

**An empirical study into economic value added (EVA) as an  
indicator of share price in the South African context**

By

Nokuthula Noluthando Magwegwe

Submitted in partial fulfillment of the requirements for the degree of  
MASTER IN BUSINESS ADMINISTRATION

Graduate School of Business, Faculty of Management  
University of Natal (Durban)

Supervisor: Professor Elza Thomson

December 2003

## DECLARATION

This research has not been previously accepted for any degree and is not being currently submitted in candidature for any degree.

Signed..... *AMMagnegne* .....  
Date..... *9/6/2003* .....

STATEMENT

## **ABSTRACT**

This research was conducted to determine whether the intrinsic share values that are obtained using the EVA valuation model are an indicator of share prices as quoted on the JSE Securities Exchange. The research did not differentiate between companies that have implemented EVA in South Africa and those that have not.

The research was conducted by performing EVA intrinsic share price calculations for 43 companies listed on the JSE Securities Exchange. These EVA share prices were correlated to the actual share price as quoted on the JSE Securities Exchange, for the current and lagged periods of one and two years. The resultant correlation coefficients were tested for significance at the 5% level.

The results show that there is no statistically significant correlation between the EVA intrinsic share values and the share price as quoted on the JSE in both the same and lagged periods. Hence we cannot conclude that EVA is an indicator of share price.

# TABLE OF CONTENTS

CHAPTER ONE.....	7
INTRODUCTION.....	7
1.1 Introduction.....	7
1.2 The importance and motivation of the study.....	8
1.3 Problem statement.....	9
1.4 Research objectives.....	10
1.5 Limitations of the research.....	10
1.6 Structure of the research.....	10
1.7 Summary.....	11
CHAPTER TWO.....	12
2.1 Introduction.....	12
2.2 Financial Economic Theories.....	12
2.2.1 Capital Asset Pricing Model (CAPM).....	12
2.2.2 Weighted cost of capital employed, $c^*$ .....	13
2.3 Performance measures.....	13
2.3.1 The Traditional Accounting Performance Measure.....	15
2.3.2 Performance measures and the share price.....	17
2.4 Economic Value Added (EVA) the theory and related ideas.....	18
2.4.1 Methods for improving EVA.....	20
2.5 The South African perspective.....	21
2.6 EVA and Residual Income.....	21
2.7 Market Value Added (MVA).....	22
2.8 Empirical Evidence on EVA and MVA.....	24
2.9 Stock market theories.....	25
2.9.1 Random Walk Theory.....	26
2.9.2 Efficient market hypothesis.....	26
2.10 Limitations of EVA as a performance measure.....	27
2.10.1 Refined Economic Value Added (REVA).....	28
2.10.2 Effects of inflation on EVA.....	28
2.10.3 Single period measure.....	28
2.11 EVA and share prices.....	29
2.12 Advantages and disadvantages of EVA.....	30
2.12.1 EVA Advantages.....	30
2.12.2 EVA Disadvantages.....	31
2.13 The intrinsic value model.....	31
2.13 Summary.....	33
CHAPTER THREE.....	34
RESEARCH METHODOLOGY.....	34
3.1 Introduction.....	34
3.2 Research hypothesis.....	34
3.3 Research methodology.....	35
3.3.1 Research methodology selection.....	35
3.3.2 The Population.....	35
3.3.3 The Sampling method.....	35
3.3.4 Sampling bias.....	36
3.4 Sources of data.....	36
3.4.1 EVA intrinsic share value model.....	36
3.4.2 EVA valuation performance.....	37
3.5 Data analysis methods.....	38
3.5.1 Correlation Analysis.....	38
3.5.2 Student t-test.....	39
3.5.3 Reasons we chose the tests.....	39

3.5.4	<i>Software used</i> .....	40
CHAPTER FOUR.....		41
RESULTS.....		41
4.2	<i>Same period tests</i> .....	41
4.3	<i>Lagged period tests</i> .....	41
4.3.1	<i>One year lag</i> .....	42
4.3.2	<i>Two year lag</i> .....	42
4.4	<i>Summary</i> .....	43
CHAPTER FIVE.....		44
RESULTS INTERPRETATION.....		44
5.1	<i>Introduction</i> .....	44
5.2	<i>Correlations during the same period</i> .....	44
5.3	<i>Correlations during lagged periods</i> .....	45
5.4	<i>Factors that must be considered</i> .....	45
5.4.1	<i>Assumptions made</i> .....	45
5.4.2	<i>Economic and Socio-political conditions</i> .....	45
5.4.3	<i>The Stock Exchange</i> .....	46
5.4.4	<i>EVA specific issues</i> .....	46
5.5	<i>Summary</i> .....	46
CHAPTER SIX.....		47
CONCLUSION.....		47
6.1	<i>Research highlights</i> .....	47
6.1.1	<i>Correlation coefficients</i> .....	47
6.1.2	<i>The Stock Exchange Market Efficiency</i> .....	47
6.1.3	<i>The EVA values</i> .....	47
6.1.4	<i>The EVA intrinsic value model</i> .....	48
6.2	<i>Research objectives</i> .....	48
6.3	<i>Recommendations to companies</i> .....	49
6.4	<i>Suggestions for further research</i> .....	49
REFERENCES.....		51
BIBLIOGRAPHY.....		54
APPENDIX.....		1

# CHAPTER ONE

## INTRODUCTION

### 1.1 Introduction

It has been argued that the ultimate objective of a company is to maximise shareholders' wealth. Since the 1980's shareholders, particularly in North America and Europe, have increased pressure on companies to increase shareholders' wealth.

Although publicly held companies are owned by shareholders, the agents of the companies, senior managers make the operational and investment decisions that influence shareholder value added.

Shareholders need reliable performance measures that would adequately assess the value added by the senior managers. Ideally the performance measures would be used to correlate the remuneration of the senior managers of a company with improvement of shareholders' value. There are various traditional accounting based metrics such as return on equity (ROE), return on investment (ROI), the price earnings ratio (P/E ratio) and earnings per share (EPS) that are used as performance measures by investors and investment analysts.

However, these performance measures are believed to be limited as indicators of shareholder value added. Traditional performance measures do not take into account the cost of capital, and mostly are influenced by accounting reporting rules, which makes it difficult to use them for comparing companies that have different reporting structures. It has not been shown theoretically that these performance measures have a strong correlation with shareholder value creation.

The limitation of traditional performance measures has driven investors to look for alternatives, such as value based measures. Value based performance measures are so-called because the standard metrics seek to measure the periodic performance in terms of change in shareholder value. Therefore over a period Value based measures assess which firms maximised value, or maximised the long-term yield on shareholders' investment.

Stern Stewart developed the Economic Value Added (EVA) method of evaluating profitability of a firm that places an emphasis on cashflows rather than profit. EVA can be defined as the adjusted operating profit less the cost of all capital employed to

produce those profits. Accordingly this method involves making numerous adjustments to accounting profits in order to reduce accounting distortions.

The method is touted by its supporters, to be superior than traditional performance measures because it allows firms to incorporate cost of funds, and reduce the effects of accounting conventions and reporting rules. EVA starts from premise that cashflows are more important in indicating value than accounting profits. The internal rate of return that is generated by a project should be adequate to cover at least the weighted average cost of capital (WACC), otherwise undertaking a project that does not cover the cost of capital, would be destroying shareholders' value.

Further, Stern Stewart has proposed that the sum of discounted future EVA approximate Market Value Added (MVA), where MVA is defined as the difference between a firm's market value of debt and equity capital and the capital invested in the firm. This the result was assumed to be true when we used the intrinsic share value model to evaluate whether EVA is correlated to the share price of the firm as quoted on the JSE Securities Exchange.

