

The Performance of the Dow Investing Strategies on the JSE Securities Exchange

Mpho R. Kubelo

**A research report submitted to the Faculty of Commerce, Law and
Management, University of the Witwatersrand, in partial fulfilment of the
requirements for the degree of Master of Business Administration**

Johannesburg, 2013

ABSTRACT

A number of studies have been published to indicate that markets are not always efficient. Amongst these studies is a study that was conducted on the JSE Industrial companies using data for the period between January 1985 and December 1998. The study showed that investing in high dividend yield and high earnings yield companies using the Dow investing strategies an investor could outperform the industrial index.

This current study sought to extend the earlier study on the performance of the Dow strategies by using data from the JSE Securities Exchange's Industrial Average Index (INDI25) for the period between January 1999 and December 2012. The performance of the Dow strategies was compared with that of the INDI25 both before and after adjusting the returns for risk. The study also compared the performance of the dividend yield strategies against that of the earnings yield strategies.

The findings of the study confirmed the outperformance of most of the Dow investment strategies as established by the earlier study and other studies conducted in international stock markets. This study however, found the dividend yield strategies to have outperformed the earnings yield strategies. This is contrary to earlier findings that found the earnings yield strategies to have outperformed the dividend yield strategies. The differences between the performances of the strategies were however found to be statistically insignificant.

DECLARATION

I, Mpho R. Kubelo, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Mpho R. Kubelo

Signed at

On the day of 2013

DEDICATION

To my dearest mother, “Ausi Ndokie”, for all the sacrifices and the unwavering support over the years.

ACKNOWLEDGEMENTS

My sincerest gratitude goes to:

- The Lord God Almighty, my Lord and personal Saviour Jesus Christ and to the Holy Spirit for providing the courage and the believe that I can do this;
- My supervisor, Dr. Thabo Mosala, for giving me the time and the guidance to complete this work;
- My dearest wife, Koko Kubelo, for your enduring support and final editorial work.
- My colleagues at the Development Bank of Southern Africa, for being understanding during the period that I undertook this journey;
- The leadership of Cosmo City Church, it is indeed a blessing to serve with you guys;
- My MBA classmates, could not have asked for a different group; and

TABLE OF CONTENTS

ABSTRACT	I
DECLARATION.....	II
DEDICATION	III
ACKNOWLEDGEMENTS.....	IV
LIST OF TABLES.....	VIII
CHAPTER 1: INTRODUCTION	1
1.1 PURPOSE OF THE STUDY	1
1.2 CONTEXT OF THE STUDY	1
1.3 RESEARCH OBJECTIVE.....	3
1.3.1 MAIN OBJECTIVE	3
1.3.2 SUB-OBJECTIVES.....	3
1.4 SIGNIFICANCE OF THE STUDY	4
1.5 DELIMITATIONS OF THE STUDY.....	4
1.6 DEFINITION OF TERMS	4
1.7 ASSUMPTIONS	5
CHAPTER 2: LITERATURE REVIEW	6
2.1. INTRODUCTION	6
2.2. BACKGROUND DISCUSSION	6
2.2.1 THE EFFICIENT MARKET HYPOTHESIS	6
2.2.2 BEHAVIOURAL FINANCE	9
2.2.3 VALUE INVESTING STRATEGIES.....	11
2.3. THE DOW STRATEGIES.....	12
2.3.1 THE TWELVE DOW STRATEGIES	13
2.3.2 PERFORMANCE OF THE DOGS OF THE DOW (HY10) ON INTERNATIONAL MARKETS...	15
2.3.3 THE PERFORMANCE OF THE TWELVE DOW STRATEGIES ON THE NYSE	17
2.3.4 PERFORMANCE OF THE DOW STRATEGIES ON THE JSE	19
2.3.5 RESEARCH QUESTION 1	22
2.3.6 RESEARCH QUESTION 2	22
2.4 CONCLUSION OF LITERATURE REVIEW	22
2.4.1 RESEARCH QUESTION 1:	23
2.4.2 RESEARCH QUESTION 2:	23
CHAPTER 3: RESEARCH METHODOLOGY	24
3.1 RESEARCH METHODOLOGY / PARADIGM	24

3.2	RESEARCH DESIGN	25
3.3	POPULATION AND SAMPLE.....	25
3.3.1	POPULATION	25
3.3.2	SAMPLE AND SAMPLING METHOD	25
3.4	THE RESEARCH INSTRUMENT	26
3.5	PROCEDURE FOR DATA COLLECTION.....	26
3.6	DATA ANALYSIS AND INTERPRETATION	27
3.6.1	PORTFOLIO FORMATION.....	27
3.6.2	CALCULATION OF RETURNS.....	28
3.6.3	ADJUSTING THE RETURNS FOR RISK	29
3.6.4	TEST FOR SIGNIFICANCE OF RESULTS	30
3.7	VALIDITY AND RELIABILITY	31
3.7.1	EXTERNAL VALIDITY	32
3.7.2	INTERNAL VALIDITY	32
3.7.3	RELIABILITY	32

CHAPTER 4: PRESENTATION OF RESULTS34

4.1	INTRODUCTION	34
4.2	DATA ANALYSIS	34
4.3	RESEARCH QUESTION 1	35
4.3.1	INDI25 PORTFOLIO	36
4.3.2	THE DOW DIVIDEND YIELD STRATEGIES	38
4.3.3	THE DOW EARNINGS YIELD STRATEGIES.....	38
4.3.4	MEAN DIFFERENCE TEST FOR THE DOW PORTFOLIOS AND THE INDI25	39
4.4	RESEARCH QUESTION 2	40
4.4.1	AVERAGE ANNUAL RETURNS OF THE DOW DIVIDEND YIELD STRATEGIES AND DOW EARNINGS YIELD STRATEGIES.....	40
4.4.2	MEAN DIFFERENCE TESTS FOR THE DIVIDEND YIELD AND THE EARNINGS YIELD PORTFOLIOS	41
4.5	SUMMARY OF THE RESULTS	42

CHAPTER 5: DISCUSSION OF THE RESULTS43

5.1	INTRODUCTION	43
5.2	RESEARCH QUESTION 1	43
5.2.1	THE DOW DIVIDEND YIELD STRATEGIES	43
5.2.2	THE DOW EARNINGS YIELD STRATEGIES.....	43
5.2.3	MEAN DIFFERENCE TEST FOR THE DOW PORTFOLIOS AND THE INDI25	44
5.2.4	CONCLUSIONS	44
5.3	RESEARCH QUESTION 2	45
5.3.1	AVERAGE ANNUAL RETURNS OF THE DOW DIVIDEND YIELD STRATEGIES AND DOW EARNINGS YIELD STRATEGIES.....	45
5.3.2	MEAN DIFFERENCE TESTS FOR THE DIVIDEND YIELD AND THE EARNINGS YIELD PORTFOLIOS	46
5.3.3	CONCLUSION	46
5.4	CONCLUSION	46

CHAPTER 6: CONCLUSIONS	48
6.1 INTRODUCTION	48
6.2 SUMMARY	48
6.3 SUGGESTIONS FOR FURTHER RESEARCH	49
REFERENCES	51
APPENDIX A.....	60
ANNUAL AVERAGE RETURNS OF THE DOW DIVIDEND YIELD STRATEGIES	60
APPENDIX B.....	61
ANNUAL AVERAGE RETURNS OF THE DOW EARNINGS YIELD STRATEGIES	61
APPENDIX C.....	62
INDI25 CONSTITUENT COMPANIES	62
APPENDIX D.....	68
CONSISTENCY MATRIX	68

LIST OF TABLES

Table 1: Findings of EMH Studies between 1994 and 2005	9
Table 2: A comparison of the performance of the Dow strategies on the NYSE for the 25 year period to December 1998.....	18
Table 3: Performance of the Dow Strategies on the JSE for the period 1985 to 1998	20
Table 4: Performance of the ALSI and the 30 Companies over the period between 1985 and 1998.....	21
Table 5: Performance of the Dow strategies using a 30 companies for the period between 1985 and 1998.....	21
Table 6: The Performance of the INDI25 over the period between January 1999 and December 2012.....	36
Table 7: The Performance of the Dividend Yield and Earnings Yield Dow Strategies over the period January 1999 and December 2012	36
Table 8: Results of the t-tests to determine significance of differences in means of the Index returns and each of the Dividend Strategies.....	37
Table 9: Results of the t-tests to determine significance of differences in means of the Index returns and each of the Earnings Yield Strategies	37
Table 10: Results of the t-tests to determine significance of differences in means of the Index returns and the Dividend and Earnings Yield Strategies...	39
Table 11: Annual Average Returns of Dividend and Earnings Yield Strategies	41
Table 12: Results of the t-test for the difference in means of dividend and earnings yield strategies	41
Table 13: Consistency matrix.....	69

CHAPTER 1: INTRODUCTION

1.1 Purpose of the study

The purpose of this study was to compare the performance of the Dow dividend yield and the Dow earnings yield investment strategies (Dow strategies) against the performance of the JSE Securities Exchange's (JSE) Industrial Index (INDI25) for the period between January 1999 and December 2012. The study further compared the performance of the Dow earnings yield strategies against the performances of the Dow dividend yield strategies over the same period.

The INDI25 is an index made up of the 25 biggest companies by market capitalisation from the basic and the general industries sub sectors of the JSE. Although the JSE reconstitutes this index on a quarterly basis, for the purpose of this study the index was reconstituted annually in January of each year.

The Dow strategies are a set of investment strategies in which companies are included in an investment portfolio based on their dividend yield at the portfolio construction date (Filbeck and Visscher, 2003). The strategies are called Dow strategies because they were first used on the New York Stock Exchange's (NYSE) Dow Jones Industrial Average (DJIA) (Le Saout, 2006). DJIA is an index made up of the 30 largest industrial companies trading on the NYSE.

This study extends research done by Wolmarans (2001) using JSE data for the period from January 1985 to December 1998.

1.2 Context of the study

Fama's (1970) efficient market hypothesis (EMH) was widely accepted to be proven beyond doubt for a considerable period of time, especially during the 1970s (Shiller, 2003). Under the EMH, stock prices are believed to reflect all the information there is to know about a particular stock at that point in time

(Barberis and Thaler, 2002). The implication of the EMH is that no investor can consistently outperform the market.

Contrary to the EMH, a number of researchers have found evidence of inefficiencies in both the JSE (e.g. De Wit and Van Eyden, 1991; Bhana, 1993; Page and Way, 1993; Muller, 1999) and other international stock markets (e.g. De Bondt and Thaler, 1985; De Bondt and Thaler, 1987; Ferri and Min, 1996).

In line with this research on market inefficiency, Wolmarans (2001) published work showing that the 'Dow Investing' strategies outperformed the JSE All Share Index (ALSI) and the Industrial Index (INDI) during the period between January 1985 and December 1998. The 'Dogs of the Dow' or the 'Dow 10' investing strategy is the original of the various Dow strategies and have been adapted into various other strategies that are expanded on in Chapter 2, Literature Review, of this report.

In its original form the strategy involves ranking the 30 stocks that form the DJIA of the NYSE by dividend yield at the beginning of the trading year and selecting the 10 stocks with the highest dividend yield to hold over the following 12 months (O'Higgins and Downes, 1992, cited in Wolmarans, 2001). The process is then repeated at the beginning of the following trading year when shares that have fallen out of the top 10 ranking are sold and those that have entered the top 10 ranking are bought to reconstitute the portfolio.

While international studies of the Dow strategies have only used dividend yield to sort the DJIA shares, Wolmarans (2001), in addition to using the dividend yield as a sorting parameter, also tested the strategies using the earnings yield as the sorting parameter in his study.

Proponents of the EMH have published work that questioned the validity of the Dow strategies mostly on the basis that the strategies were developed out of data mining efforts (McQueen, Shields and Thorley, 1997; Hirschey, 2000). This view is also supported by the fact that the biggest proponents of the strategy in

the 1990s, the online investment website, Motley Fool have abandoned these strategies as a means to select stocks for their portfolios.

It is against this context that this study sought to establish the performance of the various Dow Investing strategies over the period between January 1999 and December 2012 using the INDI25.

1.3 Research objective

1.3.1 *Main objective*

To compare the performance of the Dow investing strategies, using dividend yield and earnings yield as sorting parameters, against INDI25 and also to compare the performance of the portfolios constructed using earnings yield as a sorting parameter against that of those constructed using dividend yield as a sorting parameter using data for the period from January 1999 to December 2012.

1.3.2 *Sub-objectives*

The first sub-objective is to compare the performance of the Dow investing strategies, using dividend yield and earnings yield as sorting parameters, against the INDI25 using data for the period from January 1999 to December 2012.

The second sub-objective is to compare the performance of the portfolios constructed using earnings yield as a sorting parameter against that of those constructed using dividend yield as a sorting parameter using data for the period from January 1999 to December 2012.

1.4 Significance of the study

The study is significant in that it adds to the growing body of research pertaining to the extent of efficiency or the lack thereof on the JSE. Thirteen Dow Investing strategies were evaluated against the performances of the INDI25.

1.5 Delimitations of the study

The study did not consider the impact of trading costs on the returns as such costs can vary substantially depending on the service used to trade as well as the size of the investment in each share.

Due to the differences in tax treatments of various investment vehicles and schemes, the impact of capital gains and income taxes were not considered in the study.

The study tested the performance against the INDI25 and therefore does not test the performance of the strategies against other JSE indices. Results obtained therefore contribute to knowledge about the performance against the INDI25 and cannot be generalised to other indices of the JSE.

1.6 Definition of terms

Behavioural Finance is a theory of finance that seeks to understand how psychological factors influence the behaviour of financial practitioners and the effect on financial markets (Sewell, 2007).

Dow Jones Industrial Average (DJIA) is an index made up of the 30 largest industrial companies trading on the New York Stock Exchange.

Dow Investing Strategies are a set of investment strategies in which companies are included in an investment portfolio based on their dividend yield at the portfolio construction date (Filbeck and Visscher, 2003).

Efficient Market Hypothesis (EMH) is a theory of finance which asserts that financial markets are informationally efficient, or that prices on traded assets already reflect all available information, and instantly changes to reflect new information (Fama, 1970).

JSE Industrial Average Index (INDI25) is an index made up of the 25 biggest companies by market capitalisation from the basic and the general industries sub sectors of the JSE Securities Exchange. The index is reconstituted on a quarterly basis.

