factor
857.5	715.5	112.958	0	2	12

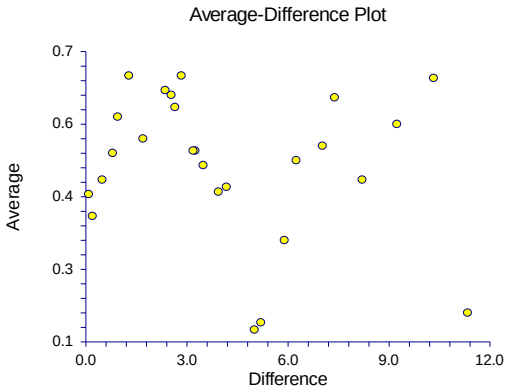
Alternative	Exact Probability Prob	Approximation Without Continuity Correction Reject H0	Approximation With Continuity Correction Prob	Approximation With Continuity Correction Reject H0

Hypothesis	Level	at .050	Z-Value	Level	at .050	Z-Value
Median<>0			1.2571	0.208716	No	1.2527
Median<0			1.2571	0.895642	No	1.2615
Median>0			1.2571	0.104358	No	1.2527

Plots Section







E3: Research Portfolio vs SATRIX Top 40 in Bear Markets (C1 = $R_{portfolio}$ - R_{satrix})

One-Sample T-Test Report

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Database
Variable C1

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	32	1.815625	3.112271	0.550177	0.6935316	2.937718

T for Confidence Limits = 2.0395

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality	1.4605	0.144159	Cannot reject normality
Kurtosis Normality	-0.8334	0.404629	Cannot reject normality
Omnibus Normality	2.8275	0.243227	Cannot reject normality
Correlation Coefficient			

T-Test For Difference Between Mean and Value Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
C1<>0	3.3001	0.002436	Yes	0.891824	0.707689
C1<0	3.3001	0.998782	No	0.000001	0
C1>0	3.3001	0.001218	Yes	0.943164	0.79622

Nonparametric Tests Section

Quantile (Sign) Test

Null Quantile (Q0)	Quantile Proportion	Number Lower	Number Higher	H1:Q<>Q0 Prob Level	H1:Q<Q0 Prob Level	H1:Q>Q0 Prob Level
0	0.5	11	21	0.110184	0.974949	0.055092

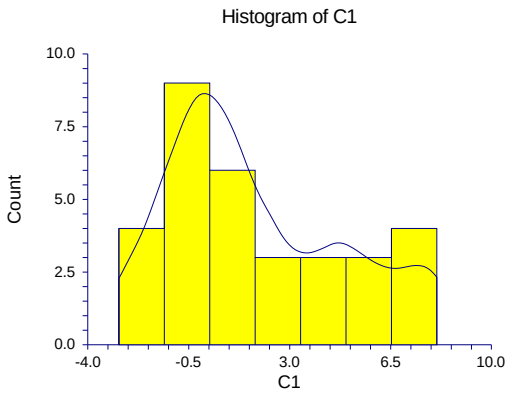
Wilcoxon Signed-Rank Test for Difference in Medians

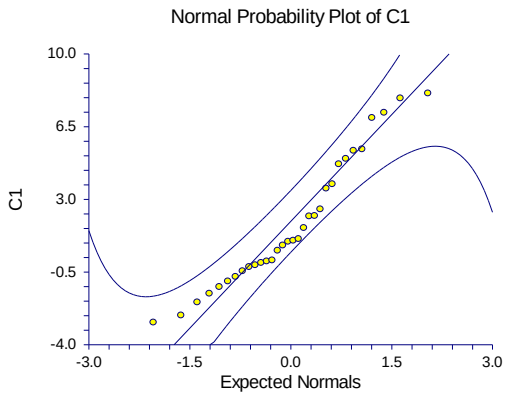
W Sum Ranks	Mean of W	Std Dev of W	Number of Zeros	Number Sets of Ties	Multiplicity Factor
404	264	53.47897	0	0	0

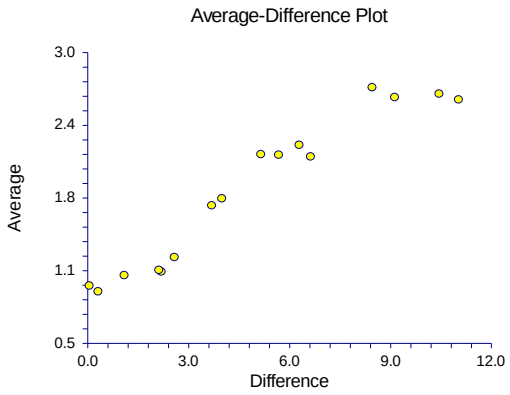
Alternative	Exact Probability Prob	Approximation Without Continuity Correction Reject H0	Approximation With Continuity Correction Prob	Reject H0

Hypothesis	Level	at .050	Z-Value	Level	at .050	Z-Value
Median<>0	0.0078	Yes	2.6179	0.008849	Yes	2.6085
Median<0	0.99633	No	2.6179	0.995576	No	2.6272
Median>0	0.0039	Yes	2.6179	0.004424	Yes	2.6085

Plots Section







E4: Family Portfolio vs SATRIX Top 40 (C1 = $R_{portfolio}$ - R_{satrix})

One-Sample T-Test Report

Page/Date/Time 1 2010/10/23 12:00:44 PM
Database
Variable C1

Descriptive Statistics Section

Variable	Count	Mean	Standard Deviation	Standard Error	95.0% LCL of Mean	95.0% UCL of Mean
C1	85	0.9736471	2.879617	0.312338	0.352528	1.594766

T for Confidence Limits = 1.9886

Tests of Assumptions Section

Assumption	Value	Probability	Decision(.050)
Skewness Normality	1.3992	0.161744	Cannot reject normality
Kurtosis Normality	0.0987	0.921372	Cannot reject normality
Omnibus Normality	1.9676	0.37389	Cannot reject normality
Correlation Coefficient			

T-Test For Difference Between Mean and Value Section

Alternative Hypothesis	T-Value	Prob Level	Reject H0 at .050	Power (Alpha=.05)	Power (Alpha=.01)
C1<>0	3.1173	0.002499	Yes	0.86896	0.684306
C1<0	3.1173	0.99875	No	0.000001	0
C1>0	3.1173	0.00125	Yes	0.926075	0.770515

Nonparametric Tests Section

Quantile (Sign) Test

Null Quantile (Q0)	Quantile Proportion	Number Lower	Number Higher	H1:Q<>Q0 Prob Level	H1:Q<Q0 Prob Level	H1:Q>Q0 Prob Level
0	0.5	31	54	0.016509	0.995582	0.008254

Wilcoxon Signed-Rank Test for Difference in Medians

W Sum Ranks	Mean of W	Std Dev of W	Number of Zeros	Number Sets of Ties	Multiplicity Factor
2441.5	1827.5	228.2173	0	5	30

Alternative	Exact Probability Prob	Approximation Without Continuity Correction Reject H0	Approximation With Continuity Correction Prob	Reject H0

Hypothesis	Level	at .050	Z-Value	Level	at .050	Z-Value
Median<>0			2.6904	0.007136	Yes	2.6882
Median<0			2.6904	0.996432	No	2.6926
Median>0			2.6904	0.003568	Yes	2.6882

Plots Section