## **1.2 The importance and motivation of the study**

South African companies are increasingly operating in a global environment. This requires that South African companies develop and adapt international standards in maximising shareholder value. Further the international globalisation of trade and capital markets has made South African companies competitors for capital. This presents South African managers of companies with a challenge of using appropriate performance measures. These managers are looking for performance measures that are closely related to their wealth creation abilities.

There have been numerous claims that were made about EVA, as an indicator of share price especially by the founders of Stern Stewart. Stern (1990) claims that "The theory of evidence all point to the same fundamental conclusion: increasing EVA should be adopted as the paramount objective of any company that professes to be concerned about maximizing its shareholders' wealth". In an article in the *Fortune* magazine (Tully, 1993), economic value added was described as "today's hottest financial idea". Many companies such as AT&T, Coca-Cola, Quaker Oats and Eli Lilly have utilised EVA as an essential measure of corporate performance (Kramer and Pushner, 1996). Despite EVA's popularity, there are inadequate empirical studies in corporate finance literature, which investigate the claims made by Stern Stewart.

Further the available EVA literature seems to be contradictory, making it difficult for company management to make conclusive decisions. In fact one of the key difficulties with the EVA literature is that the research conducted by players with a business interest in the success of EVA, has found glowing results on EVA. Yet when “independent” researchers followed scientifically sound methods of testing the databases that were used by EVA proponents, found opposing results. EVA detractors argue that it is indeed in the best interest of the EVA proponents with a commercial interest on the trademark to make positive findings about the performance measure and its abilities (Kramer and Pushner, 1997).

It is not clear whether EVA is relevant and/or applicable in the South African context. This research assumes there is no evidence presented that would impede the applicability of EVA in the South African context because the EVA concepts relates to a generic company with relevant financial data.

This study seeks to evaluate whether there is a relationship between EVA and the share price performance in the JSE Securities Exchange. The study describes the EVA theory, reviews literature that relates to the implementation of EVA, uses an intrinsic value model to test whether there is correlation between these intrinsic values to the share price of the company.

In the studies previously done in South Africa for example, Jeffreys (1996) and Wood (2000), the emphasis was on the examination of the implementation of EVA, its uses, benefits, limitations and relevance in the South African context and the accounting technicalities that are involved in the actual calculation of EVA. Jeffreys (1996) also investigated whether EVA is a better performance measure when compared to traditional measures. Van Wyk (2001) investigated whether there is a correlation between EVA and the share price of the top 200 firms in the JSE and she found that a positive correlation exists between intrinsic share values (based on the EVA valuation model) and the share prices as quoted on the JSE, when compared during the same period as well as in the subsequent period.

In this study we will use data on companies covering the period 1995 to 1999 to investigate whether the initial finding by van Wyk still holds.

### **1.3 Problem statement**

International academics and the international financial press have given EVA a lot of attention. Academic research has been conducted to test the claims that are made by Stern Stewart with regards to EVA being a better performance measure. The research

conducted on many dimensions such as the correlation between EVA and MVA, the correlation of both EVA and traditional methods with the share price of companies as quoted on the stock exchanges.

This study will investigate claims made by Stern Stewart that EVA has a better correlation with the share price than traditional accounting measures such as ROE in the South African context. We will:

- (1) investigate the correlation between the share price of a firm and the EVA. through the use of the EVA intrinsic share valuation model.

#### **1.4 Research objectives**

The objective of this research is to investigate whether there is a correlation between the EVA intrinsic values of the company shares and the actual share prices as listed on the JSE Securities Exchange, and therefore, whether EVA is an indicator of share price.

#### **1.5 Limitations of the research**

The study will be limited because of these factors:

- The sample is selected from the companies that are listed on the JSE Securities Exchange for the entire period of the study, as described in chapter 3 below. This method may create a bias because all small companies that are not listed in the Top 200 companies survey have been excluded, yet the research generalises its findings to the whole population, which are all the companies listed on the JSE Securities Exchange. Mitigating this limitation however is the fact that the sample is inclusive of broad sectors of the JSE.
- The research has made no distinction between companies that have implemented EVA and those that have not. There maybe a different correlation between companies that have implemented EVA from those that have not.
- There are other factors, variables or measures that may also be correlated to the share price. This research will not seek to investigate what they are, and to study these factors or compare them with EVA

#### **1.6 Structure of the research**

The first chapter contains the background to the research, the research problem and objectives, the importance and the motivation for the study and its limitations.

In the next chapter we will review current literature on the subject. This chapter will review the basic Economic Value Added (EVA) concepts and the key related theories,

and summarise research to date with a view to search for clues for the research problem.

Chapter 3 will describe the research methodology. The population, the sample, the sample selection procedures, data selection and collection methods, and the data analysis will be discussed.

The research results will be displayed in chapter four and chapter five will contain a detailed analysis and interpretation of these results.

In chapter 6 we will draw conclusions from the research and make suggestions for future research and suggestions to management of South African companies.

### **1.7 Summary**

In this chapter we have introduced the research topic and the problem that we trying to solve. In order to solve the problem statement, we will start by presented the current EVA literature.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

The literature review will start with economic theories that will lay a foundation in discussing performance measures in general. Different performance measures will then be discussed. A broad discussion of EVA will follow, starting with the basic theory followed by the EVA related concepts of residual income and Market Value Added (MVA). Stock market theories will be discussed as well as links of EVA to stock market prices.

#### 2.2 Financial Economic Theories

We will now discuss the financial economic indicators that are relevant to the EVA theory. We will start by discussing the Capital Asset Pricing Model (CAPM).

##### 2.2.1 Capital Asset Pricing Model (CAPM)

The CAPM shows that there is positive relationship between systematic risk as measured by a metric beta, and the return earned by an investor. An investor according to this model will not be compensated for unsystematic risk that he has not diversified away. He will only be compensated for the additional systematic risk that he undertakes. The CAPM therefore summarises the difficult concepts of market return into a simple linear relationship. The CAPM may be stated as:

$$R = R_f + \beta (R_m - R_f)$$

where R = the expected return

$R_m$  = market rate of return

$R_f$  = risk free rate

The expected stock return is therefore dependent on the following:

- The market risk premium ( $R_m - R_f$ )
- The beta or the systematic risk of the particular stock with the market
- Risk free rate, or the time value of money

In the South African research, Lyles (2000) investigated whether there were empirical anomalies to the CAPM on the JSE Securities Exchange between 1982-1999. He found that there were 17 anomalies, which is in line with international findings. Despite these shortcomings, as an academic model the simplicity of the CAPM makes it a “useful tool” and a readily available starting point for investment analysis.