Sharpe Ratio is a ratio that measures excess return above a risk free rate per unit risk, where risk is measured by the standard deviation of returns (Filbeck and Visscher, 2003).

Value strategies are those investment strategies where shares that are perceived to be undervalued are bought so as to realise superior returns (Fraser and Page, 2000).

1.7 Assumptions

The following key assumptions were made in this study:

- Data used to constitute the JSE Industrial Average Index is without error and is comparable to that used by Wolmarans in the 2001 study;
- Prices prevailing at the close of the market on the last trading day of the year are the same as the prices available to purchase shares at the opening of the market at the start of first trading day of the following year; and
- It is possible to purchase fractions of shares.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

This literature review section discusses results and findings of research output relating to returns on stock markets, using the Dow strategies as a stock selection method, both on the JSE and international markets. The review starts in Section 2.2 by providing a brief background on aspects of EMH, behavioural finance and value investing strategies. A review of literature on research findings relating to the performance of the Dow investing strategies on various stock markets across the world is then presented in section 2.3 before this literature review section is concluded in section 2.4.

2.2. Background discussion

2.2.1 The Efficient Market Hypothesis

The efficient market hypothesis, first formalised by Fama (1970), relates share price behaviour and information efficiency (Thompson, 1994). The hypothesis can be stated in three forms as follows (Reilly and Brown, 2006):

- Weak-form EMH which asserts that the share price of a company reflects all historical information about the company therefore implying that technical analysis cannot be used to earn superior returns on the market;
- Semi-strong-form EMH which asserts that the share price of a company rapidly adjusts to all available public information about the company therefore implying that fundamental analysis cannot be used to earn superior returns on the market; and
- Strong-form EMH which asserts that the share price of a company reflects all available information about the company therefore implying that even inside traders cannot profit from privileged information

The general implication of the EMH is that rational investors should adopt a passive, low risk investment strategy when investing in the stock market as they have no hope of beating the market (Thompson, 1994). This passive strategy however introduces a paradox in that the presence of competing analysts and fund managers who use extensive investment research and analysis keeps the market efficient and difficult to beat (Boudreaux, 1975; cited in Thompson, 1994).

According to Damant (1986), although the EMH was widely accepted in the United States' (US) academic space in the early 1970s it only gained acceptance and became a general model of US stock exchange behaviour in the late 1970s, and was widely accepted in the United Kingdom (UK) during 1984/85. Lovell-Greene, Affleck-Graves and Money (1986) found, by analysing investment appraisal methods employed by analysts on the JSE, that the degree to which EMH has been accepted on the JSE is lower than in the cases of the US and the UK.

Various tests can be employed to test for efficiency in stock markets (Thompson, 1994; Jefferis and Smith, 2005). According to Firth (1976, cited in Thompson, 1994) these tests can be categorised into statistical tests that test the dependence of share prices, tests that evaluate trading rules, tests of how share prices respond to new information and tests that evaluate performance of portfolios.

Thompson (1994) found, after an extensive review of literature on the efficiency of the JSE covering studies using different methodologies and over differing time periods, that no clear conclusion could be drawn on the efficiency of the JSE. However, he tended towards concluding that the JSE was weak-form and semi-strong-form efficient but strong-form inefficient. Wood (2006) extended the above study by including research published after Thompson (1994) had published his study and found that "the JSE Securities Exchange operates as an efficient market, in all forms of the Efficient Market Hypothesis." (Wood, 2006:ii).

Amongst those studies that have found the JSE to be efficient in the weak form are those by Magnusson and Wydick (2002), Smith, Jefferis and Ryoo (2002), Jefferis and Smith (2004) and Jefferis and Smith (2005). However, Fraser and Page (2000), Dumont de Chassat and Firer (2001) and Graham and Uliana (2001) have found the JSE to be weak form inefficient.

In the case of semi-strong-form efficiency, Atkins and Ward (1996) and Jefferis and Okeahalam (1999) found the JSE to be efficient while Glass and Smith (1995) and Bhana (2005) found evidence of inefficiency.

Smit and von Wielligh (2000) and Mordant and Muller (2003) found the JSE to be strong-form efficient after testing the persistence of the performance of unit trusts and the performance of directors' dealings on shares of companies listed on the JSE respectively. Beale, Edwards, Firer, Hendrie and Scheppening (2001) and Bhana (2005) found the JSE to be strong form inefficient since company insiders could exploit information that they got to know as insiders to earn excess returns.

Wood's review of 2006 found some difference in findings of efficiency studies conducted after 1994 to those conducted before 1994 as reviewed by Thompson in 1994. The 2006 review concluded that the post 1994 findings seems to point to a more efficient JSE compared to the findings in publications pre 1994. Woods (2006) attributes these changes mostly to the opening up of the JSE to international investors as South Africa reintegrated into the global markets and also the adaption by the JSE of technologies such as STRATE which allowed for a more efficient decimation of information. The table below summaries Wood's findings by number of publications reviewed and by the form of efficiency.

Table 1: Findings of EMH Studies between 1994 and 2005

	Publications Reviewed	Number Supporting	% Supporting	Number Rejecting	% Rejecting
Weak-Form Efficient	16	10	62.5%	6	37.5%
Semi-Strong- Form Efficient	17	12	70.6%	5	29.4%
Strong-Form Efficient	12	9	75.0%	3	25.0%
TOTAL	45		68.9%	14	31.1%

Source: Wood (2006)

2.2.2 Behavioural Finance

Empirical evidence and academic research starting from the 1980s has cast considerable doubt on the validity of the EMH (Shiller, 2003). De Bondt and Thaler (1985) were amongst the first to show that markets are not always efficient when they found, using the New York Stock Exchange data, that a portfolio of previous losers outperformed that of previous winners. De Bondt and Thaler (1985) used end of December as their date of portfolio formation.

Other researchers including Chopra, Lakonishok and Ritter (1992) have supported De Bondt and Thaler's (1985) work. However, Ball, Kothari and Shanken (1995) disagreed. They showed that if portfolios are formed based on past performance periods ending mid-year the outperformance of past losers is substantially decreased.

Subrahmanyam (2007) provides a comprehensive review of work done in the area of behavioural finance. At its core, behavioural finance rejects the EMH and attempts to understand asset prices in the context of human behavioural (psychological) aspects taking into account that participants in stock markets are not always rational as suggested by the EMH (Stracca, 2004).

Kahneman and Tversky's (1982) work on prospect theory and decision making under risk forms the basis of the extensive behavioural finance research of the 1990s (Fama and French, 1992). Kahneman and Tversky (1982) postulated that when making decisions people tend to overweight recent data and underweight prior data. Proponents of behavioural finance have used this work to argue that participants in stock markets tend to overreact to current earnings rather than long term earning power of a company (De Bondt and Thaler, 1985).

Bhana (1995) tested the reaction of investors to earnings announcements on the JSE and found that a strategy of buying shares of companies announcing negative earnings and holding them for a period of twelve months generated an average excess return of 12.5% before transaction costs during the period 1975 to 1989.

Muller (1999) found evidence of overreaction on the JSE by testing the performance of a previous winner portfolio against that of previous loser portfolio over the period 1989 to 1997. He found that a portfolio of previous winners underperformed that of previous losers by 5% over the test period.

Cubbin, Eidne, Firer and Gilbert (2006) also found evidence of overreaction by testing the JSE for mean reversion using share data for the period October 1983 to December 2005. Bailey and Gilbert (2007) developed the economic validity of conclusion by Cubbin *et al.* (2006) through applying liquidity constraints to their portfolio formation. Gilbert and Strugnell (2008) extended the Cubbin et al (2006) study and the Bailey and Gilbert (2007) study by 21 months and also found evidence of overreaction on the JSE. Gilbert and Strugnell (2008), however controlled their data for survivorship bias by comparing the results of these studies, which included to the extent possible, all delisted shares with those of shares that were listed at the time of the study. The study found that when the portfolios are formed from currently listed shares only, i.e. excluding delisted shares, the outperformance was much higher thereby concluding that the effects of survivorship bias are present and material.

Although only a limited number of literature that deals with behavioural issues on the JSE has been found, all of them seem to come to the same conclusion that there is evidence of behavioural biases on the market and that the JSE is not necessarily efficient. Like many international tests, South African tests have focused on overreaction as a way of testing for behavioural anomalies of the JSE.

2.2.3 Value Investing Strategies

High dividend yield strategies, high earnings-yield strategies, low price-to-book ratio strategies, high price-cash flow ratios and expected low growth rates, form part of what is commonly called value investment strategies (Fraser and Page, 2000; Filbeck and Visscher, 2003). Value strategies are those investment strategies where shares that are perceived to be undervalued are bought so as to realise superior returns (Fraser and Page, 2000).

Research on international markets has shown that value strategies can earn excess return (Rosenberg, Reid and Lanstein, 1985; Fama and French, 1992; Chan, Hamao and Lakonishok, 1992; Capaul, Rowley and Sharpe, 1993).

Klerck and Maritz (1997) demonstrated that an investor who used Graham's criteria for value investing, on the JSE between 1977 and 1994, would have achieved returns higher than those of the industrial index. These criteria include (Rea, 1977; cited in Klerck and Maritz, 1997):

- An earnings-to-price yield at least twice the AAA bond yield;
- A price-earnings ratio less than 40% of the highest price-earnings ratio the stock had over the past five years;
- A dividend yield of at least two-thirds of the AAA bond yield;
- A stock price below two-thirds of the tangible book value per share;
- A stock price below two-thirds "net current asset value";
- Total debt less than book value;
- Current ratio greater than two;

- Total debt less than twice “net current asset value”;
- Earnings growth of prior ten years at least at a 7% annual compound rate; and
- Stability of growth of earnings in that no more than two declines of 5% or more in year ending earnings in the prior ten years are permissible.

Fraser and Page (2000) showed, using data for industrial companies listed on the JSE between January 1973 and October 1997, that value strategies using price-to-book and dividend-to-price ratios have power to predict share returns one month into the future and therefore to earn superior returns. The book-to-price ratio was found to have a better predictive power when compared to the dividend-to-price ratio.

Studies by Black and Scholes (1974), Goetzmann and Jorion (1993) and Goetzmann and Jorion (1995) have found no relationship between dividend yield and share returns. However a positive relationship between dividend yield and share price performance was found in studies by Fama and French (1988), Hodrick (1992) and Grant (1995). Gumbola and Liu (1993) argued that the effectiveness of the high dividend yield strategies depended on economic cycles. Keppler (1991) found that by investing in markets with high dividend yields, global investors can achieve excess risk-adjusted returns over the long term.

2.3. The Dow Strategies

The Dogs of the Dow strategy, also known as the High Yield Ten or Dow 10 strategy, was first mentioned in a Wall Street Journal column in 1998 (Domian, Louton and Mossman, 1998; Filbeck and Visscher, 2003). The author of the column, John Slatter, concluded that between 1973 and 1987 the uncompounded annual return for the Dogs of the Dow stocks was 18.4% while the DJIA returned 10.9%. Since then a number of books have been written to establish the performance of this strategy, and its variants (see for example

O'Haggins and Downes, 1992; Knowles and Petty, 1992; Gardner and Gardner, 1996 and Bauer and Gardner, 1999).

2.3.1 *The Twelve Dow strategies*

An explanation of the twelve Dow strategies, based on the works of O'Higgins and Downes (1992), Knowles and Petty (1992), Gardner and Gardner (1996) and Bauer and Gardner (1999), and summarised by Coleman (1998) and repeated in Wolmarans (2001) is provided below:

- **The Dogs of the Dow (HY10)** – also known as the High Yield Ten strategy or Dow 10 strategy, the strategy involves buying the 10 DJIA companies with the highest dividend yield at the time of portfolio formation.
- **High Yield Five (HY5)** – also known as Dow Five strategy, involves buying the 5 companies with the highest dividend yield at the time of portfolio formation.
- **Beating the Dow Five (BTD5)** – involves ranking the HY10 companies by price and buying the five lowest priced companies from the HY10 list.
- **Beating the Dow Four (BTD4)** – the lowest priced company in the BTD5 list is dropped and only the four companies starting with the second lowest priced company in the BTD5 list are bought.
- **Penultimate Profit Prospect (PPP)** – in this strategy only the second lowest priced share in the BTD5 list is bought.
- **The Old Foolish Four (OFF)** – as is the case with the BTD4 strategy, this strategy involves dropping the lowest priced BTD5 share. However, the OFF strategy differs with the BTD4 in that the investment in the second lowest priced share of the BTD5 is doubled.
- **The Foolish Four (FF)** – the strategy drops the lowest priced share in the BTD5 list only if it also has the highest dividend yield. If the lowest priced stock also has the highest dividend yield then stocks 2, 3, 4 and 5 are bought for the portfolio otherwise stocks 1, 2, 3 and 4 are bought.

- **Foolish Four Plus (F4+)** – the amount invested in the two lowest priced stocks of the FF strategy are doubled.
- **Foolish Two (UV2)** – also known as the unemotional value strategy, involves buying only the two lowest priced stocks from the FF list.

In addition to the above Dow Dividend Yield strategies that are based on sorting by dividend yield and price, Coleman (1998) and Wolmarans (2001) also define the Reverse Procedure (RP) strategies. The RP strategies are based on dividing the dividend yields of the DJIA stock by the square root of their prices to get the RP ratio of each stock. The stocks are then ranked from highest to lowest by their RP ratios for selection into the various RP portfolios. According to Bauer and Gardner (1999) the rationale behind these strategies is that beta is related to the share price of a company through square root of the share price. The RP ratio therefore allows the investor to identify high yielding, low priced shares with the most upside potential. These strategies can be summarised as follows:

- **Reverse Procedure Two (RP2)** – in this strategy the shares with the second and third highest RP ratios are bought for the portfolio.
- **Reverse Procedure Four (RP4)** – shares ranked second highest, third highest, fourth highest and fifth highest by RP ratio are bought for the portfolio.
- **Reverse Procedure Four Plus (RP4+)** – in this strategy the second, third, fourth and fifth ranked shares are purchased with the amount invested in the second and third ranked shares double the amount invested in the fourth and fifth ranked shares.
- **Reverse Procedure Five (RP5)** – this strategy adds the sixth ranked share to the RP4 strategy thus investing in the shares ranked second, third, fourth, fifth and sixth by RP ratio.