### 2.2.2 Weighted cost of capital employed, $c^*$

The weighted average cost of capital employed is the combined cost of debt and equity as weighted by their proportion in the firm’s capital structure. The cost of debt reflects the long-term borrowing rate after adjusting for tax. The cost of equity  $K_e$  is assumed to follow the capital asset pricing model (CAPM). This model states that an investor will expect a rate of return equal to the short-term risk free rate,  $R_f$  plus a risk premium factor beta, denoted by  $\beta$ , which measures the business and financial risk associated with particular stock. Beta measures systematic risk that cannot be eliminated by holding a diversified portfolio. Hence

$$K_e = R_f + \beta(R_m - R_f)$$

Therefore

$$c^* = K_e \left[ \frac{E}{D + E} \right] + K_D (1 - T_c) \left[ \frac{D}{D + E} \right]$$

where

$R_m$  = the return on the market portfolio

D = total debt

E = total equity

$K_D$  = cost of debt

$T_c$  = corporate tax rate

### 2.3 Performance measures

The management of companies use performance measures in order to maximise their shareholder wealth creation. Further, shareholders and society at large need to ensure that all the resources that are available to companies are allocated, managed and redeployed

as efficiently as possible. As the result of efficient resource allocation and employment is maximisation of value to all stakeholders (namely the shareholders, the employees and the government). It is logical to argue that if management were offered compensation that is tied to shareholder wealth creation, they would have higher incentives to improve shareholders' wealth. Furthermore the shareholders' expected rate of return,  $E(R)$ , is captured by the CAPM model as discussed above. In fairly efficient markets, shareholders would be able to calculate the minimum return they expect from an investment. They would be seeking investments that will consistently return super normal profits that exceed the minimum expected return as stated by  $E(R)$ . Since the expected return just covers the systematic risk undertaken to achieve the return earned. This relationship is represented below as:

$$\alpha_{j,t} = R_{j,t} - E(R_{j,t})$$

Where,

$\alpha_{j,t}$  = the abnormal return of stock j at time t

$R_{j,t}$  = observed rate of return stock j at time t

$E(R_{j,t})$  = expected rate of return of stock j at time t

### **Trading-based performance measures**

It has been argued in the corporate finance literature that a company's share price itself represents a metric for shareholders' wealth creation (Jensen and Murphy (1990) and Milbourn (1996)). Both the appreciation of the stock price of company j,  $P_j$  at time t, and the dividends declared  $D_j$  during the period t, would represent by how much shareholders' wealth has changed from time t-1 to time t, as presented below:

$$R_{j,t} = D_{j,t} + \frac{(P_{j,t} - P_{j,t-1})}{P_{j,t-1}}$$

This share price method of calculating shareholders' wealth creation is known as the *trading-based* measure of performance. However the stock price is influence by many factors outside the control of the management of the company such as the prevailing

interest rates and country risk grading. In the short-term the trading-based method would be inappropriate.

If stock markets are efficient the trading-based performance should converge to the *operating performance* over time. Accordingly management performance must be measured its against the market using financial performance measures.

### **Operating performance measure**

Rappaport (1983, p36) states that for a performance measure to be successful, it needs to meet five criteria:

1. *Validity* of the measure, the performance measure should be consistent with the basic economic theory of value.
2. *Verifiability* of the measure, the data used in the calculations must be unambiguous and should not lend itself to be easily manipulated.
3. *Global comparability* of the measure in that it must offer direct comparison with other measures that are internal and external to the company.
4. *Communicable* easily and be understood and explained by the relevant people both inside and outside the company.
5. An individual must have reasonable *control* over the measure if it used as an appraisal tool.

Proponents of EVA claim that it meets all of the above requirements.

We will now take turns to discuss these criteria in greater detail, their implications for EVA, and how EVA compares with traditional accounting performance measures.

#### **2.3.1 The Traditional Accounting Performance Measure**

The traditional accounting performance measures are a summary of the accounting financial statements that are prepared to give financial information about a company. By their very nature, these performance measures come from readily available information.

The most common traditional accounting measures are:

- Earnings per share (EPS)
- Price Earnings ratio (P/E ratio)
- Return on Equity (ROE)
- Return on Assets (ROA)
- Return on Investment (ROI)

Earnings per share (EPS), is calculated by dividing the net profit after tax with the number of shares in issue. This measure gives shareholders a guideline of the value of their investment in the company.

EPS is widely used, understood and accepted by investment analysts, companies and shareholders as a performance measure. It is very easy to calculate and allows direct comparison of two companies. These features make EPS quite attractive.

However, a major drawback is that accounting conventions have a considerable influence on the EPS. Management can apply their discretion to get to the net profit after tax number. Therefore it fails test number two, verifiability.

The P/E ratio is calculated by dividing the share price with earnings per share. This results in a multiple that measures how much more investors are willing to pay for the share in the company. The interpretation of this multiple is often difficult, especially in the “new economy”. Traditional it used to be accepted that high P/E’s were indicative of a company that has high growth prospects. However the 1990’s saw the rise of many IT companies that were characterised by high P/E’s and were highly geared. By the late 1990’s analyst questioned the business models many of this companies were based on and downgraded them. Investors followed suit by dumping their stocks. to this day the telecommunications and computers sectors have not fully recovered, only a few players remain in the global market.

It is clear from the above discussion that this performance measure also fails the verifiability test as it based on earnings.

ROA is calculated by dividing net operating profit before interest and tax with total assets. It measures the profitability of the assets invested in a company.

ROE is another profitability measure, which measures the return on total equity employed by the company. It is calculated by dividing net profit after tax by the total shareholders’ equity.

Both ROA and ROE fail the validity and verifiability tests because they can be influenced by the management of the company by selecting projects that are biased towards high return. Further, the accounting conventions allow for a certain degree of discretion in calculating the numerator, thus they can be distorted.

ROI is a measure of a company's profitability, equal to a fiscal year's income divided by common stock and preferred stock equity plus long-term debt. ROI measures how effectively the firm uses its capital to generate profit; the higher the ROI, the better. The ROI also fails the validity and verifiability tests for reasons similar to ROA and ROE limitations.

Perhaps the most scathing attack traditional measures was by Clark (1989) stating, "Even a carefully selected combination of commonly used financial indicators is an imperfect proxy for wealth creation".

Rappaport (1986, p20) summarises that the accounting based performance measures are fail the five criteria since:

- They exclude risk;
- The investment requirements are excluded;
- They ignore the time value of money;
- The accounting framework allows for the adoption of alternative accounting methods.

The failure of traditional accounting based measures makes a strong case for the implementation of value based performance measures.

### **2.3.2 Performance measures and the share price**

The problem statement in this research states that we are investigating the correlation between the share prices of companies and the intrinsic share values using the EVA valuation model. Can performance measures such EVA be an indicator of wealth creating abilities of a company? How would you describe wealth creation? It is intuitive to think that shareholder wealth is created when a company's share price increases from the purchase price. However our discussions on the trading-based performance measure above points to several flaws of this method even though it links directly to the share price.

The question then becomes has it been shown whether the traditional accounting or value based performance measures are correlated to the share prices, are an indicator of share prices. If they are what is the time that we expect the effects of any changes in the performance measures to be reflected in the share prices.

The literature on accounting performance measures furnishes no evidence of agreement amongst researchers on which is the best measure that is an indicator of share prices and when does the effects of the measure reflect in the share prices. Some researchers such as Sloan (1996) argue that it is not only the performance measures that have an impact on the share prices but there is other information such as announcements on restructuring, changes in management, and new projects. However the focus of investment analysts, investors and management of companies have been on the earnings information only to the exclusion of information on cashflows. This is supported by the findings of Kramer and Pushner (1997) that information with regards to cashflows is ignored, however that is because earnings are more readily available to the market.

There is also a tendency amongst company management to make a choice of a performance measure based only on the correlation of the measure against share price on a year-on-year basis. Zimmerman (1997) cautions against the use of year-on-year share prices since the share prices in efficient markets are forward looking by nature. They incorporate the expectations about the future performance of a company and the macro-economic outlook of investors. Hence he found that traditional accounting measures could only explain 10% of the share price changes over a year, improving to 33% over five years, and 60% over ten years.

Ferguson and Leistikow (1998) also stated that there was no reason to expect an appropriate measure of one period's operating performance to be significantly correlated to the same period's abnormal returns.

When Kramer and Pushner (1997) conducted research on effects of the changes in EVA on MVA they found that in the short term the market does not react favourably to changes in EVA.