2.3.2 Performance of the Dogs of the Dow (HY10) on international markets

McQueen *et al.* (1997) tested the Dow 5, Dow 10 and Dow 15 strategies over a period of 50 years (1946 to 1995) on the NYSE and found that the Dow 5 (4.62% outperformance) strategy performed best, followed by the Dow 10 (3.06% outperformance) while the Dow 15 (2.10% outperformance) had the lowest results. After adjusting for risk; the Dow 5, Dow 10 and Dow 15 strategies outperformed the DJIA by 1.45%, 1.52% and 1.09% respectively. The results after adjusting for both risk and trading costs were outperformances of 0.56%, 0.95% and 0.72% for the Dow 5, Dow 10 and Dow 15 strategies respectively.

Filbeck and Visscher (1997) tested the Dow 10 strategy on the British stock exchange using data for the period between 1984 and 1994. They found the strategy to be ineffective both before and after adjusting the results for risk. They attributed this to the composition of the FTSE 100.

Le Saout (2006) tested the Dow 10 strategy on the London Stock Exchange and six other European stock markets (Paris, Amsterdam, Frankfurt, Zurich, Brussels and Madrid) using data for the period January 1991 to December 2003. The Frankfurt market data was from January 1992 to December 2003. The author found the strategy to have outperformed in all the markets over the test period. The German and Swiss excess returns were low, averaging 0.85% and 1.63% respectively over the study period. The London Stock Exchange had the highest outperformance over the period achieving 13.03% outperformance. The study also found that even after adjusting the results for risk the strategy still outperformed in all seven markets.

In a study of the performance of the Dow 10 strategy against the Toronto 35 and Toronto 300 indices, using data for the period August 1987 to July 1997, Filbeck and Visscher (2003) found that the Dow strategy outperformed both indices both before and after adjusting for risk. The strategy was tested using

single year holding periods as well as five year holding periods. For the single year holding periods the Dow 10 strategy outperformed both indices in 8 of the 10 years. For the 5 year holding period the Dow strategy outperformed in each of the seven periods.

Domian *et al.* (1998) tested the connection between past returns, dividend yields and future returns using NYSE data for the period between 1964 and 1997. At the centre of this study was the desire to find out if the performance of the Dow 10 companies was a result of high yields or was it in line with the winner/loser effect observed by De Bondt and Thaler (1985) in their overreaction study of the NYSE. The authors conducted their study by forming two portfolios at the portfolio formation date (January 1st of each year in the research window). The one portfolio was formed by selecting the 10 highest yielding companies while the second portfolio was formed by selecting the 10 lowest yielding companies. The returns of these portfolios were calculated for the 12 months prior to portfolio formation and 12 months post portfolio formation.

The finding indicated that on average the high yielding stocks outperformed the Standard & Poor's 500 (S&P 500) by 4.76% 12 months after portfolio formation while the low yielding companies underperformed the index by 0.52% during the same period. However, during the period prior to portfolio formation the high yielding stocks had underperformed the index by 3.67% while the low yielding stocks had outperformed by 7.81%. Based on these findings the authors concluded that the Dow 10 strategy performance was not so much about the dividend yields of the companies included in the portfolio but mostly in line with the winner/loser effect found in the overreaction studies of Du Bondt and Thaler (1985) and other researchers.

In essence, the reason the Dow 10 stocks end with high dividend yields is due to the decline in prices experienced twelve months prior to portfolio formation due to some form of overreaction by the market. In line with the overreaction hypothesis, these companies outperformed the market in the following twelve

months as they recovered from the impact of the overreaction of the prior twelve months.

Domain *et al.* (1998) further subdivided their study period into two sub-periods, 1964 to 1986 (period before the 1987 crash) and 1989 to 1997 (period after the crash). The findings for the pre-crash period are the same as those of the full period, that is the high yielding stocks underperformed the S&P 500 during the 12 months period before portfolio formation while they outperformed during the subsequent twelve months. The low yielding stock outperformed during the twelve months leading to portfolio formation while they underperformed in the twelve months post portfolio formation. For the post-crash period, both the high yielding and the low yielding portfolios outperformed the index in twelve months period leading to portfolio formation while they underperformed in the period after portfolio formation.

It is interesting to note that post the 1987 crash the performance of the Dow 10 strategy seem to have broken down. Le Saout (2006) attributes this to one or both of the following reason, (i) the inclusion of Microsoft and Intel in the DJIA index during the 1990s which drove up the performance of the index while both companies are low dividend paying companies, and (ii) the popularity of the strategy during the 1990s as evidenced by the amount of money that flowed into mutual fund portfolios investing on the basis of the strategy.

2.3.3 *The performance of the Twelve Dow strategies on the NYSE*

The performance of the twelve Dow strategies, described in section 2.3.1, on the NYSE for the 25 year period ending December 1998 is shown in the table below.

Table 2: A comparison of the performance of the Dow strategies on the NYSE for the 25 year period to December 1998

	CAGR	Average	SD	Sharpe
DJIA	16.68%	17.60%	14.34%	0.748
S&P 500	17.25%	18.03%	13.32%	0.838
HY10	18.02%	18.91%	15.10%	0.797
HY5	19.26%	20.64%	19.05%	0.723
BTD5	19.36%	20.85%	19.43%	0.720
PPP	27.86%	31.87%	45.54%	0.549
OFF	22.36%	24.81%	25.83%	0.695
F4	20.55%	22.47%	22.54%	0.692
F4+	22.83%	24.06%	23.28%	0.738
UV2	23.67%	26.40%	28.36%	0.689
RP4	24.54%	25.97%	18.79%	1.016
RP4+	22.17%	23.37%	16.99%	0.971
RP2	27.52%	29.64%	23.53%	0.968
RP5	21.98%	23.21%	17.66%	0.925

Source: Wolmarans (2001)

In the above table:

- DJIA represents the performance of the Dow Jones Industrial Average
- S&P 500 represents the performance of Standard and Poor's 500 Index of the NYSE
- CAGR is the compounded annual growth rate of each strategy as well as the DJIA and the S&P 500
- SD is the standard deviation of the annual returns of each strategy, the DJIA and the S&P 500
- Sharpe is the Sharpe ratio of each of the strategy, the DJIA and the S&P 500. This ratio measures the excess return above a risk free rate per unit risk, where risk is measured by the standard deviation of returns (Filbeck and Visscher, 2003).

The above results show that before adjusting for risk, all the Dow strategies outperformed both the DJIA and the S&P 500 over the 25 year window. However, after adjusting for risk only the four RP strategies beat the S&P 500.

The HY10 and the four RP strategies performed better than the DJIA after adjusting for risk.

2.3.4 Performance of the Dow strategies on the JSE

Wolmarans (2001) tested the performance of the twelve strategies on the JSE using data for the period between December 1985 and December 1998. The results were compared against four benchmarks created out of the JSE's largest industrial companies by assets. The first benchmark was created using the 20 largest companies by assets, the second using the 30 largest, the third using the 40 largest and the fourth using the 50 largest companies. In each index the companies were equally weighted. The study excluded companies that were delisted during the study and therefore an argument for survivorship bias could be made as an investor employing the strategies in December 1985 would have not known those companies that would be delisted during the period.

In addition to testing the strategies using the dividend yield information, Wolmarans (2001) also tested the strategies using earnings yield. Instead of sorting the companies by dividend yield as was the case with the Dow dividend yield strategies, the companies were sorted using earnings yield. For the RP strategies, the RP ratio was calculated by dividing the earnings yield by the square root of price instead of dividing the dividend yield by the square root of the price.

The results of this study are presented in the table below.

Table 3: Performance of the Dow Strategies on the JSE for the period 1985 to 1998

	50 Shares		40 Shares		30 Shares		20 Shares		Average	
	DY	EY	DY	EY	DY	EY	DY	EY	DY	EY
HY10	23.3%	33.5%	25.9%	29.7%	26.1%	30.0%	21.6%	22.9%	24.2%	29.0%
HY5	29.6%	33.5%	32.7%	37.3%	29.0%	39.1%	22.5%	30.4%	28.5%	35.1%
BTD5	27.8%	29.1%	30.8%	36.2%	31.7%	35.1%	27.0%	26.0%	29.3%	31.6%
PPP	28.3%	43.2%	27.3%	22.8%	38.1%	54.8%	32.8%	35.5%	31.6%	39.1%
OFF	21.9%	29.2%	24.6%	34.7%	31.2%	36.0%	27.4%	27.6%	26.3%	31.9%
FF	35.9%	31.5%	24.2%	38.1%	31.9%	36.1%	24.1%	24.8%	29.0%	32.6%
F4+	35.5%	33.9%	26.0%	35.3%	30.6%	38.1%	24.0%	26.7%	29.0%	33.5%
UV2	34.6%	39.4%	29.4%	29.7%	28.0%	42.1%	23.8%	29.1%	29.0%	35.1%
RP4	28.9%	28.4%	26.2%	30.8%	30.0%	38.0%	23.0%	25.4%	27.0%	30.7%
RP4+	28.2%	29.9%	24.7%	30.9%	33.5%	41.0%	24.8%	26.7%	27.8%	32.1%
RP2	26.8%	32.7%	21.9%	31.3%	40.5%	47.0%	29.2%	29.2%	29.6%	35.1%
RP5	27.5%	31.7%	23.8%	32.7%	30.0%	34.5%	23.5%	22.5%	26.2%	30.4%
Average	29.0%	33.0%	26.5%	32.5%	31.7%	39.3%	25.3%	27.2%	28.1%	33.0%

Source: Wolmarans (2001)

The table above shows that selecting shares to invest in from a universe of 30 companies, selected on the basis of their total assets, provided the best average performance when compared to using 20, 40 or 50 companies. The dividend yield strategies when selecting from 30 companies had an average return of 31.7% compared to 29.0%, 26.5% and 25.3% for the 50 companies, 40 companies and 20 companies respectively. The earnings yield strategies produced an average return of 39.3% when selecting from 30 companies compared to 33%, 32.5% and 27.2% for the 50, 40 and 20 companies respectively. The other observation to be made is that in each of the cases, that is 20, 30, 40 and 50 companies, the earnings yield strategies produced superior average returns over the test period when compared to the dividend yield strategies.

Wolmarans (2001) further adjusted the 30 companies returns for risk and compared the results with the returns that would have been obtained had the investor invested in all the thirty companies or in the All Share Index (ALSI). The results are shown in the table below together with the average performance, the standard deviation and Sharpe ratios for the 30 companies and the ALSI.

Table 4: Performance of the ALSI and the 30 Companies over the period between 1985 and 1998

	Average	SD	Sharpe
ALSI	13.20%	18.90%	-0.111
30 Companies	16.10%	23.80%	0.034

Source: Wolmarans (2001)

Table 5: Performance of the Dow strategies using a 30 companies for the period between 1985 and 1998

	Dividend Yield			Earnings Yield		
	Average	SD	Sharpe	Average	SD	Sharpe
HY10	26.1%	34.2%	0.316	30.0%	31.6%	0.465
HY5	29.0%	39.4%	0.348	39.1%	29.6%	0.804
BTD5	31.7%	36.2%	0.453	35.1%	33.5%	0.591
PPP	38.1%	53.5%	0.426	54.8%	67.9%	0.582
OFF	31.2%	38.2%	0.416	36.0%	31.4%	0.659
FF	31.9%	35.1%	0.473	36.1%	32.1%	0.648
F4+	30.6%	35.6%	0.430	38.1%	37.4%	0.610
UV2	28.0%	42.0%	0.302	42.1%	50.7%	0.529
RP4	30.0%	34.1%	0.431	38.0%	31.9%	0.712
RP4+	33.5%	38.3%	0.475	41.0%	34.7%	0.741
RP2	40.5%	50.1%	0.503	47.0%	43.5%	0.729
RP5	30.0%	32.5%	0.452	34.5%	28.7%	0.669
Average	31.7%		0.419	39.3%		0.645

Source: Wolmarans (2001)

The above results show that both the Dow dividend yield and the Dow earnings yield strategies outperformed the two benchmarks (ALSI and 30 companies) both before and after adjusting for risk. Each of the twelve different strategies also beat both indices before and after adjusting for risk in each of the two selection methods (dividend yield and earnings yield). In each of the above analysis, Wolmarans (2001) ignored the impact of trading costs and taxes.

Based on the above work by Wolmarans, this study aims to answer the following research questions:

2.3.5 Research Question 1

How have the Dow strategies, based on the dividend yield and earnings yield, performed against the INDI25 over the period January 1999 to December 2012, both before and after adjusting for risk?

2.3.6 Research Question 2

How have the Dow dividend yield strategies performed against the Dow earnings yield strategies on the JSE for the period January 1999 to December 2012?

2.4 Conclusion of Literature Review

In this chapter, literature relating to market efficiency, behavioural finance, value investing strategies and the performance of Dow investing strategies was reviewed.

Indications are that although cases of inefficiencies in markets abound, the JSE seems to have increasingly become more efficient in recent time. This is based on the number of publications reviewed by Wood (2006) that show the market to be efficient compared to those that show it to be inefficient. Behavioural finance research on the JSE is still in its infancy; however the little research that has been done around overreaction indicates that there is evidence of overreaction, therefore inefficiency, on the JSE.

The literature also provides evidence of outperformance by value based strategies, not only on the South African market but in other markets as well. The outperformance by the Dow investing strategies abound although there seems to be indications that in the late 1990s the strategies seem to have failed to beat the market.

2.4.1 *Research Question 1:*

How have the Dow strategies, based on the dividend yield and earnings yield, performed against the INDI25 over the period January 1999 to December 2012, both before and after adjusting for risk?

2.4.2 *Research Question 2:*

How have the Dow dividend yield strategies performed against the Dow earnings yield strategies on the JSE for the period January 1999 to December 2012?

CHAPTER 3: RESEARCH METHODOLOGY

This chapter presents the research methodology that was used to answer the research questions posed in the previous chapter. The chapter begins by providing an explanation of the research methodology used in the study then the research design is presented. Thereafter the population, sample and the sampling methodology used in the study are discussed followed by a discussion of the research instrument employed, as well as procedure for data collection, analysis and interpretation. The chapter is concluded through a discussion of the reliability and validity of the study itself.

3.1 Research methodology / paradigm

There are three methodologies that can be followed in conducting any form of research. These are qualitative, quantitative or mixed methods which combine qualitative and quantitative methods (Creswell, 2003). This study uses the quantitative methodology.

In quantitative research, experimental methods and quantitative measures are employed to test hypothetical generalisations (Hoepfl, 1997). According to Johnson and Onwuegbuzie (2004:18) “the major characteristics of traditional quantitative research are a focus on deduction, confirmation, theory/hypothesis testing, explanation, prediction, standardised data collection and statistical analysis”.

This research methodology is appropriate for this study because portfolio returns were analysed using share price data. By its very nature this type of data requires mathematical/statistical methods for analysis.

3.2 Research Design

The methodological approach adopted for this study is that of mathematical modelling. This approach was used in all the Dow investing studies reviewed in section 2.3 of the literature review chapter.

The key advantage of using this approach is that the research results are independent of the researcher (Johnson and Onwuegbuzie, 2004). The researcher is able to study the phenomenon without influencing or being influenced by it (Brazil, Lohfeld and Sale, 2002).

The main disadvantage of the methodology is that the researcher's choice of data may be biased thus making it impossible to generalise findings to a larger population (Johnson and Onwuegbuzie, 2004).

3.3 Population and sample

3.3.1 *Population*

The population is all the shares listed on the JSE at each portfolio formation date.

3.3.2 *Sample and sampling method*

The sample used is shares that were part of the INDI25 at each portfolio formation date during the period between January 1999 and December 2012. The shares of the INDI25 are used in this study because it is the closest index to the DJIA on the JSE. The number of shares to include in each portfolio was dictated by the strategy being tested. The time frame is dictated by the desire to extend Wolmarans' (2001) study which used data up to December 1998, thus this study starts from January 1999.

In order to avoid look ahead bias, the study also included the shares that were delisted subsequent to portfolio formation for as long as they meet the criteria

for selection into the portfolio. Look ahead bias result when ex post knowledge is used to explain ex ante results at some time later, but failing to recognise that such results were not available at that time (Banz and Breen, 1986; cited in Serfontein, 2007).

3.4 The research instrument

A mathematical model was used to calculate the returns of a portfolio of shares over a period of 12 months. Thereafter statistical methods were used to analyse this returns as a way to answer the research questions posed in the literature review chapter.

3.5 Procedure for data collection

Data concerning companies that formed the INDI25 throughout the study period was obtained from the JSE's FTSE/Africa Index series desk. Since the INDI25, like all other JSE indices, is reconstituted on a quarterly basis, the study did not use the actual INDI25 returns as a benchmark but rather the average returns of the 25 companies that were part of the INDI25 on 1 January of each year with the assumption that these companies remain in the INDI25 throughout the 12 months holding period.

Historical daily closing prices, dividend yield information and earnings yield information for companies that formed part of the INDI25 during the research window period were obtained from McGregor/Bureau of Financial Analysis (McGregor/BFA). Where possible this information was checked for correctness by comparing it with data from the Standard Bank Online Trading platform. Daily prices were used so that in cases where a share that was in the INDI25 at the time of portfolio formation drops off before the end of the 12 month holding period, the last trading price could be used for analysis of returns.

Daily yield data on the South African government's one year Treasury bill was obtained from the I-Net Bridge workstation.

To account for delistings, corporate actions and any other activity that could make share prices of a company not to be available throughout the period of study, Stock Exchange News Services (SENS) data used was obtained from Profile Media's ShareData website (www.sharedata.co.za).

3.6 Data analysis and interpretation

In this section the procedures followed to analyse the data used in the study and to interpret the results are presented.

3.6.1 *Portfolio formation*

INDI25 portfolio

The constituents of the portfolio were obtained from the JSE data at each portfolio formation date, being the first trading day in January of each of the years in the study period. Unlike in the case of the JSE where the index is weighted by market capitalisation of the constituent companies, for this study all the companies carry an equal weighting in the index.

Any cash dividends received during the holding period is assumed to have been held in a non interest earning account for investment only at the next portfolio formation date. Where a company that forms part of the index is delisted, cash proceeds were also assumed to have been held in a non interest earning account until the next portfolio formation date. Where a corporate action involving a company in the portfolio occurred and the payment was in the form of shares of another company, such shares were assumed to have been sold immediately upon receipt at the closing price on the day of sale. The proceeds from sale were assumed to have been held in a non interest earning cash account as well.

The Dow portfolios

Companies were included in each of the twenty six Dow portfolios (thirteen dividend yield portfolios and thirteen earnings yield portfolios) as described in section 2.3.1 of this report. Portfolios were formed on the first trading day of January of each year and held for the following 12 months until the last trading day of December of that year.

Any cash dividends received during the holding period were assumed to have been held in a non interest earning account for investment only at the next portfolio formation date. Where a company that formed part of any of the portfolios was delisted, cash proceeds were also assumed to have been held in a non interest earning account until the next portfolio formation date. Where a corporate action involving a company in any of the portfolio occurred and the payment is in the form of shares of another company, such shares were assumed to have been sold immediately upon receipt at the closing price on the day of sale. The proceeds from sale were assumed to have been held in a non interest earning cash account as well.

3.6.2 Calculation of returns

The returns for the portfolio were calculated as per equations 3.1 and 3.2 below.

$$R_{port} = \frac{\sum_{i=1}^n R_i}{n} \dots\dots\dots 3.1$$

$$R_i = \frac{P_{i1} + \text{Cash}_i - P_{i0}}{P_{i0}} \dots\dots\dots 3.2$$

where;

R_{port} is the total percentage return on the portfolio for the 12 months holding period.

R_i is the total percentage return on the i^{th} share during the 12 months holding period.

n is the number of shares in the portfolio at the start of the 12 months holding period.

P_{i1} is the price of the i^{th} share at the end of the 12 months holding period. If the i^{th} share is disposed of before the end of the 12 months period its price at the end of the period is set to zero and the cash received is included in **Cash_{*i*}**.

P_{i0} is the price of the i^{th} share at the beginning of the 12 months holding period.

Cash_{*i*} is the cash received due the holding of the i^{th} share during the 12 months holding period.

The average return for each of the portfolios over the holding period was calculated as the simple average of the returns of the portfolio over each of the 12 months holding period.

$$R_{ave,i} = \frac{1}{14} * \sum_{j=1}^{11} R_{port,j} \dots\dots\dots$$

3.3

where,

$R_{ave,i}$ is the average return of the i^{th} strategy over the 14 year window period.

$R_{port,j}$ is the return of each portfolio in the j^{th} 12 month period.

3.6.3 *Adjusting the returns for risk*

It is important to adjust returns from any investment for risk as this allows one to compare returns associated with different levels of risk (Dowd, 2000). To adjust the returns for risk, in this study, the Sharpe ratio for each holding period was used.

The Sharpe ratio measures excess returns obtained per unit of risk, where risk is measured by the standard deviation of returns. Excess returns are calculated as the difference between the returns from a riskless asset/portfolio (e.g. government bond) and the returns of a risky asset/portfolio of risky assets (e.g. shares) (Capaul *et al.*, 1993). When choosing between alternatives using the Sharpe ratio criteria, the alternative with the highest Sharpe ratio must be chosen (Dowd, 2000). The calculation of the Sharpe ratio is shown in the equation below:

$$SR_{port} = \frac{R_{ave,i} - R_f}{SD_{port}} \dots\dots\dots$$

3.4

where

SR_{port} is the Sharpe ratio of the portfolio

R_f is the risk free rate of return

SD_{port} is the standard deviation of the returns of the portfolio

The average annual yield on the South African Government's 1 year Treasury bill was used as proxy for the risk free rate.

3.6.4 Test for significance of results

To be able to answer the research questions presented, the difference between the average return of the INDI25 and each of the two strategies were tested for significance using t-tests. The difference between the earnings yield and the dividend yield strategies were similarly tested for significance.

The difference between two means for matched paired data tests was used to test for the significance of the results at a 5% level of significance. This method was chosen because the samples that were dealt with were not independent as

they come from the same population, being shares listed on the JSE. The equation for this test is given in Keller (2008) as:

$$t = \frac{(R_{ave,1} - R_{ave,2}) - (\mu_1 - \mu_2)}{\sqrt{s_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \dots\dots\dots$$

3.5

$$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \dots\dots\dots 3.6$$

where

t is the t-statistic

$R_{ave,1}$ is the average return of the first of the two portfolios being compared

$R_{ave,2}$ is the average return of the second of the two portfolios being compared

$\mu_1 - \mu_2$ is the value of the hypothesis being tested

n_1 is the number of observations in the first portfolio

n_2 is the number of observations in the second portfolio

s_1^2 is the variance of the returns of the first portfolio

s_2^2 is the variance of the returns of the second portfolio

3.7 Validity and reliability

According to Golafshani (2003), in quantitative research validity is concerned with whether the means of measurement are accurate and whether they measure what they are meant to measure while reliability is concerned with whether the results can be repeated.

3.7.1 External validity

External validity deals with whether the results obtained through a study can be generalised to other populations, other times and contexts (Leedy, 1989). For this study the sample from which the portfolios were formed was drawn from shares listed on the JSE. However such shares are only drawn from the INDI25 therefore making it impossible to generalise the results to the rest of the shares trading on the JSE.

As Gumbola and Liu (1993) indicated, the effectiveness of dividend yield strategies may be affected by economic cycles therefore care should be taken before generalising the results of this study across all time frames on the JSE.

3.7.2 Internal validity

Trochim (2006:1) states that “internal validity is the approximate truth about inferences regarding cause-effect or causal relationships. Thus, internal validity is only relevant in studies that try to establish a causal relationship. It's not relevant in most observational or descriptive studies, for instance.”

This study does not seek to explain the reasons for the performance of the Dow strategies on the JSE but rather seeks to observe their performance over the study period relative to the INDI25 and to each other. Internal validity was therefore not an issue of concern in the study.

3.7.3 Reliability

According to Golafshani (2003), to the extent that the results of a research are consistent over time and accurately represent the population under study then they are reliable. Reliability also deals with the accuracy of the measuring instrument (Leedy, 1989) in that a measuring instrument is reliable if the results of a study can be reproduced under a similar method (Golafshani, 2003).

The measurement instrument used in this study is a mathematical model and has been employed by other researchers in similar studies (e.g. McQueen *et al.*, 1997; Wolmarans, 2001, Filbeck and Visscher, 2003). The study should therefore have high levels of reliability.

CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents the results obtained following the use of the research methodology and data analysis approaches described chapter 3. The key issues that had to be dealt with in analysing the data are presented first in section 4.2 then the results obtained from research question 1, including the t-tests conducted to establish the statistical significance of the differences in returns of the two strategies against the INDI25 are presented in section 4.3. The results for research question 2 which sought to establish whether there was a difference in returns between the earnings yield based strategies and the dividend yield based strategies are then presented in section 4.4 before the chapter is concluded by summarising the results obtained in section 4.5.

4.2 Data Analysis

The following key issues had to be dealt with in the collection and analysis of the data.

Special dividends were included both in the calculation of dividend yields and total returns. The assumption was that an investor screening companies on dividend yield for inclusion in their portfolio would not go into the detail of removing the impact of special dividends from the dividend yield data published by most share data services, including those used for this research.

To form the different portfolios, companies were first ranked by dividend yield (for dividend based portfolios) and earnings yield (for earnings based portfolios). The companies were then further ranked by actual share price so as to make allocations to share price based portfolios. To be able to rank shares using prices, actual prices on the day of inclusion in the portfolio were obtained. This was necessary because both McGregor/BFA and Standard Bank adjust prices

backwards to account for share splits and consolidations. As an example, PPC did a 1:10 share split during 2008 resulting in issued shares increasing by a factor of 10 and the share trading at 1/10 (a tenth) of the price immediately before the split. Both McGregor/BFA and Standard Bank adjusted all the historic PPC share data contained in their databases to account for the split therefore resulting in share prices reflecting the split as if it happened before the actual date on which it happened. To account for this, when sorting companies by share price, the share prices were adjusted accordingly so that pre consolidation or split prices are used. Using the PPC example, for the 2008 and prior years, the PPC share price obtained from the databases was multiplied by 10 before being used in the sorting since an investor making the decision at that time would have used the pre-split share price.

For the 2000 analysis, one of the shares included in the INDI25 was Educor Limited. The author could not find reliable share price data for the share. As a means to preserve data integrity the share was excluded from the analysis, therefore using 24 instead of 25 shares for the analysis in that year. The exclusion of the company from the data should not have a major bearing on the results given that only 1 data point was excluded from a total of 350 (25 companies in each of the 14 years) data points in the sample used for the analysis.

An average of the 3 months Treasury bill interest rate on the 1st January of each of the portfolio years (1999 to 2012) was used as the risk free rate for the calculation of the Sharpe Ratio. This was used instead of the more appropriate 1 year Treasury bill interest rate as the data for the 1 year bill does not go as far back as 1999. The average rate was calculated to be 9.24%.

4.3 Research Question 1

Research Question 1: How have the Dow strategies, based on the dividend yield and earnings yield, performed against the INDI25 over the period January 1999 to December 2012, both before and after adjusting for risk?

4.3.1 *INDI25 Portfolio*

Table 6: The Performance of the INDI25 over the period between January 1999 and December 2012

	Average	SD	Sharpe
INDEX	20.19%	25.35%	0.43

Table 6 above shows the average returns (Average), the standard deviation of returns (SD) and the Sharpe Ratio (Sharpe) for the INDI25 portfolio over the research window period. The INDI25 portfolio had an average return of 20.19% with a standard deviation of 25.35% and a Sharpe Ratio of 0.43.

Table 7: The Performance of the Dividend Yield and Earnings Yield Dow Strategies over the period January 1999 and December 2012

	Dividend Yield Strategies			Earnings Yield Strategies		
	Average	SD	Sharpe	Average	SD	Sharpe
HY10	25.66%	26.72%	0.61	22.66%	24.28%	0.55
HY5	24.60%	29.94%	0.51	26.77%	34.24%	0.51
BTD5	24.34%	31.56%	0.48	22.88%	33.23%	0.41
BTD4	24.61%	36.80%	0.42	20.66%	33.10%	0.35
PPP	27.43%	37.64%	0.48	16.66%	41.72%	0.18
OFF	25.17%	36.43%	0.44	19.93%	31.70%	0.34
FF	26.49%	34.79%	0.50	23.53%	32.43%	0.44
F4+	29.00%	35.61%	0.55	23.57%	32.12%	0.45
UV2	34.01%	39.00%	0.64	23.46%	36.14%	0.39
RP2	21.90%	33.30%	0.38	12.00%	28.04%	0.10
RP4	26.15%	29.91%	0.57	23.60%	28.39%	0.51
RP4+	24.73%	28.90%	0.54	19.89%	27.53%	0.39
RP5	25.49%	30.45%	0.53	23.11%	32.16%	0.43

Table 7 above contains the average returns for the different Dow Investment Strategies using both dividend yield and the earnings yield as sorting parameters. The table also shows the standard deviations and Sharpe Ratios for each of the portfolios. Annual returns of each of the strategies are included in Appendix A (dividend yield strategies) and Appendix B (earnings yield strategies).