#### **2.4 Economic Value Added (EVA) the theory and related ideas**

Economic Value Added (EVA) is a financial performance metric developed by Stern Stewart. There are two but equivalent methods of calculating EVA, namely the residual and the spread methods. We will first discuss the "residual method", where EVA is measured as:

Net Operating Profit After Tax (NOPAT) – Cost of Capital (WACC) x Total Invested Capital

We will now state the “spread method”. The economic book value of capital is multiplied by the spread between the rate of return and the weighted average cost of capital, as shown below.

$$EVA = (r - c^*) \times \text{capital}$$

where  $r$  is the rate of return, calculated as  $r = \frac{NOPAT}{\text{capital}}$

$c^*$  is the weighted average cost of capital (WACC)

Stern (1991) defines the EVA components of NOPAT and Total Invested Capital or plainly Capital in the following manner.

**NOPAT** is a company’s operating profit before extraordinary income, and reflects only the cash taxes paid and excludes financing expenses. The only non-cash item reflected in NOPAT is depreciation, which is considered an economic charge.

**Total Invested Capital** is the combined cash deposits that have been made into the company irrespective of the financing form. It is the book value of ordinary and preferred equity, equity equivalents, minority interests and total debt. Goodwill and other tangibles are not subtracted from ordinary equity.

Therefore both the NOPAT and the total invested capital prior to their use are adjusted to reflect the cash return earned and the true capital base on which returns are generated. Stern Stewart calls for these adjustments to remove the effects of “sunk costs”, which are the apparent cause of accounting distortions. The basic theme of the EVA model is that in order to create wealth, management need to deliver returns that are higher than the cost of funds. An example of NOPAT and capital adjustments is as shown in Table 1 below, as adapted from Stewart (1991) and Green (1995):

	<b>NOPAT</b>	<b>Capital</b>
Start with	Income available to ordinary shareholders	Ordinary shareholders' equity
Add	Interest expense after tax	All debt
Add	Preference share dividends	Preference share capital
Add	Minority shareholders' share of profits	Minority shareholders' interest
Add	Increase in equity equivalents	Equity equivalents

Stewart (1994) states that these adjustments to accounting information should not be made indiscriminately. He further lists the criteria that need to be used in deciding whether an adjustment to NOPAT or capital should be made. He argues whether an adjustment should be made depends on whether:

- The adjustment is likely to have a material impact on EVA;
- The information required for the adjustment is relatively easy to obtain;
- The adjustment and the reason thereof, would be understood by the operations people;
- Management can influence the outcome.

Bennett Stewart, a founding member of Stern Stewart, describes EVA in his book *Quest for Value*, as: 1) “operating profit less the cost of all capital employed to produce those earnings”, 2) “the only measure to tie directly to intrinsic market value”.

#### **2.4.1 Methods for improving EVA**

Although there are innumerable individual operational components that can create shareholder value and increase EVA, often EVA does not on its own help find ways of improving operational efficiency. Neither does EVA directly assist in finding strategic advantages that will allow a company to earn abnormal returns that are consistently higher than expected rate of return. It is still useful to understand the four methods of improving EVA.

1. If there is additional capital that is invested in new business projects earning a rate of return that is more than the weighted average cost of capital and higher than the current return.
2. Divesting from businesses that have failed to earn a rate of return that is higher than the weighted average cost of funds.

3. Improve the rate of return on the current capital base by generating more operating profits from the same capital base. This will increase the spread between  $r$  and  $c^*$ .
4. Restructuring the capital financing of the company in order to minimise the weighted average cost of capital. This decision involves the changing the debt equity mix, the type of debt, and the dividend policies.

## **2.5 The South African perspective**

EVA has had some acceptance from South African companies. In fact the Johannesburg Stern Stewart office was the second opened outside North America. Wood (2000) argues that the return of international stockbroking firms into South Africa in the early 1990's spurred more South African companies into the use of EVA. However there are very few South African stockbrokers who rank the performance of companies in relation to EVA. Analysts still prefer using traditional accounting based performance measures.

In South Africa previous research conducted on EVA has been contradictory. De Villiers and Auret (1998) when comparing the explanatory power of EPS and EVA in the share prices found that EPS had more power than EVA. However in an earlier study by Lee (1995) to determine whether EVA should be used as opposed to traditional accounting measures in measuring corporate performance, found that EVA was a marginally better performance measure than ROE and ROA. Jeffrey (1996) studied the influence of the implementation of EVA in the business performance of companies that have implemented EVA. His findings, although based on a small sample, suggests that the companies remained optimistic about the abilities of EVA as a performance measure if the tool was implemented correctly.

Also of concern is the applicability of CAPM, one of the EVA components, in the South Africa context. As we have discussed in the paragraph 2.2.1 above we found that the CAPM holds in the South African context when shares are actively traded. However for less traded stock we found that the application of the CAPM model could be problematic.

## **2.6 EVA and Residual Income**

The concept of economic profit is not new, as it based on the accounting concept of residual income. Residual income is defined as the operating profit minus the capital

charge. Thus to those familiar with residual income, EVA is a variation, which takes into account a few adjustments of how income and capital are defined.

It is believed that residual income can be traced to Alfred Marshall in 1890 (Wallace, 1997, p1). However Dodd & Chen (1996, p27) argue that residual income surfaced in 1917 in literature written by Church. It is puzzling then to many academics why the concept of EVA, which is a residual income variation, would be now so popular and recognised. Makelainen (1998, p9) suggests that EVA has been marketed with a concept of Market Value Added (MVA), and hence offered a theoretically sound link to market valuations. He also argues that the time of the launch of EVA, investors were demanding a focus on shareholder value issues, it made EVA a “good bite”.

EVA detractors who believe that EVA is just revised residual income can best be described by the words of the 19<sup>th</sup> century philosopher Mary Baker Eddy who said that “when the truth come the current scholars oppose it as being not true, and when it becomes widely accepted that they have always known it to be true”.

## 2.7 Market Value Added (MVA)

MVA is defined as the difference between market value of the firm and the book value of capital, i.e.

MVA = [(Ordinary shares outstanding x share price) + (market value of preference shares) + (market value of debt)] – book value of total capital

MVA is therefore a cumulative measure of wealth created by listed companies for their investors. If the total market value of the company exceeds the book value of capital, the company has created value for its shareholders. However if the opposite is true, then the company has destroyed value for its shareholders. MVA is therefore a forward looking measure as opposed to EVA, which is a backward looking measure.

Stern Stewart proposes that MVA is the sum of all discounted EVA as presented in the formula:

$$MVA_t = \sum_t \frac{EVA_t}{(1+r)^t} + e_t$$

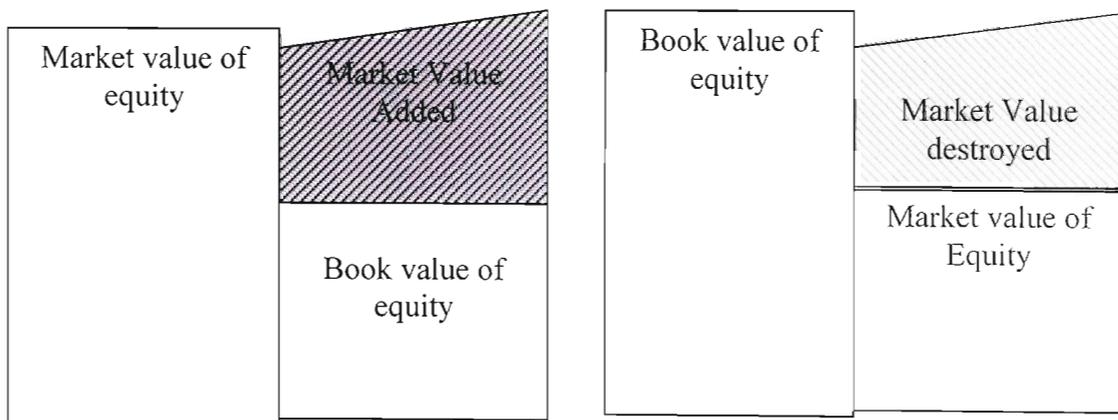
Specifically that MVA is the added value of all future EVA's discounted at the companies WACC, during a period of competitive advantage, and a special EVA at the end of the period of competitive advantage. EVA is expected to grow for a limited

period, which is known as the period of competitive advantage. The special EVA at the end of the competitive advantage is discounted by WACC less the assumed continuous growth rate, which generally accepted to be the inflation rate. Stewart argues that depending on numerous factors such as the socio-political situation in the country, micro factors that are company and industry specific, and the product life cycle of the company, the period of competitive advantage varies in period between zero and thirty years.