To test if the average returns of each of the Dow Dividend Yield and the Dow Earnings Yield strategies were different from those of the INDI25 at a 5% significance level, two-tailed t-tests were conducted using Microsoft Excel's Data Analysis Tools and the results are shown in Table 8 and Table 9 below.

Table 8: Results of the t-tests to determine significance of differences in means of the Index returns and each of the Dividend Strategies

Null Hypothesis	t-Critical	t-stat	p-value	Decision
MEAN_HY10 - MEAN_INDEX = 0	2.160368656	1.533207747	0.149194165	Fail to Reject the Null Hypothesis
MEAN_HY5 - MEAN_INDEX = 0	2.160368656	0.815181551	0.429650667	Fail to Reject the Null Hypothesis
MEAN_BT5 - MEAN_INDEX = 0	2.160368656	0.89594845	0.386570151	Fail to Reject the Null Hypothesis
MEAN_BT4 - MEAN_INDEX = 0	2.160368656	0.824983716	0.424260799	Fail to Reject the Null Hypothesis
MEAN_PPP - MEAN_INDEX = 0	2.160368656	1.072683526	0.302922557	Fail to Reject the Null Hypothesis
MEAN_OFF - MEAN_INDEX = 0	2.160368656	0.921594676	0.373527182	Fail to Reject the Null Hypothesis
MEAN_FF - MEAN_INDEX = 0	2.160368656	1.071972827	0.303229894	Fail to Reject the Null Hypothesis
MEAN_F4+ - MEAN_INDEX = 0	2.160368656	1.40413802	0.183715424	Fail to Reject the Null Hypothesis
MEAN_UV2 - MEAN_INDEX = 0	2.160368656	1.802313082	0.094718297	Fail to Reject the Null Hypothesis
MEAN_RP2 - MEAN_INDEX = 0	2.160368656	0.20125026	0.84361761	Fail to Reject the Null Hypothesis
MEAN_RP4 - MEAN_INDEX = 0	2.160368656	1.549458961	0.14526549	Fail to Reject the Null Hypothesis
MEAN_RP4+ - MEAN_INDEX = 0	2.160368656	0.917117037	0.375782205	Fail to Reject the Null Hypothesis
MEAN_RP5 - MEAN_INDEX = 0	2.160368656	1.491066211	0.159805823	Fail to Reject the Null Hypothesis

Table 9: Results of the t-tests to determine significance of differences in means of the Index returns and each of the Earnings Yield Strategies

Null Hypothesis	t-Critical	t-stat	p-value	Decision
MEAN_HY10 - MEAN_INDEX = 0	2.160368656	0.986880753	0.341713808	Fail to Reject Null Hypothesis
MEAN_HY5 - MEAN_INDEX = 0	2.160368656	1.19330103	0.254074867	Fail to Reject Null Hypothesis
MEAN_BT5 - MEAN_INDEX = 0	2.160368656	0.63550454	0.536126387	Fail to Reject Null Hypothesis
MEAN_BT4 - MEAN_INDEX = 0	2.160368656	0.131414348	0.897459548	Fail to Reject Null Hypothesis
MEAN_PPP - MEAN_INDEX = 0	2.160368656	-0.371640111	0.716147822	Fail to Reject Null Hypothesis
MEAN_OFF - MEAN_INDEX = 0	2.160368656	-0.074045577	0.942101357	Fail to Reject Null Hypothesis
MEAN_FF - MEAN_INDEX = 0	2.160368656	0.756962599	0.462571736	Fail to Reject Null Hypothesis
MEAN_F4+ - MEAN_INDEX = 0	2.160368656	0.691265305	0.501557306	Fail to Reject Null Hypothesis
MEAN_UV2 - MEAN_INDEX = 0	2.160368656	0.437238648	0.669113855	Fail to Reject Null Hypothesis
MEAN_RP2 - MEAN_INDEX = 0	2.160368656	-2.160674038	0.04997209	Reject Null Hypothesis
MEAN_RP4 - MEAN_INDEX = 0	2.160368656	1.083968712	0.298073378	Fail to Reject Null Hypothesis
MEAN_RP4+ - MEAN_INDEX = 0	2.160368656	-0.107253138	0.916225716	Fail to Reject Null Hypothesis
MEAN_RP5 - MEAN_INDEX = 0	2.160368656	0.796456944	0.440069725	Fail to Reject Null Hypothesis

4.3.2 The Dow Dividend Yield Strategies

For the dividend yield strategies, the UV2 portfolio had the highest non risk adjusted return with a return of 34.01% and a standard deviation of 39.00%. The RP2 portfolio had the lowest non risk adjusted return of all the Dow Dividend Yield Strategies with a return of 21.9%% and a standard deviation of 33.3%. The results show that on a non-risk adjusted basis, all the Dow Dividend Yield Strategies outperformed the INDI25 portfolio which achieved a non-risk adjusted average return of 20.19% with a standard deviation of 25.38%.

On a risk adjusted basis, the UV2 portfolio still had the best performance amongst all the Dow Dividend Yield Strategies with a Sharpe Ratio of 0.64. The RP2 portfolio had the lowest risk adjusted returns amongst the Dow Dividend Yield Strategies with a Sharpe Ratio of 0.38. On a risk adjusted basis the INDI25 outperformed the BT4 and the RP2 portfolios as it had a higher Sharpe Ratio compared to the two portfolios.

The test of significance performed on each of the Dow Dividend Yield Strategies against the Mean returns of the INDI25, as shown in table 8 above, indicate that the returns of the strategies were not significantly different from those of the index at a 5% significance level.

4.3.3 The Dow Earnings Yield Strategies

For the earnings yield strategies, the HY5 portfolio had the highest non risk adjusted return with a return of 26.77% and a standard deviation of 34.24%. The PPP portfolio had the lowest non-risk adjusted return of all the Dow Earnings Yield Strategies with returns of 16.66% and standard deviations of 41.72%. The results show that on a non-risk adjusted basis, 9 of the 13 Dow Earnings Yield Strategies outperformed the INDI25 portfolio. The strategies that underperformed the INDI25 portfolio are PPP (16.66%), OFF (19.93%), RP2 (12.00%) and RP4+ (19.89%).

On a risk adjusted basis, the HY10 portfolio had the best performance amongst all the Dow Earnings Yield Strategies with a Sharpe Ratio of 0.55. The RP2 portfolio had the lowest risk adjusted returns amongst the Dow Earnings Yield Strategies with a Sharpe Ratio of 0.10. When compared to the INDI25 portfolio on a risk adjusted basis, 7 of the 13 Dow Earnings Yield Strategies underperformed. The four strategies, BTD5 (Sharpe Ratio of 0.41), BTD4 (0.35), PPP (0.18), OFF (0.34), UV2 (0.39), RP2 (0.10) and RP4+ (0.39) had Sharpe Ratios lower than that of the INDI25 portfolio (0.43) meaning that they underperformed the INDI25. The RP5 portfolio had the same Sharpe Ratio as the INDI25 meaning that on a risk-adjusted basis the two portfolios performed the same.

The test of significance performed on each of the Dow Earnings Yield Strategies against the Mean returns of the INDI25, as shown in table 9 above, indicate that except for the RP2 strategies, the returns of all the other strategies were not significantly different from those of the index at a 5% significance level

4.3.4 Mean Difference Test for the Dow Portfolios and the INDI25

To test if the average returns of the Dow Dividend Yield and the Dow Earnings Yield strategies were different from those of the INDI25 at a 5% significance level, two-tailed t-tests were conducted using Microsoft Excel's Data Analysis Tools and the results are shown in Table 10 below.

Table 10: Results of the t-tests to determine significance of differences in means of the Index returns and the Dividend and Earnings Yield Strategies

Null Hypothesis	t-Critical	t-stat	p-value	Decision
MEAN_DY - MEAN_INDEX = 0	2.160368656	1.311469013	0.21239	Fail to Reject the Null Hypothesis
MEAN_EY - MEAN_INDEX = 0	2.160368656	0.41089757	0.68784	Fail to Reject the Null Hypothesis

The above results show that the difference in average returns of the dividend yield strategies (MEAN_DY) and the average returns of the INDI25 (MEAN_INDEX) were not significant at a 5% significance level. The results also

show that the difference in average returns of the earnings yield strategies (MEAN_EY) and the average returns of the INDI25 (MEAN_INDEX) were not significant at a 5% significance level. The decision in both cases is therefore to fail to reject the Null Hypothesis.

4.4 Research Question 2

Research Question 2: How have the Dow dividend yield strategies performed against the Dow earnings yield strategies on the JSE for the period January 1999 to December 2012?

4.4.1 Average Annual Returns of the Dow Dividend Yield Strategies and Dow Earnings Yield Strategies

Table 9 below shows the annual average returns of the Dow Dividend Yield Strategies and the Dow Earnings Yield Strategies. The table also highlights the average returns for each of the two sorting criteria (dividend yield and earnings yield) over the 14 year research window. The above calculations do not include the returns of the INDI25 portfolios.

Table 11: Annual Average Returns of Dividend and Earnings Yield Strategies

	MEAN_DY	MEAN_EY
1999	84.11%	63.61%
2000	-22.30%	-33.53%
2001	41.30%	25.80%
2002	27.68%	14.94%
2003	30.55%	33.15%
2004	54.16%	57.33%
2005	19.11%	35.81%
2006	39.73%	39.53%
2007	6.92%	-3.66%
2008	-25.99%	-26.32%
2009	33.99%	28.89%
2010	10.75%	21.67%
2011	2.75%	-0.45%
2012	62.97%	43.41%
Average	26.12%	21.44%

The dividend yield strategies achieved an annual average return of 26.12% while the earnings yield strategies achieved an annual average return of 21.44%. Therefore, the dividend yield strategies outperformed the earnings yield strategies over the research window period.

4.4.2 Mean Difference Tests for the Dividend Yield and the Earnings Yield Portfolios

To test if the means of the average returns of the two strategies were different at a 5% significance level, a two-tailed t-test was conducted using Microsoft Excel's Data Analysis Tools and the results are shown in Table 12 below.

Table 12: Results of the t-test for the difference in means of dividend and earnings yield strategies

Null Hypothesis	t-Critical	t-stat	p-value	Decision
MEAN_DY - MEAN_EY = 0	2.160368656	1.584917158	0.137	Fail to Reject the Null Hypothesis

The results of the t-test conducted to test the difference in the mean returns of the dividend yield portfolios (MEAN_DY) and the earnings yield portfolios (MEAN_EY) show that the differences were not significant at a significance level of 5%. The decision is therefore to fail to reject the Null Hypothesis.

4.5 Summary of the results

The research methodology described in chapter 3 was used to gather and analyse the data and the results were presented in this chapter. It was found that all the Dow investment strategies based on the dividend yield outperformed the INDI25 portfolios before adjusting for risk. Two (2) of the dividend yield portfolios underperformed the INDI25 after adjusting for risk using the Sharpe ratio.

For the earnings yield strategies it was found that 3 of the 13 portfolios underperformed that INDI25 portfolio before adjusting for risk while 4 of 13 portfolios underperformed after adjusting for risk. None of the dividend yield strategies were found to have produced results that were different from the INDI25 at a 5% significance level while the RP2 strategy produced results that were different at a 5% significance level when using the earnings yield strategies.

At an overall strategy level the study found that the differences in performances of both the dividend yield strategies and earnings yield strategies were not significantly different from the performance of the INDI25 portfolio at a significance level of 5%. The performance of the dividend yield strategies and the earnings yield strategies were also found not to be statistically different at the 5% significance level.

CHAPTER 5: DISCUSSION OF THE RESULTS

5.1 Introduction

The results presented in chapter 4 of this report will be discussed in this chapter. The results are compared with the results obtained in the Wolmarans (2001) study to check for consistency of findings between the two studies.

5.2 Research Question 1

5.2.1 The Dow Dividend Yield Strategies

The results of the analysis of the performance of the Dow Dividend Strategies against that of the INDI25 were presented in section 4.3.2. The analysis of the results indicated that, consistent with the Wolmarans (2001) study presented in section 2.3.4 of this report, all the Dow Dividend Strategies outperformed the INDI25 before adjusting for risk. Unlike the Wolmarans (2001) study, after adjusting for risk two of the 13 strategies underperformed the INDI25. The performance before adjusting for risk is also consistent with the findings on the NYSE using the data for the 25 year period to December 1998 as stated in Wolmarans (2001). The risk adjusted returns, however differ from those of the JSE in that the Wolmarans (2001) JSE study found that all the strategies outperformed after adjusting for risk while for this study the BT4 and the RP2 strategies underperformed the INDI25. The dividend based strategies are also largely in line with studies conducted in other markets other than the JSE and the NYSE as reviewed in chapter 2, literature review, of this report.

5.2.2 The Dow Earnings Yield Strategies

The results of the analysis of the performance of the Dow Earnings Strategies against that of the INDI25 were presented in section 4.3.3. The analysis of the

results indicated that 9 of the 13 Dow Earnings Strategies outperformed the INDI25 before adjusting for risk, while 7 of 13 strategies underperformed after adjusting for risk. The seven underperforming strategies after adjusting for risk included the BTD5, BTD4, PPP, OFF, UV2, RP2 and RP4+ strategies. The RP5 strategy produced the same results as the INDI25 after adjusting the returns for risk. These results are inconsistent with those obtained by Wolmarans (2001) where all the earnings based strategies outperformed both before and after adjusting for risk. Of all the literature reviewed for the purpose of this study, only Wolmarans (2001) tested the Dow strategies using earnings yield while all other studies focused on the dividend yield based strategies only. It is therefore not possible to compare the findings of this study on the earnings yield strategies against those of studies on other markets other than the JSE.

5.2.3 Mean Difference Test for the Dow Portfolios and the INDI25

The results of the mean difference tests as stated in section 4.3.4 in the previous chapter indicate that both the average returns of the dividend yield and earnings yield strategies were not different from those of the INDI25. In his study, Wolmarans (2001) did not test the difference between the means of the returns of the dividend yield strategies and the earnings yield strategies against the INDI25, but he rather tested the differences in the means of the returns of the various portfolios. His findings were that the means were not significantly different at a significance level of 5%. Although the tests were not the same the results are found to be consistent with each other.

5.2.4 Conclusions

An analysis of the results of the tests comparing the performance of the different Dow strategies, based on the dividend yield and the earnings yield, against the INDI25 were presented in this section and compared to the findings of the test conducted by Wolmarans in a 2001 study of the performance of the same strategies on the JSE using data for the period between January 1985

and December 1998. This study found, consistent with Wolmarans (2001), that all the dividend yield strategies outperformed the INDI25 both before adjusting for risk, while unlike the Wolmarans (2001) study, some of the strategies were found to have underperformed the INDI25 after adjusting for risk.

For the earnings yield strategies the results found that although on average the strategies outperformed the INDI25, some of the individual portfolios underperformed both before and after adjusting for risk. This is contrary to the findings of the Wolmarans (2001) study where all the strategies outperformed.

The mean returns of the dividend yield strategies and the earnings yield strategies were found not to be significantly different from the mean return of the INDI25 at a significance level of 5%.

Based on the above results and analysis it is concluded that the findings of the Wolmarans (2001) study still holds over the period of this study. It is however noted that some differences did occur as evidenced by the differences in performance of the earnings yield based strategies.

5.3 Research Question 2

5.3.1 Average Annual Returns of the Dow Dividend Yield Strategies and Dow Earnings Yield Strategies

The second part of the study sought to compare the performance of the dividend yield based strategies against the earnings yield based strategies. The results were presented in section 4.4.1. The dividend yield based strategies outperformed the earnings yield by 4.68%. This is contrary to the findings of Wolmarans (2001) in which the earnings yield strategies were found to have outperformed the dividend yield strategies by 7.6% as presented in section 2.3.4 of this report.

One of the reasons for the outperformance of the dividend yield strategies could be the inclusion of special dividends in the calculation of both dividend yields and total returns. It is possible that the market rated companies that paid special dividends higher than those that did not, thereby suppressing their earnings yield while dividend yield were boosted by the payment of special dividends. This would have caused companies not paying special dividends to have been excluded from dividend yield based portfolios but to be included in the earnings yield based portfolios.

5.3.2 Mean Difference Tests for the Dividend Yield and the Earnings Yield Portfolios

The results of the test of differences in the average returns of the dividend yield based and earnings yield based strategies were presented in section 4.4.2 and indicate that the means were not significantly different at a significance level of 5%. These results also differ from those obtained by Wolmarans (2001) where he found that the outperformance of the earnings based strategies was significant with a p-value of 0.04.

5.3.3 Conclusion

The performance of the earnings yield strategies against the dividend yield strategies were found to be inconsistent with the findings of the Wolmarans (2001) study in that the dividend yield strategies outperformed the earnings yield strategies. The possible explanation for this is the inclusion of special dividends in the calculation of dividend yields and total returns.

5.4 Conclusion

The results of the study, as presented in chapter 4 of this report, were discussed and analysed in this chapter. It was found that consistent with Wolmarans' (2001) study of the performance of the Dow strategies, both based

on dividend yield and earnings, using JSE data for the period between December 1985 and December 1998, these strategies continued to outperform the industrial index before adjusting for risk, for the period between January 1999 and December 2012. This study also found the difference in means of returns for both the dividend yield based strategies and the earnings yield based strategies against the mean return of the INDI25 to have not been significantly different at a significance level of 5%. Wolmarans (2001) did not test for the difference in means as tested in this study but instead tested for the difference in means between the different portfolios and found them not significant at the 5% significance level.

Unlike the Wolmarans (2001) study which found the earnings yield strategies to have outperformed the dividend yield strategies, this study found the contrary. The one possible reason for this finding is the inclusion of special dividends in the calculation of dividend yields and total returns.

CHAPTER 6: CONCLUSIONS

6.1 Introduction

A summary of the findings of the research as presented in chapter 5 is presented in this chapter followed by suggestions for further research based on some additional questions that came out of the findings of this research.

6.2 Summary

The objectives of this research were:

- To compare the performance of the Dow dividend yield investment strategies and the Dow earnings yield investment strategies against the performance of the INDI25 using JSE data for the period between January 1999 and December 2012; and
- To compare the performance of the Dow dividend yield investment strategies against the performance of the Dow earnings yield investment strategies using the JSE data for the period between January 1999 and December 2012.

Consistent with the findings of a similar study conducted by Wolmarans in 2001 using JSE data for the period between January 1985 and December 1998, this research found that all the Dow dividend strategies outperformed the INDI25 before adjusting the returns for risk using the Sharpe ratio. The results were found to be inconsistent after adjusting for risk in that some of the strategies underperformed the INDI25.

Although the study found the Dow earnings yield strategies to have outperformed the INDI25 on average, contrary to the Wolmarans (2001) findings, not all earnings yield portfolio outperformed.

This study also found the dividend yield strategies to have outperformed the earnings yield strategies, which is contrary to the Wolmarans (2001) study which found the earnings yield strategies to have outperformed the dividend yield strategy. The differences in the performances of the different strategies and the INDI25 were however found not to be significant at a 5% significance level. Wolmarans (2001) found the difference in the performance between the dividend yield and the earnings yield strategies to have been significant with a p-value of 0.04. He however, did not test for the significance of the performance of the two strategies against the performance of the INDI25.

Based on the findings of this research it is concluded that by adopting the Dow investment strategies based on either the dividend yield approach or earnings yield approach, an investor in the JSE's industrial companies can outperform the INDI25 albeit that the outperformance may be statistically insignificant. For the reason that the findings of this study on the performance of the dividend yield strategies against the earnings yield strategies are contrary to those of Wolmarans (2001), it is concluded that there is no sufficient evidence to support either of the two strategies against the other. The inclusion of special dividends in the calculation of dividend yields could have been the cause of the reversal of the performances of the two strategies against each other.

6.3 Suggestions for further research

Domian *et al.* (1998) tested the Dow 10 strategies using NYSE data for the period between 1964 and 1997 and concluded that the outperformance of the strategy is explained by the overreaction hypothesis rather than the high dividend yields. A similar study could be conducted on the JSE to determine if the outperformance established in the Wolmarans (2001) study and this study could be explained by the overreaction hypothesis.

This study found, contrary to Wolmarans (2001), that the dividend yield strategies outperformed the earnings yield strategies and the possible reason given for that is the inclusion of the special dividends in the calculation of

dividend yields. A possible further study could investigate the impact of payment of special dividends on future share price performance.

This study was limited to studying of the performance of the various strategies based on companies in the INDI25. Further research could be undertaken to determine the performance of these strategies using data from other JSE indices.

The performances of South African Unit Trusts are generally reported over 6 months, 12 months, 3 years and 5 years holding period. This study only looked at the performance over a 12 months holding period. The performance of Dow investment strategies over 6 months, 3 years and 5 years holding periods could be researched further.

REFERENCES

Atkins, M. and Ward, M. (1996) The supply and demand effect of block transactions on share prices, *Investment Analysts Journal*, 43, p. 49 – 56.

Bailey, G. and Gilbert, E. (2007) The impact of liquidity on mean reversion of share returns of the JSE, *Investment Analysts Journal*, 66, p. 1 – 11.

Ball, R., Kothari, S. and Shanken, J. (1995) Problems in measuring portfolio performance: An application to contrarian investment strategies, *Journal of Financial Economics*, 38, p. 79 – 107.

Banz, R. and Breen, W. (1986) Sample-Dependent Results Using Accounting and Market Data: Some Evidence, *The Journal of Finance*, 41(4), p. 779 – 793.

Barberis, N. and Thaler, R. (2002) *A Survey of Behavioural Finance*, last accessed 27 July 2010, from <http://www.nber.org/papers/w9222>.

Bauer, B. and Gardner, T. (1999) *The Foolish Four: How to crush your mutual funds in 25 minutes a year*, The Motley Fool, Alexandria, Virginia.

Beale, J., Edwards, M., Firer, C., Hendrie, J., Scheppening, D. (2001) The persistence of performance of South African unit trusts, *South African Journal of Business Management*, 32(2), p. 1 – 7.

Bhana, N. (2005) The share price reaction to management buyout announcements of companies listed on the JSE Securities Exchange, *Investment Analysts Journal*, 62, p. 19 – 30.

Bhana, N. (1993) The relationship between growth in money supply and share prices: A test of the efficiency of the Johannesburg Stock Exchange, *Management Dynamics*, 2(2), p. 31– 42.

Bhana, N. (1995) The share market reaction to earnings announcements – a test of efficiency of the Johannesburg Stock Exchange, *Investment Analysts Journal*, 42, p. 47 – 57.

Black, F. and Scholes, M. (1974) The Effects of Dividend Yield and Dividend Policy on Common Stock Prices and Returns, *Journal of Financial Economics*, 1(1), p. 1 – 22.

Boudreaux, K. (1975) Competitive rates, market efficiency, and the economics of security analysis, *Financial Analysts Journal*, 31(2), p. 18 – 24 & 92.

Brazil, K., Lohfeld, L. And Sale, J. (2002) Revisiting the Quantitative-Qualitative Debate: Implications for Mixed-Methods Research, *Quality and Quantity*, 36, p. 43 – 53.

Capaul, C., Rowley, I. and Sharpe, W. (1993) International Value and Growth Stock Returns, *Financial Analysts Journal*, 49(1), p. 27 – 36.

Chan, L., Hamao, Y. and Lakonishok, J. (1991) Fundamentals and stock returns in Japan, *Journal of Finance*, 46(5), p. 1467 – 1789.

Chopra, N., Lakonishok, J. and Ritter, J. (1992) Measuring Abnormal Performance: Do Stocks Overreact?, *Journal of Financial Economics*, 31(2), p. 235 – 268.

Coleman, A. (1998, Last Update 28 October 1998) *Variations on variations: An analysis of returns over 25 years*, last accessed 25 July 2010, from <http://www.fool.com/ddow/1998/ddow981028.htm>

Creswell, J. (2003) *Research Design: Qualitative and Quantitative and Mixed Methods Approaches*, 2nd ed, SAGE Publications, Thousand Oaks, p. 18 – 23.

Cubbins, E., Eidne, M., Firer, C. and Gilbert, E. (2006) Mean reversion on the JSE Securities Exchange, *Investment Analysts Journal*, 63, p. 1 – 17.

Damant, D. (1986) The efficient market model and the stock markets, *The Investment Analyst*, 80, p. 23 -29.

De Bondt, W. and Thaler, R. (1985) Does the Stock Market Overreact?, *The Journal of Finance*, XL(3), p. 793-805.

De Bondt, W. and Thaler, R. (1987) Further evidence of investor overreaction and stock market seasonality, *Journal of Finance*, 42, p. 557 – 581.

De Wit, P. and Van Eyden, R. (1991) The use of certain technical analysis techniques to project a future share price on the Johannesburg stock Exchange: An attitudinal study, *South African Journal of Economic and Management Sciences*, 6, p. 87 – 105.

Domian, D., Louton, D. and Mossman, C. (1998) The rise and fall of the “Dogs of the Dow”, *Financial Services Review*, 7, p. 145 -159.

Dowd, K. (2000) Adjusting for risk: An improved Sharpe ratio, *International Review of Economics and Finance*, 9, p. 209 – 222.

Du Toit, G. (1986) *Technical Analysis and Market Efficiency on the Johannesburg Stock Exchange*, Unpublished Doctor of Commerce Thesis, University of South Africa, Pretoria.

Fama, E. (1970) Efficient Capital Markets: A Review of Theory and Empirical Work, *The Journal of Finance*, 25(2), p. 383-417.

Fama, E. and French, K. (1988) Dividend Yields and Expected Stock Returns, *Journal of Financial Economics*, 22(1), p. 3 – 26.

Fama, E. and French, K. (1992) The cross-section of expected stock returns, *Journal of Finance*, 42(2), p. 427 – 465.

Ferri, M. and Min, C. (1996) Evidence that the stock market overreacts and adjusts, *The Journal of Portfolio Management*, 23(3), p. 71 -76.

Filbeck, G. and Visscher, S. (1997) Dividend Yield Strategies in the British Stock Market, *European Journal of Finance*, 3(4), p. 277 – 289.

Filbeck, G. and Visscher, S. (2003) Dividend-Yield Strategies in the Canadian Stock Market, *Financial Analysts Journal*, 59(1), p. 99 – 103.

Firth, M. (1976) *Share prices and mergers: A study of stock market efficiency*, Saxon House/Lexington Books, Westmead, England.

Fraser, E. and Page, M. (2000) Value and momentum strategies: Evidence from the Johannesburg Exchange, *Investment Analyst Journal*, 51, p. 25 – 35.

Gardner, D. and Gardner, T. (1996) *The Motley Fool investment guide: How the fools beat Wall Street's wise men and how you can too*, Simon and Schuster, New York.

Gilbert, E. and Strugnell, D. (2008) Does Survivorship Bias really matter? An Empirical Investigation into its Effects on the Mean Reversion of Share Returns on the JSE Securities Exchange (1984 – 2006), *Stellenbosch Economic*

Working Papers, 19, p. 1 – 19, last accessed 24 July 2010, from <http://www.ekon.sun.ac.za/wpapers/2008/wp192008/wp-19-2008.pdf>

Graham, M. and Uliana, E. (2001) Evidence of a value-growth phenomenon on the Johannesburg Stock Exchange, *Investment Analysts Journal*, 53, p. 7 – 17.

Glass, R. and Smith, E. (1995) The relationship between changes in the money supply and changes in share prices: the semi-strong form efficiency of the Johannesburg Stock Exchange revisited, *South African Journal of Business Management*, 26, p. 131 – 140.

Goetzmann, W. and Jorion, P. (1993) Testing the Predictive Power of Dividend Yields, *Journal of Finance*, 48(2), p. 663 – 679.

Goetzmann, W. and Jorion, P. (1995) A Longer Look at Dividend Yields, *Journal of Business*, 68(4), p. 483 – 508.

Golafshani, N. (2003) Understanding Reliability and Validity in Qualitative Research, *The Qualitative Report*, 8(4), p. 597 – 607.

Grant, J. (1995) A Yield Effect in Common Stocks Returns, *Journal of Portfolio Management*, 21(2), p. 35 – 40.