The MVA formula above implies that the market value of equity or the intrinsic value of the firm is equal to:

The current book value of equity plus the present value of all future  $EVA_t$ .

The MVA formulas above suggest that the current price of a company is not only determined by the book value of equity but is also dependent on how the firm will perform in the future. A company that it punted to have positive cumulative EVA, will trade at a premium of book value of equity. Similarly, a firm that is believed will have negative cumulative EVA, will possibly trade at a discount to book value of equity, and this will depend on the extent of the erosion of shareholder value. This is presented graphically in figure 1 below, as adapted from Makalainen (1998).



**Figure 1 MVA/EVA relationship**

## 2.8 Empirical Evidence on EVA and MVA

Stewart (1990) studied the relationship between EVA and MVA, based on a sample of 618 US companies. Stewart found that EVA and MVA, except where there is a negative EVA and negative MVA, were highly correlated.

Stern Stewart and Chen (1995) research suggests that EVA is a good predictor of MVA. They found  $R^2$  of the correlation of EVA and MVA at 60%. However the results were based on groupings of firms as opposed to individual firms.

Kramer and Pushner (1997) conducted research, which included all of the 1000 companies in the Stern Stewart database, known as SS1000, from 1982-1992. They performed at least squares regression on each firm (j) over each year (t) using the formula:

$$MVA_{j,t} = a + bEVA_{j,t} + e \quad (3)$$

They found that the formula yielded a positive and statistically significant (at the 0.01 level) coefficient of 2.28 and an adjusted  $R^2$  of 0.0993 for the whole sample. They repeated these test on NOPAT and found that NOPAT was also positively correlated with MVA but interestingly, NOPAT explained the total variation in the MVA better than EVA. These results were true for both current and lagged periods in EVA and NOPAT. Hence there was no clear evidence to support the claim that EVA is the best internal measure of shareholder value.

Kramer and Peters (2001) used the SS1000 from 1978-1996 to study the EVA and MVA relationship for companies in different industries. They performed the least squares regression for each firm j over every year t and industry i. This allowed the researcher to determine the strength of the relation between MVA and EVA, as well as, MVA and NOPAT. In each industry, if the  $R^2$  of  $\frac{MVA}{EVA}$  was greater than  $\frac{MVA}{NOPAT}$ , then EVA would be a better proxy for MVA than NOPAT. The results indicated that EVA outperformed NOPAT in 10 of the 53 industry classifications. The researchers concluded that although “EVA does not suffer from any industry specific bias as a proxy for MVA.

it is consistently outperformed by NOPAT, a readily available measure of financial performance.

Yet a study of EVA and MVA as performance measures and signals for strategic change conducted by Lehn and Makhija (1996) on 241 firms over a period of four years from 1987-1993, found that EVA had a slightly better correlation with MVA, than ROA, ROE or Return on Sales (ROS). They also examined the EVA/MVA relationship with corporate focus.

Lehn and Makhija concluded that EVA and MVA were effective performance measures that served as a signal for strategic change.

Uyemura, Kantor and Pettit (1996) presented the results of their research on the relationship between EVA and MVA for 100 bank holding companies. They calculated regressions to five performance measures ROE, ROA, net income, EPS and EVA with MVA. They found that EVA had 40% correlation coefficient compared to 13% ROA, 10% ROE, 8% net income, and 6% EPS.

However in the same year, Dodd and Chen studied the correlation between stock returns and the different profitability measures including EVA, the non-adjusted residual income, ROA, EPS and ROE. They reported that ROA explained 24.5% of market stock returns as opposed to 20.2% by EVA, and residual income explained 19.4% of stock returns. They concluded that firms adopting EVA might as well use simple residual income because residual income correlation to share prices was almost the same as EVA correlation to share prices.

The current research on EVA as a performance measure would suggest that there are mixed results on the correlation between EVA and MVA. In the research by de Villiers and Auret (1998) where the explanatory power of EPS is compared to EVA, it was concluded that EPS has more power.

## **2.9 Stock market theories**

We discuss below the random walk theory and efficient market hypothesis that were advanced to explain the movements in share prices in stock exchanges.

### **2.9.1 Random Walk Theory**

The random walk theory states that changes in share price are random and unpredictable. Therefore changes that have happened in the past cannot be used to predict the future. Hence future share prices are independent of current share prices (Fama, 1995). If share markets truly followed the random walk theory then both technical and fundamental analysis would be of little value. Technical analysis or the chartist method using certain techniques to spot trends in the behaviour of share prices and the information is used to predict the future prices. Whilst fundamental analysis is the examination of the underlying forces that affect the well being of the economy, industry groups, and companies using the related intrinsic values, where the intrinsic values are calculated using the earnings potential of the company. Fundamental analysis therefore assesses whether the stock is under or over valued based on the comparison between intrinsic values and the stock price. However if the random walks theory holds, then the share prices would already be reflecting the true intrinsic values, making fundamental analysis of little value. According to Ross et al, 1996, if the random walk theory is valid, then the share markets are efficient, as share prices will be already reflected by the shares' intrinsic values making fundamental analysis useless unless there is new information that is not reflected in the share prices.

### **2.9.2 Efficient market hypothesis**

The efficient market hypothesis (EMH) states that if a market is efficient then the price at any point in time reflects all the available information. Under such conditions, it would be impossible to consistently obtain abnormal returns, or in the stock market lingo, consistently "beat the market". Ross et al, 1996, stated that organised capital markets are characterised by efficient markets. Further that there are three types of efficiency, namely:

The *weak form* of efficiency, any share price information from the past will not help predict future share prices. Therefore the current share price is the reflection of past prices, previously traded volumes and other relevant information. Thus an investor may not use technical analysis to make abnormal profits;

The *semi-strong form* of efficiency states that all public available information is already reflected in the share price. Therefore it would be impossible to make abnormal returns from fundamental analysis;

The *strong form* of efficiency, all information about that affects the share, whether publicly or privately held, is already reflected in the share price.

It is often difficult to show the existence of the strong form of efficiency. In more mature and open stock exchanges, where there freer movement of information, a semi-strong form of efficiency may be expected.

Ross et al, (1996) suggest that the South African JSE Securities Exchange does not have a weak form efficiency. However, earlier results, in research conducted by Philpott (1993) on JSE Securities Exchange efficiency yielded mixed results. He found that “share price anomalies on the JSE Securities Exchange are common”. However there were pockets of efficiency and research suggested that market efficiency was likely to be limited to liquid shares as opposed to illiquid stock.