Gumbola, M. and Liu, F. (1993) Dividend Yields and Stock Returns: Evidence of Time Variation between Bull and Bear Markets, *Journal of Financial Research*, 16(2), p. 139 – 150.

Hirschey, M. (2000) The “Dogs of the Dow” Myth, *Financial Review*, 35(2), p 1 – 16.

Hodrick, R. (1992) Dividend Yields and Expected Stock Returns: Alternative Procedures for Inference and Measurement, *Review of Financial Studies*, 5(3), p. 357 – 386.

Hoepfl, M. (1997) Choosing qualitative research: A premier for technology education researchers, *Journal of Technology Education*, 9(1), p. 47 – 63.

Jefferis, K. and Okeahalam, C. (1999) An Event Study of the Botswana, Zimbabwe and Johannesburg Stock Exchanges, *South African Journal of Business Management*, 30(4), p. 131 – 140.

Jefferis, K. and Smith, G. (2004) Capitalisation and Weak-form Efficiency in the JSE Securities Exchange, *South African Journal of Economics*, 72(4), p. 684 – 707.

Jefferis, K. and Smith, G. (2005) The Changing Efficiency of African Stock Markets, *South African Journal of Economics*, 73(1), p. 54 – 67

Johnson and Onwuegbuzie (2004) Mixed Method Research: A Research Paradigm Whose Time Has Come, *Educational Researcher*, 33(7), p. 14 26.

Kahneman, D. and Tversky, A. (1982) 'Intuitive Predictions: Biases and Corrective Procedures', In Kahneman, D., Slovic, P. and Tversky, A. (eds.) *Judgement Under Uncertainty: Heuristics and Biases*, Cambridge University Press, Cambridge, p. 414 – 421.

Keller, G. (2008) *Managerial Statistics*, 8th ed, SOUTH-WESTERN CENGAGE Learning, Manson, Ohio.

Keppler, A. (1991) The Importance of Dividend Yields in Country Selection, *Journal of Portfolio Management*, 17(2), p. 24 – 29.

Klerck, W. (1986) Forecasting Share Prices on the Johannesburg Stock Exchange Using Multivariate Time Series Analysis, *Investment Analysts Journal*, 28, p. 27 – 33.

Klerck, W. and Maritz, A. (1997) A test of Graham's stock selection criteria on industrial shares traded on the JSE, *Investment Analysts Journal*, 45, p. 25 – 33.

Knight, R. and Affleck-Graves, J. (1983) The Efficient Market Hypothesis and a Change to LIFO: An Empirical Study on the JSE, *Investment Analysts Journal*, 21, June: 21 –23.

Knight, R. and Affleck-Graves, J. (1985) An Empirical Evaluation of the Effectiveness of South African Investment Analysts, *South African Journal of Business Management*, 16(4), p. 157 –160.

Knowles and Petty (1992) *The Dividend Investor*, Probus, Chicago, Illinois.

Le Saout, E. (2006) Dividend-Yield Strategies in the European Stock Market, *Euro-Mediterranean Economics and Finance Review*, 1(4), p. 127 – 137.

Leedy, P. (1989) *Practical Research Planning and Design*, 4th ed, Macmillian, New York.

Lovell-Greene, N., Affleck-Graves, J. and Money, A. (1986) A survey of investment appraisal methods used by financial analysts in South Africa, *The Investment Analysts Journal*, November, p. 7 – 19.

Magnusson, M. and Wydick, B. (2002) How Efficient are Africa's Emerging Stock Markets?, *The Journal of Development Studies*, 38(4), p. 141 – 156.

McQueen, G., Shields, K. and Thorley, S. (1997) Does the "Dow-10 Investment Strategy" Beat the Dow Statistically and Economically?, *Financial Analysts Journal*, July/August, p. 66 – 71.

Mordant, N. and Muller, C. (2003) Profitability if directors' share dealings on the JSE, *Investment Analysts Journal*, 57, p. 17 – 28.

Muller, C. (1999) Investor overreaction on the Johannesburg Stock Exchange, *Investment Analysts Journal*, 49, p. 5 – 17.

Muller, C. and Scher, N. (2005) Equity style and performance persistence in South African unit trusts, *Investment Analysts Journal*, 61, p. 5 – 14.

O'Higgins, M. and Downes, J. (1992) *Beating the Dow*, Harper Perennial, New York.

Page, M. and Way, C. (1993) Stock market overreaction: The South African evidence, *Investment Analysts Journal*, 36, p. 35 – 49.

Rea, R. (1977) Remembering Benjamin Graham – teacher and friend, *The Journal of Portfolio Management*, , p. 66 – 72.

Reilly, F. and Brown, K. (2006) *Investment Analysis and Portfolio Management*, 8th ed., Thomson Higher Education, Mason, Ohio.

Rosenberg, B., Reid, K. and Lanstein, R. (1985) Persuasive evidence of market inefficiency, *Journal of Portfolio Management*, 11, p. 9 – 17.

Serfontein, B. (2007) *Abnormal Returns Following Earnings Announcements on the JSE Securities Exchange*, Unpublished MBA Research Report, University of the Witwatersrand, Johannesburg.

Sewell, M. (2007) *Behavioural Finance*, last accessed 27 July 2010, from <http://www.behaviouralfinance.net/behavioural-finance.pdf>.

Shiller, R. (2003) From Efficient Markets Theory to Behavioural Finance, *The Journal of Economic Perspectives*, 17(1), p. 83-104.

Smith, G., Jefferis, K. and Ryoo, H-J. (2002) African stock markets: multiple variance ratio tests of random walks, *Applied Financial Economics*, 12(7), p. 475 – 484.

Smit, E. and von Wielligh, J. (2000) Persistence in the performance of South African unit trusts, *South African Journal of Management*, 31(3), p. 120 – 129.

Stracca, L. (2004) Behavioural finance and asset prices: Where do we stand?, *Journal of Economic Psychology*, 25, p. 373-405.

Subrahmanyam, A. (2007) Behavioural Finance: A Review and Synthesis, *European Financial Management*, 14(1), p. 12-29.

Thompson, A. (1994) *The Johannesburg Stock Exchange as an Efficient Market: A Review*, Unpublished MBA Research Report, University of the Witwatersrand, Johannesburg.

Trochim (2006, Last Updated 20 October 2006) *Internal Validity*, last accessed 29 July 2010, from <http://www.socialresearchmethods.net/kb/intval.php>.

Wolmarans, H. (2001) Can the small investor beat the market by 'Dow investing'?, *Investment Analyst Journal*, 53, p. 41 – 51.

Wood, A. (2006) *A Review of the Efficiency of the JSE Securities Exchange*, Unpublished MBA Research Report, University of the Witwatersrand, Johannesburg.

APPENDIX A

Annual Average Returns of the Dow Dividend Yield Strategies

Strategy	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	S. AVE	SD
INDEX	57.04%	-26.32%	-3.37%	2.87%	26.48%	53.07%	30.06%	37.47%	15.28%	-19.21%	33.82%	18.84%	27.63%
HY10	80.95%	-13.70%	31.80%	19.84%	20.78%	64.61%	20.55%	35.14%	9.45%	-17.06%	25.66%	25.27%	29.02%
HY5	70.13%	-10.17%	54.38%	16.91%	18.88%	79.23%	11.25%	41.26%	6.79%	-25.15%	17.96%	25.59%	32.44%
BTD5	85.45%	-26.20%	41.88%	16.06%	14.11%	59.14%	17.43%	37.25%	-0.41%	-19.81%	31.19%	23.28%	32.85%
BTD4	111.22%	-26.28%	23.96%	10.33%	11.87%	58.33%	14.44%	38.77%	-1.38%	-16.39%	40.39%	24.11%	38.08%
PPP	111.72%	-37.60%	56.33%	28.26%	38.83%	41.06%	12.95%	34.24%	17.84%	-23.15%	26.98%	27.95%	49.63%
OFF	111.32%	-28.55%	30.43%	13.92%	17.26%	54.87%	14.14%	37.86%	2.47%	-17.74%	37.70%	24.88%	37.69%
FF	111.22%	-27.08%	40.58%	24.79%	23.59%	41.42%	22.11%	30.31%	1.76%	-14.61%	40.39%	26.77%	36.07%
F4+	108.00%	-28.63%	55.37%	27.73%	26.04%	44.86%	21.80%	31.11%	4.72%	-19.18%	46.49%	28.94%	37.14%
UV2	101.55%	-31.73%	84.96%	33.61%	30.95%	51.74%	21.18%	32.72%	10.64%	-28.31%	58.70%	33.27%	41.23%
RP2	11.02%	-11.91%	62.10%	53.45%	56.64%	44.61%	15.57%	52.73%	10.83%	-45.94%	10.69%	23.62%	33.77%
RP4	68.45%	-11.03%	10.13%	37.06%	47.03%	55.71%	26.82%	50.42%	8.15%	-36.57%	40.00%	26.92%	31.45%
RP4+	49.31%	-11.32%	27.45%	42.52%	50.23%	52.01%	23.07%	51.19%	9.04%	-39.70%	30.23%	25.82%	29.56%
RP5	73.04%	-25.68%	17.52%	35.30%	40.91%	56.45%	27.06%	43.50%	10.09%	-34.20%	35.43%	25.40%	32.34%

APPENDIX B

Annual Average Returns of the Dow Earnings Yield Strategies

Strategy	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	AVERAGE	STD DEV
INDEX	57.04%	-26.32%	-3.37%	2.87%	26.48%	53.07%	30.06%	37.47%	15.28%	-19.21%	33.82%	18.84%	27.63%
HY10	61.91%	-21.03%	23.65%	13.54%	20.33%	55.52%	31.31%	40.11%	1.51%	-16.38%	26.31%	21.53%	26.40%
HY5	108.15%	-13.22%	47.32%	10.89%	15.23%	71.04%	26.66%	34.13%	11.16%	-25.34%	29.75%	28.71%	37.38%
BTD5	88.01%	-38.78%	28.87%	22.21%	22.47%	53.81%	26.66%	49.24%	-7.96%	-28.38%	33.23%	22.67%	36.65%
BTD4	78.88%	-42.01%	7.68%	23.58%	26.80%	66.37%	30.69%	39.74%	-10.82%	-27.42%	23.97%	19.77%	36.59%
PPP	-17.65%	-57.93%	56.33%	-17.86%	66.88%	67.58%	55.46%	15.90%	-19.92%	-33.47%	39.88%	14.11%	45.22%
OFF	59.57%	-45.19%	17.41%	15.29%	34.82%	66.62%	35.65%	34.97%	-12.64%	-28.63%	27.15%	18.64%	34.88%
FF	78.88%	-39.30%	35.50%	25.93%	23.97%	66.37%	30.69%	45.29%	-7.68%	-20.87%	23.97%	23.89%	35.31%
F4+	64.87%	-40.17%	51.99%	17.10%	27.99%	62.36%	38.99%	47.39%	-7.86%	-24.86%	28.39%	24.20%	35.07%
UV2	36.87%	-41.89%	84.96%	-0.56%	36.02%	54.32%	55.57%	51.57%	-8.23%	-32.85%	37.24%	24.82%	40.11%
RP2	42.04%	-36.93%	-14.84%	10.55%	39.37%	22.31%	32.07%	41.63%	10.83%	-29.09%	37.24%	14.11%	29.04%
RP4	71.80%	-17.07%	3.74%	27.75%	40.28%	59.27%	35.07%	38.01%	-1.29%	-21.67%	22.37%	23.48%	29.91%
RP4+	61.88%	-23.69%	-2.45%	22.02%	39.98%	46.95%	34.07%	39.22%	2.75%	-24.14%	27.32%	20.35%	28.57%
RP5	91.77%	-18.74%	-4.71%	23.81%	36.84%	52.78%	31.70%	36.65%	2.54%	-29.02%	18.71%	22.03%	34.22%

APPENDIX C

INDI25 Constituent Companies

1999		2000		2001	
CODE	NAME	CODE	NAME	CODE	NAME
AMI	Anglo Am Ind Corp Ld Ord	BAR	Barlow Ltd Ord	BAW	Barloworld Ltd
BAR	Barlow Ltd Ord	BVT	Bidvest Ltd Ord	BVT	Bidvest Ltd Ord
BVT	Bidvest Ltd Ord	CGS	C.g.smith Ltd	CPX	Comparex Holdings Ltd
CGS	C.g.smith Ltd	CPX	Comparex Holdings Ltd	DDT	Dimension Data Hldgs Plc
CPX	Comparex Holdings Ltd	DDT	Dimension Data Hlds Ltd	DTC	Datatec Ltd
DDT	Dimension Data Hlds Ltd	DTC	Datatec Ltd	ECO	Edgars Cons Stores Ltd
DTC	Datatec Ltd	EDC	Education Inv Corp Ltd	IPL	Imperial Holdings Ltd
IPL	Imperial Holdings Ltd	IPL	Imperial Holdings Ltd	JDG	Jd Group Ltd
ISC	Iscor Ltd	JDG	Jd Group Ltd	JNC	Johnnic Holdings Ltd
JDG	Jd Group Ltd	MCE	M-cell Ltd	MCE	M-cell Ltd
JNC	Johnnies Industrial Corp	MTC	Metro Cash & Carry Ltd	MHH	Mih Holdings Ltd
LON	Lonrho P L C	NPK	Nampak Ltd Ord	MTC	Metro Cash & Carry Ltd
NAN	New Africa Investmnt -n-	NPN	Naspers Ltd -n-	NCL	New Clicks Hldgs Ltd
NPK	Nampak Ltd Ord	PEP	Pepkor Ltd Ord	NPK	Nampak Ltd Ord
NPN	Naspers Ltd -n-	PON	Profurn Ltd	NPN	Naspers Ltd -n-
PEP	Pepkor Ltd Ord	RBH	Rebhold Ltd	PEP	Pepkor Ltd Ord
RCH	Richemont Securities Dr	RCH	Richemont Securities Dr	PIK	Pik N Pay Stores Ltd
RMT	Rembrandt Group Ltd	RMT	Rembrandt Group Ltd	PON	Profurn Ltd
SAB	S A Breweries Ltd Ord	SAB	S A Breweries Plc	RBH	Rebhold Ltd
SAP	Sappi Ltd	SFT	Softline Ltd	RCH	Richemont Securities Dr
SFR	Safmarine & Rennies Ord	SPG	Super Group Ltd	REM	Remgro Ltd
SOL	Sasol Ltd	TIG	Tiger Oats Ltd	SAB	S A Breweries Plc
SPG	Super Group Ltd	TNT	Tongaat-hulett Group Ord	TBS	Tiger Brands Ltd Ord
TIG	Tiger Oats Ltd	WHL	Woolworths Holdings Ltd	TNT	Tongaat-hulett Group Ord
TNT	Tongaat-hulett Group Ord	WLN	Wooltru Ltd-n-	VNF	Venfin Ltd