## **2.10 Limitations of EVA as a performance measure**

It is can be deduced from the above discussions of EVA that the performance measure has its drawbacks. A few academics argue that EVA proponents make serious claims about the abilities of EVA to measure performance. As we have discussed in the empirical findings on EVA, these academics have found that EVA was at best no better than other traditional performance measures. These academics argued that given the financial and time investment that a company has to undertake in order to implement EVA that this performance measure should compensate the investors with superior returns.

The proponents of EVA have great difficulty explaining why the complicated calculations of EVA adjustments are necessary in order to measure EVA. Further that these adjustments are in most instances unique and applicable to each company. We have summarised below the major drawbacks of EVA and classified them into categories.

We will start by discussing the proposal by Bacidore et al (1997) that EVA’s applicability in a company is limited to the executive level and that they have found a performance measure that is better than EVA. We will then discuss the role of inflation in EVA calculations and lastly discuss the limitations of applying EVA to a single period.

### **2.10.1 Refined Economic Value Added (REVA)**

Conceptual concerns have been raised about the calculation of EVA. Bacidore et al (1997) argue that a companies operating measure of performance should correlate highly with  $\alpha_{j,t}$  the abnormal returns for company j at time t. Since  $\alpha_{j,t}$  is a true measure of shareholder wealth creation. They argue that whilst EVA has a high correlation with  $\alpha$ , it is beaten by a measured they invented known as Refined Economic Value Added (REVA). REVA is a performance measure that considers net operating income after taxes, the amount of capital invested, and the required rate of return on capital. REVA is conceptually different from EVA in that it uses the market-value of capital invested and market based weighted average cost of capital.

In the research they conducted taking a random sample of 600 firms from the SS1000 for the years 1982-1992. They calculated the firms EVA, REVA, total shareholders' return and the risk-adjusted abnormal return for each of those years. They found that whilst both EVA and REVA correlated with increased shareholder wealth creation, REVA had a better correlation. They also found that when EVA was correlated with abnormal returns in the current and lagged periods, that the EVA was positively correlated with abnormal returns for the current period but showed a negative correlation with the lagged period. This would suggest that if the market were using past performance as indicator of future performance, and if this was not met, the market revise their expectation.

### **2.10.2 Effects of inflation on EVA**

De Villiers (1997) found that inflation distorts EVA since the divergence between accounting and economic profits he found was worsened by inflation. Thus EVA unadjusted for inflation behaved similarly to accounting measures that are not adjusted for inflation. Wood (2000) argue that with the ongoing decline in the inflation rate in South Africa since 1997, when de Villiers conducted his research, inflation should prove a less severe problem than it was.

### **2.10.3 Single period measure**

The operating performance measures have the ability to be applied to single period. For example, conceptually, ROE is a period measure because it is only the earnings that are accumulated during the relevant year that are used in calculating the metric. However, the EVA definition that:

$$\text{EVA} = (r - c^*) \times \text{capital}$$

makes some academics sceptical about the application of EVA as a period measure since the calculation of  $r$  in a single investment is sensitive to the periodization. Especially where positive cashflows in a project are generated after an installation phase. This is mitigated by the fact that companies generally make continuous streams of investments and therefore the problem of wrong periodizing of the rate of return is not as serious as when there is single investment.

### **2.11 EVA and share prices**

Stern (1991) states that “EVA is the only measure to tie directly to intrinsic market value”. Stern also maintains that “Corporate managers should accept that stock prices represent intrinsic value,..” (1991, p53). EVA is by implication a superior indicator of share price because not only does it tie directly to intrinsic market value, it has been shown stock prices represent intrinsic value. EVA has proved to be quite popular with the financial press such the Fortune magazine.

Critics of EVA have long since commented that these claims are unsubstantiated by empirical evidence. Kramer and Pushner (1997) found that EVA was limited as a performance measure. These finding were echoed in the Kramer and Peters (2001) findings that “EVA’s effectiveness as a proxy for MVA is not encouraging, anecdotal evidence points to the need for further research to determine the behavioural aspects of implementing the EVA management system”.

Another hindrance in the testing of the EVA theory and share price correlation is that the market values are based on expectations about the future free cash flows. Makelainen (1998, p29) states that “Changes in the current share prices thus reflect changes in future EVA expectations. Therefore current EVA can never explain share prices very well.” Indeed Makelainen argues that the current change in EVA might imply some change in future EVA and that EVA would be visible in other performance measures. Therefore EVA explanatory powers would make the other performance measures have almost as much explanatory power as EVA without the costs associated with implementing EVA. It follows under this argument that as long as EVA is not expected to explain current share prices, then EVA would be at least marginally better than other performance measures in

indicating the share price. Therefore EVA can be viewed as “a power tool in the analytical tool kit” (Topkis, 1996, p265).

## **2.12 Advantages and disadvantages of EVA**

We have stated the current theories with regards to EVA, how EVA is calculated and relates to MVA and share prices but we have to admit that EVA has its advantages and disadvantages. Below we summarise the advantages and disadvantages of using EVA.

### **2.12.1 EVA Advantages**

1. EVA is closely related to the concept of Net Present Values (NPV). It is closest in spirit to corporate finance theory that argues that the value of the firm will increase if you take positive NPV projects.
2. EVA can be used to identify which businesses are non-core and the non-performance in order to divest from non-core businesses.
3. EVA is a measure of dollar surplus value, not the percentage difference in returns. It is closest in both theory and construct to the net present value of a project in capital budgeting, as opposed to the internal rate of return (IRR). EVA therefore avoids the problems associated with approaches that focus on percentage spreads - between ROE and Cost of Equity and ROC and the Cost of Capital. These approaches may lead firms with high ROE and ROC to turn away good projects to avoid lowering their percentage spreads.
4. It makes top managers responsible for a measure that they have more control over - the return on capital and the cost of capital are affected by their decisions - rather than one that they feel they cannot control as well - the market price per share. This is in line with the statement by Bacidore (1997) that EVA should not be viewed primarily as a performance measure but that it is also a behavioural tool to compensate management and employees for making value added decisions.
5. EVA aims at reducing the conflicts between shareholders and the managers of the businesses by aligning the interest of shareholders and managers.
6. EVA is influenced by all of the decisions that managers have to make within a company - the investment decisions and dividend decisions affect the return on capital (the dividend decisions affect it indirectly through the cash balance) and the financing decision affects the cost of capital.

### **2.12.2 EVA Disadvantages**

1. Complexity of EVA as a calculation makes EVA expensive to implement and to run an EVA system.
2. EVA is difficult for employees to understand especially if implemented at all levels of the business and is not directly linked to the top management of a company.
3. EVA calculation requires several adjustments to publicly available information and sometimes these adjustments have to be tailor-made for the business making it difficult to compare EVA companies.
4. EVA seems to be biased towards companies with heavily depreciated assets as opposed to start-ups with low returns.
5. EVA has been accused of being short-term focused because it may discourage companies from investing in financial sound projects that worsen the current EVA, without further investigation on the impact of these decisions on long-term returns. However such arguments stem from academics that question the relationship between EVA and MVA. Since if the EVA/MVA relationship holds, then it would be impossible for management of a company to turn away projects that will improve the company's MVA.

### **2.13 The intrinsic value model**

An integral part of the hypothesis that we are testing is the EVA intrinsic value model. In this section we explain how the model works.

The assumptions that are made:

- The period of competitive advantage.
- The rate of return ( $r$  in the formula) and the weighted average cost of capital during the competitive period.
- The growth rate of capital during the period of competitive advantage.
- Growth in EVA is perpetual after the period of competitive advantage.

In the EVA intrinsic value model illustration below it was assumed:

- The period of competitive advantage is five years;
- The rate of return on equity  $r$  is 12.5%, and will remain at this rate throughout the competitive period;

- The WACC ( $c^*$ ) is 10%, and will remain at this throughout the period of competitive advantage;
- Capital growth equals 10% per annum;
- EVA remains constant after the period of competitive advantage.

The intrinsic value per share at the end of year 1 based on this valuation model is equal to the valuation derived from the model divided by the number of share in issue. The intrinsic value at end of year 1 for example if there were 100 shares in issue that year would be R3.04 per share. For our research this theoretical share price would be compared to the share price as quoted on the JSE Securities Exchange in year 1.

The intrinsic value model:

	Year 1	Year 2	Year 3	Year 4	Year 5	Beyond Year 5
Capital (1)	2,200	2,420	2,662	2,928	3,221	3,543
R (2)	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%
C* (3)	10%	10%	10%	10%	10%	10%
Spread (4) = (2) - (3)	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%
EVA (5) = (4) x (1)	55	61	67	73	81	89
Present value (PV) factor at 10% (6)	0.9535	0.8668	0.7880	0.7164	0.6512	6.5123
PV of EVA (7) = (5) X (6)	52.44	52	52	52	52	576.84
Cumulative PV of EVA (8)	52	105	157	210	262	839
Add opening capital (9)						2,200
Value (8) + (9)						3,039

Adapted from: Stewart (1991, p 231)

### 2.13 Summary

In this chapter we have revised the existing theories on EVA. We have noted the opposing opinions on the usefulness of EVA. We have further discussed how these theories relate to the hypothesis that we are trying to test. We need to discuss the methodologies that we will follow in testing our hypothesis.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Introduction

EVA as a measure of performance has received a lot of attention from an international point of view. Research papers have been written to test the correlation between EVA and MVA. Further research has been done to investigate the correlation of both EVA and traditional methods with the share price of firms and to test which of these methods is a better performance measure. There have been studies on the implementation of EVA.

Yet few of the research conducted relates directly to South Africa. In rare circumstances that it does, it does not investigate the correlation of EVA as a performance measure against the share price, in the South African context.

This study will seek to investigate the correlation between the share price of a firm and the EVA, through the use of the EVA intrinsic share valuation model.

#### 3.2 Research hypothesis

In order to test the validity of the problem statement we have developed a hypothesis that we were tested. The hypothesis we test investigates whether there is any relationship between a company's EVA and the share price at time  $t$ . The null hypothesis states that there is no correlation between the EVA model intrinsic values and the share price as quoted on the JSE Securities Exchange. Therefore a two-tailed hypothesis as stated below was used because the research attempts to determine whether there is a linear relationship in the population.

$$H_0 : p = 0$$

$$H_A : p \neq 0$$

The hypothesis that we test was sub-divided into two sub-hypotheses. The first sub-hypothesis tests whether there is a relationship between EVA at time  $t$  and the share prices as quoted on the JSE Securities Exchange. The second sub-hypothesis tests whether there is a relationship between EVA and the share prices for lagged periods of one and two years, therefore at time  $t+1$  and  $t+2$ . The second sub-hypothesis was formulated because the literature suggests that the effects of change in EVA are more likely to be reflected in the subsequent periods.

### **3.3 Research methodology**

We will discuss how the research would be conducted, in particular, how the population would be defined, the sampling methodology that would be followed and the sampling bias that might arise.

#### **3.3.1 Research methodology selection**

The design is a cross-sectional, correlation research designed as described below. The data will be represented in samples for relevant years. The data will be used to generate intrinsic share value as described in the methodology below. The research technique is quantitative. The research as described above would be a scientific study.

#### **3.3.2 The Population**

The population are all the companies listed on the JSE Securities Exchange.

#### **3.3.3 The Sampling method**

The *Finance Week* magazine published the research that Stern Stewart conducts on companies listed on the JSE Securities Exchange in March of every year of the research period. The study used data supplied by these publications for the years 1995-1999 to draw samples.

The sample was drawn from this data for all companies that have complete relevant data for the period 1995-1999. Companies that have incomplete data were discarded from the sample to ensure that there is comparability over the entire period. Companies in the financial and mining sectors of the JSE Securities Exchange were eliminated because there is a capital reserves requirement on the former. The latter were eliminated because there are accounting conventions that are peculiar to the industry, and would therefore make difficult comparability.

The sample therefore only included companies that were traded on the JSE Securities Exchange for the entire research period. Further the sample was limited by INET-Bridge, which has data for companies that are actively traded on the JSE Securities Exchange. There were some shares that were eliminated after the initial sampling phase because the companies underwent restructuring that had an impact on the listed shares. For example Iscor Limited was eliminated because the holding company, Iscor Limited was split into Kumba Resources and Iscor Limited. Even though the JSE Securities Exchange trading code for Iscor remained the same over the duration of the research, in order to make a reasonable comparison of the data prior and after the split we would have had to add the two stocks together. Whilst theoretically this may have worked, it was assumed in this research that these shares trade at prices that depend

on separate volatilities and drivers, hence adding the value of the two stocks would have been inaccurate. The sample was therefore to a large extent determined by the available sources for collecting data and structural changes that have happened in companies.

The final selected sample consisted of 43 companies in various sectors of the JSE as indicated in the appendix below.

### **3.3.4 Sampling bias**

It is possible that bias may have been introduced by the method of selecting the sample from large listed companies and eliminating companies with a small market capitalisation.

## **3.4 Sources of data**

The author obtained information for the research period 1995 to 1999 and based calculation on following sources. The capital outstanding values were obtained from the *Finance Week Top 200* survey. The financial and other data relating to companies was obtained from the annual financial statements. The author also obtained the share price from INET-Bridge and the return on capital and the WACC were obtained from Bloomberg and the companies' annual financial statements. Only publicly listed companies were included in the sample, as the author does not have access to privately held information.

### **3.4.1 EVA intrinsic share value model**

The intrinsic share value model was used extensively in the test that we conducted. The model is designed to have the following components: the EVA values, the rates of return, the WACC and the capital balances. These were used to calculate projected future EVA valuations that would be discounted to net present value to get the MVA as illustrated in chapter two. We calculated EVA intrinsic values for the 1996, 1997, 1998 and 1999 year-ends.

Several assumptions had to be made in order to calculate the intrinsic share values. Stern Stewart suggests that the period of competitive advantage is between five and thirty years. The period depends on numerous factors such as macroeconomic and political states in a country, micro factors affecting companies in a particular industry, particular factors peculiar to a company such as its product life cycle. It is clear from the above discussion that it is unlikely for two companies can have exactly the same periods of competitive advantage. For simplicity we have assumed the period of competitive advantage was assumed to be ten years for all the companies in the

sample because previous research done in South Africa assumes the competitive advantage to be ten years.

The annual capital growth was assumed to be equal to the average capital growth in the preceding five years. There were instances where this rate was exceptionally high because of the increased use of debt, the use of working capital and the share issue adjustments. In the cases where such average capital growth was perceived to be unsustainable in view of the available information in the annual financial statements, an average of the averages of the other data in the sample was used. The recalculated “average five year growth” was applied to four companies in the 1996 valuations, four companies in the 1997 valuation, four companies in the 1998 valuation and six companies in the 1999 valuation.

The return rate and the WACC applied in a particular valuation, the actual rates were for the period in question, and were held constant for the entire period of competitive advantage. Resulting in a constant spread during the period of competitive advantage.

We have assumed that the growth rate after the ten year will be our estimate of the inflation at 9% after the tenth year. We believe this is line with inflation targeting of the South African Reserve Bank.