2002		2003		2004	
CODE	NAME	CODE	NAME	CODE	NAME
AEG	Aveng Ltd	ABI	Amalgamated Beverage Industries	ABI	AMALGAMATED BEVERAGE IND
AVI	Anglovaal Industries Ord	AFX	African Oxygen	AFX	AFRICAN OXYGEN LTD ORD
BAW	Barloworld Ltd	AVI	Anglovaal Inds.	AVI	AVI LTD
BVT	Bidvest Ltd Ord	BAW	Barloworld	BAW	BARLOWORLD LTD
CPX	Comparex Holdings Ltd	BVT	Bidvest Group	BVT	BIDVEST LTD ORD
DDT	Dimension Data Hldgs Plc	DDT	Dimension Data Holdings	DDT	DIMENSION DATA HLDGS PLC
IPL	Imperial Holdings Ltd	IPL	Imperial Holdings	ECO	EDGARS CONS STORES LTD
JDG	Jd Group Ltd	ISC	ISCOR	IPL	IMPERIAL HOLDINGS LTD
JNC	Johnnic Holdings Ltd	JNC	Johnnic Holding Limited	ISC	ISCOR LTD
MCE	M-cell Ltd	MTC	Metro Cash & Carry	JDG	JD GROUP LTD
NAN	New Africa Investmnt-n-	MTN	MTN Group	MSM	MASSMART HOLDINGS LTD
NPK	Nampak Ltd Ord	MUR	Murray & Roberts	MTN	MTN GROUP LTD
NPN	Naspers Ltd -n-	NPK	Nampak	NPK	NAMPAK LTD ORD
PIK	Pik N Pay Stores Ltd	NTC	Network Healthcare Holdings	NPN	NASPERS LTD -N-
RCH	Richemont Securities Dr	PIK	Pick N Pay Stores	NTC	NETWORK HEALTHCARE HLDGS
REM	Remgro Ltd	PPC	Pretoria Portland Cement	PIK	PIK N PAY STORES LTD
RLO	Reunert Ord	RCH	Compagnie Financiere Richemont AG	PPC	PRETORIA PORT CEMNT
SAB	S A Breweries Plc	RLO	Reunert	RCH	RICHEMONT SECURITIES DR
SHF	Steinhoff Interntl Hldgs	SAB	SABMiller	SAB	SABMILLER PLC
SHP	Shoprite Hldgs Ltd Ord	SAP	Sappi	SAP	SAPPI LTD
SPG	Super Group Ltd	SHF	Steinhoff International Holdings	SHF	STEINHOFF INTERNTL HLDGS
TBS	Tiger Brands Ltd Ord	SHP	Shoprite	SHP	SHOPRITE HLDGS LTD ORD
TNT	Tongaathulett Group Ord	TBS	Tiger Brands	TBS	TIGER BRANDS LTD ORD
VNF	Venfin Ltd	TNT	Tongaathulett Group	TKG	TELKOM SA LTD
WHL	Woolworths Holdings Ltd	WHL	Woolworths Holdings	WHL	WOOLWORTHS HOLDINGS LTD

2005		2006		2007	
CODE	NAME	CODE	NAME	CODE	NAME
AFX	AFRICAN OXYGEN LTD ORD	APN	ASPEN PHARMACARE HLDGS.	BAW	BARLOWORLD LTD
AVI	AVI LTD	BAW	BARLOWORLD LTD	BVT	BIDVEST LTD ORD
BAW	BARLOWORLD LTD	BVT	BIDVEST LTD ORD	ECO	EDGARS CONS STORES LTD
BVT	BIDVEST LTD ORD	ECO	EDGARS CONS STORES LTD	IPL	IMPERIAL HOLDINGS LTD
ECO	EDGARS CONS STORES LTD	FOS	FOSCHINI LTD ORD	JDG	JD GROUP LTD
FOS	FOSCHINI LTD ORD	IPL	IMPERIAL HOLDINGS LTD	MLA	MITTAL STEEL SA LTD
IIS	ISPAT ISCOR LTD	JDG	JD GROUP LTD	MTN	MTN GROUP LTD
IPL	IMPERIAL HOLDINGS LTD	MLA	MITTAL STEEL SA LTD	MUR	MURRAY AND ROBERTS H ORD
JDG	JD GROUP LTD	MSM	MASSMART HOLDINGS LTD	NPK	NAMPAK LTD ORD
MSM	MASSMART HOLDINGS LTD	MTN	MTN GROUP LTD	NPN	NASPERS LTD -N-
MTN	MTN GROUP LTD	NPK	NAMPAK LTD ORD	NTC	NETWORK HEALTHCARE HLDGS
NPK	NAMPAK LTD ORD	NPN	NASPERS LTD -N-	PIK	PIK N PAY STORES LTD
NPN	NASPERS LTD -N-	NTC	NETWORK HEALTHCARE HLDGS	PPC	PRETORIA PORT CEMNT
NTC	NETWORK HEALTHCARE HLDGS	PIK	PIK N PAY STORES LTD	RCH	RICHEMONT SECURITIES DR
PIK	PIK N PAY STORES LTD	PPC	PRETORIA PORT CEMNT	REM	REMGRO LTD
PPC	PRETORIA PORT CEMNT	RCH	RICHEMONT SECURITIES DR	RLO	REUNERT ORD
RCH	RICHEMONT SECURITIES DR	RLO	REUNERT ORD	SAB	SABMILLER PLC
SAB	SABMILLER PLC	SAB	SABMILLER PLC	SAP	SAPPI LTD
SAP	SAPPI LTD	SAP	SAPPI LTD	SHF	STEINHOFF INTERNTL HLDGS
SHF	STEINHOFF INTERNTL HLDGS	SHF	STEINHOFF INTERNTL HLDGS	SHP	SHOPRITE HLDGS LTD ORD
SHP	SHOPRITE HLDGS LTD ORD	SHP	SHOPRITE HLDGS LTD ORD	SUI	SUN INTERNATIONAL LTD
TBS	TIGER BRANDS LTD ORD	TBS	TIGER BRANDS LTD ORD	TBS	TIGER BRANDS LTD ORD
TKG	TELKOM SA LTD	TKG	TELKOM SA LTD	TKG	TELKOM SA LTD
TRU	TRUWORTHS INTERNATIONAL	TRU	TRUWORTHS INTERNATIONAL	TRU	TRUWORTHS INTERNATIONAL
WHL	WOOLWORTHS HOLDINGS LTD	WHL	WOOLWORTHS HOLDINGS LTD	WHL	WOOLWORTHS HOLDINGS LTD

2008		2009	
CODE	NAME	CODE	NAME
ACL	ARCELORMITTAL SA LTD	ACL	ARCELORMITTAL SA LTD
AEG	Aveng Ltd	AEG	AVENG LTD
APN	Aspen Pharmacare Hldgs.	APN	ASPEN PHARMACARE HLDGS.
BAW	Barloworld Ltd	BVT	BIDVEST LTD ORD
BVT	Bidvest Ltd Ord	CFR	COMPAGNIE FIN RICHEMONT
IPL	Imperial Holdings Ltd	FOS	FOSCHINI LTD ORD
MND	MONDI LIMITED	IPL	IMPERIAL HOLDINGS LTD
MSM	Massmart Holdings Ltd	MDC	MEDI-CLINIC CORP LTD ORD
MTN	Mtn Group Ltd	MND	MONDI LIMITED
MUR	Murray And Roberts H Ord	MSM	MASSMART HOLDINGS LTD
NPK	Nampak Ltd Ord	MTN	MTN GROUP LTD
NPN	Naspers Ltd -n-	MUR	MURRAY AND ROBERTS H ORD
NTC	Network Healthcare Hldgs	NPN	NASPERS LTD -N-
PIK	Pik N Pay Stores Ltd	NTC	NETCARE LIMITED
PPC	PRETORIA PORT CEMNT	PIK	PIK N PAY STORES LTD
RCH	Richemont Securities Dr	PPC	PRETORIA PORT CEMNT
REM	REMGRO LTD	REM	REMGRO LTD
RLO	Reunert Ord	SAB	SABMILLER PLC
SAB	Sabmiller Plc	SAP	SAPPI LTD
SAP	Sappi Ltd	SHF	STEINHOFF INTERNTL HLDGS
SHF	Steinhoff Interntl Hldgs	SHP	SHOPRITE HLDGS LTD ORD
SHP	Shoprite Hldgs Ltd Ord	TBS	TIGER BRANDS LTD ORD
SUI	SUN INTERNATIONAL LTD	TKG	TELKOM SA LTD
TBS	Tiger Brands Ltd Ord	TRU	TRUWORTHS INTERNATIONAL
TKG	Telkom Sa Ltd	WHL	WOOLWORTHS HOLDINGS LTD

2010		2011		2012	
CODE	NAME	CODE	NAME	CODE	NAME
ACL	ARCELORMITTAL SA LTD	ACL	ARCELORMITTAL SA LTD	ACL	ARCELORMITTAL SA LTD
AEG	AVENG LTD	AEG	AVENG LTD	APN	ASPEN PHARMACARE HLDGS
APN	ASPEN PHARMACARE HLDGS	APN	ASPEN PHARMACARE HLDGS	BTI	BRITISH AM. TOBACCO PLC
BVT	BIDVEST LTD ORD	BVT	BIDVEST LTD ORD	BVT	BIDVEST LTD ORD
CFR	COMPAGNIE FIN RICHEMONT	CFR	COMPAGNIE FIN RICHEMONT	CFR	COMPAGNIE FIN RICHEMONT
IPL	IMPERIAL HOLDINGS LTD	IPL	IMPERIAL HOLDINGS LTD	IPL	IMPERIAL HOLDINGS LTD
KIO	KUMBA IRON ORE LTD	KIO	KUMBA IRON ORE LTD	KIO	KUMBA IRON ORE LTD
MDC	MEDI-CLINIC CORP LTD ORD	MNP	MONDI PLC	LHC	LIFE HEALTHCARE GRP HLDG LTD
MNP	MONDI PLC	MSM	MASSMART HOLDINGS LTD	MDC	MEDI-CLINIC CORP LTD ORD
MSM	MASSMART HOLDINGS LTD	MTN	MTN GROUP LTD	MNP	MONDI PLC
MTN	MTN GROUP LTD	NPN	NASPERS LTD -N-	MPC	MR PRICE GROUP LTD ORD
MUR	MURRAY AND ROBERTS H ORD	NTC	NETCARE LIMITED	MSM	MASSMART HOLDINGS LTD
NPN	NASPERS LTD -N-	PIK	PIK N PAY STORES LTD	MTN	MTN GROUP LTD
NTC	NETCARE LIMITED	PPC	PRETORIA PORT CEMENT	NPN	NASPERS LTD -N-
PIK	PIK N PAY STORES LTD	REM	REMGRO LTD	NTC	NETCARE LIMITED
PPC	PRETORIA PORT CEMENT	SAB	SABMILLER PLC	PIK	PIK N PAY STORES LTD
REM	REMGRO LTD	SAP	SAPPI LTD	REM	REMGRO LTD
SAB	SABMILLER PLC	SHF	STEINHOF INTERNTL HLDGS	SAB	SABMILLER PLC
SAP	SAPPI LTD	SHP	SHOPRITE HLDGS LTD ORD	SHF	STEINHOF INTERNTL HLDGS
SHF	STEINHOF INTERNTL HLDGS	TBS	TIGER BRANDS LTD ORD	SHP	SHOPRITE HLDGS LTD ORD
SHP	SHOPRITE HLDGS LTD ORD	TFG	THE FORSHINI GROUP LTD	TBS	TIGER BRANDS LTD ORD
TBS	TIGER BRANDS LTD ORD	TKG	TELKOM SA LTD	TFG	THE FORSHINI GROUP LTD
TKG	TELKOM SA LTD	TRU	TRUWORTHS INTERNATIONAL	TRU	TRUWORTHS INTERNATIONAL
TRU	TRUWORTHS INTERNATIONAL	VOD	VODACOM GROUP LTD	VOD	VODACOM GROUP LTD
VOD	VODACOM GROUP LTD	WHL	WOOLWORTHS HOLDINGS LTD	WHL	WOOLWORTHS HOLDINGS LTD

APPENDIX D

Consistency Matrix

Table 13: Consistency matrix

To compare the performance of the Dow investing strategies, using dividend yield and earnings yield as sorting parameters, against INDI25 of the JSE and also to compare the performance of the portfolios constructed using earnings yield as a sorting parameter against that of those constructed using dividend yield as a sorting parameter using data for the period starting January 1999 to December 2012.					
Sub-problem	Literature Review	Research questions	Source of data	Type of data	Analysis
Compare the performance of the Dow investing strategies, using dividend yield and earnings yield as sorting parameters, against the INDI25 of the JSE using data for the period starting January 1999 to December 2012.	Coleman (1998) Wolmarans (2001) Keller (2008)	How have the Dow strategies, based on the dividend yield and earnings yield, performed against the INDI25 over the period January 1999 to December 2012, both before and after adjusting for risk?	Share Prices and SENS data from McGrigor/BFA, Standard Bank Online Trading Platform and Profile's ShareData	Quantitative	Returns calculations, Significance of the difference in mean returns

To compare the performance of the Dow investing strategies, using dividend yield and earnings yield as sorting parameters, against INDI25 of the JSE and also to compare the performance of the portfolios constructed using earnings yield as a sorting parameter against that of those constructed using dividend yield as a sorting parameter using data for the period starting January 1999 to December 2012.

Sub-problem	Literature Review	Research questions	Source of data	Type of data	Analysis
Compare the performance of the portfolios constructed using earnings yield as a sorting parameter against that of those constructed using dividend yield as a sorting parameter using data for the period starting January 1999 to December 2012.	Coleman (1998) Wolmarans (2001) Keller (2008)	How have the Dow dividend yield strategies performed against the Dow earnings yield strategies on the JSE for the period January 1999 to December 2012?	Share Prices and SENS data from McGrigor/BFA, Standard Bank Online Trading Platform and Profile's ShareData	Quantitative	Returns calculations, Significance of the difference in mean returns