The lagged correlations were performed such that the intrinsic values for a particular period are compared to the share price of the stock for the next period after discounting the share price with the compounded growth rate. For example in the one-year lag done for 1996, the intrinsic share values as calculated using the EVA valuation model in 1996 were correlated to the share prices in 1997, which was discounted by 9%. Similarly the two year lag done for 1996, the 1996 intrinsic share values as calculated using the EVA valuation model were correlated to the share prices as quoted on the JSE in 1998, discounted by 18.81%.

#### **3.4.2 EVA valuation performance**

The EVA valuations were performed for the each of the companies in the sample for 1996,1997, 1998 and 1999 year ends. Resulting in four years valuation performance for each of the sample companies.

The annual capital balances that were used during the period of competitive advantage were increased on year-on-year basis using the preceding five year average growth, except for those companies that we applied the assumed growth rate. The annual spread was assumed to be constant, and was applied to the capital balances at the end of each year during the competitive period to obtain annual EVA. The annual EVA

values in the period were discounted at the WACC rate to obtain the discounted EVA at the end of each year. The perpetual terminal EVA value at the end of the competitive period was calculated by discounting EVA at WACC less the assumed growth rate of 9%.

The presented EVA values were accumulated and to this the opening economic capital balance was added in order to get the value of the company. The intrinsic value was obtained by dividing the company value obtained by the shares in issue at the end of the year.

The share prices that were used were obtained from INET-Bridge. When performing the same period correlation, the share prices were not adjusted. However when the lagged periods correlations were performed, the share prices were discounted using the assumed growth rate of 9%.

### **3.5 Data analysis methods**

We analysed data analysis methods to assess whether the share price was correlated with the EVA valuations, and the degree of the correlation.

#### **3.5.1 Correlation Analysis**

According to Cooper and Schindler (2001, p533), “the correlation coefficient varies over the range of +1 through 0 to -1”. This measure represented by  $\rho$  is the estimate of the coefficient’s estimate of the strength of linear relationship of two variables based on the sampling data. If  $\rho$  is closer to 1 then there is a positive linear relationship between the variables. Similarly if  $\rho$  is close to -1, then there is a negative linear relationship between the variable. A correlation of zero suggests that the data may not be linear or that there is no direction of the relationship. Our variables are the intrinsic values calculated using the EVA valuation model and the share prices as quoted on the JSE.

1. The study made use of an EVA valuation model that generated the intrinsic share values. For each of the companies in the sample selected, the intrinsic share values were calculated using the model for the each year-end from 1996-1999, the value obtained was correlated with the companies share prices for respective year-end.
2. The share prices were correlated with the intrinsic share prices for each year-end from 1996-1999, with the lagged period of 1 year. The intrinsic share values were calculated for each year-end 1996-1999 results were correlated with the

share prices of the companies at time  $t+1$ . For example the 1996 intrinsic share values were correlated with the 1997 share prices.

3. The share prices were correlated with the intrinsic share prices for each year-end from 1996-1999, with the lagged period of 2 years. The intrinsic share values were calculated for each year-end 1996-1999 results were correlated with the share prices of the companies at time  $t+2$ . For example the 1996 intrinsic value was correlated with the 1998 share price.

It should be noted that when the lagged results were used, the share prices were discounted by the assumed growth factor of 9% for each year, otherwise no other adjustments were effected on the share prices as quoted on INET-Bridge.

### 3.5.2 Student t-test

We performed the  $t$ -tests to determine whether the correlations obtained were statistically different from zero. Since if they are not significantly different from zero we would not be able to generalise our results to the population as defined. The formula employed for the  $t$ -test is described below:

$$t = \frac{(r - p)}{\sqrt{\frac{1 - r^2}{n - 2}}}$$

where

$r$  = the sample correlation coefficient

$p$  = the hypothesised population correlation coefficient

$n$  = the number of paired observations

The t-statistic calculated was compared to the critical t-value obtained from the statistical tables. We rejected the null hypothesis at a 5% significance level if calculated t-statistic was greater than the critical value. The t test has been chosen because the sample size is small.

Since the research report investigates whether there is correlation between the calculated value as per EVA intrinsic model and the share price as quoted on the JSE Securities Exchange, we tested the significance of the results obtained with two-tailed student t-test.

### 3.5.3 Reasons we chose the tests

The same period tests were chosen because in an efficient market (weak form), all known information is expected to be reflected in the share price, as share prices respond quickly to new information.

However, the literature review above suggests that there is mixed evidence on the correlation for the same period. It suggests that changes in EVA are only reflected in the share price only in subsequent periods. Therefore it was interesting the effects of lagged time period on the correlation coefficients.

#### **3.5.4 Software used**

The data was processed and stored using Microsoft Excel Version 2000. Further the calculations for the correlation coefficients were performed using Microsoft Excel Version 2000.

#### **3.6 Summary**

In this chapter we discussed how we collected and manipulated data. Further we described and justified the statistical tools that were used in data analysis. We will now discuss the findings of our research.

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## CHAPTER FOUR

### RESULTS

#### 4.1 Introduction

In this chapter we evaluate and discuss the results of the same period and lagged period tests that were performed in accordance with our data analysis. We will start by discussing the same period tests and later the lagged period tests.

#### 4.2 Same period tests

The same period sub-hypothesis stated that there is no correlation between intrinsic values as calculated using the EVA valuation model and the share prices as quoted on the JSE Securities Exchange, when compared in the same period.

We performed four tests to test this hypothesis in the following manner: the intrinsic share values were calculated for companies in the sample for the 1996, 1997, 1998 and 1999 year-ends, the results were correlated with the share prices as at the respective year-ends. The results are shown in the table below.

	1996 : 1996	1997 : 1997	1998 : 1998	1999 : 1999
Correlation coefficient	0.4291	0.0523	0.1633	0.3255
Calculated t value	3.0419	0.3353	1.0599	2.2043
Critical t value	2.021	2.021	2.021	2.021
Reject or fail to reject the null hypothesis	Reject	Fail to reject	Fail to reject	Reject

Table 4.1: Results of the correlations during the same periods.

#### 4.3 Lagged period tests

The second sub-hypothesis stated that no correlation exists between the intrinsic share values as calculated using the EVA valuation model and the share prices as quoted on

the JSE Securities Exchange, when compared to subsequent periods. We split the hypothesis into a one-year and a two-year lag.

#### 4.3.1 One year lag

We performed four tests to evaluate this sub-hypothesis in the following manner: the intrinsic share values, as calculated for the 1996, 1997, 1998 and 1999 year ends for all the companies in the sample, were correlated to the share prices at the following year ends. Therefore the intrinsic share values for 1996 were correlated to 1997 share prices, the 1997 intrinsic share values were correlated to the 1998 share prices, the 1998 intrinsic share values were correlated to the 1999 share prices and the 1999 intrinsic share values were correlated to the 2000 share prices. The results are stated below.

	1996 : 1997	1997 : 1998	1998 : 1999	1999 : 2000
Correlation coefficient	0.3271	-0.0289	0.185	0.2597
Calculated t value	2.2164	-0.1851	1.2054	1.7220
Critical t value	2.021	2.021	2.021	2.021
Reject or fail to reject the null hypothesis	Reject	Fail to reject	Fail to reject	Fail to reject

Table 4.2: Results of correlations during a one-year lag

#### 4.3.2 Two year lag

We performed three tests to evaluate this sub-hypothesis in the following manner: the intrinsic share values, as calculated for the 1996, 1997 and 1998 year ends for all the companies in the sample, were correlated to the share prices at the following year ends. Therefore the intrinsic share values for 1996 were correlated to 1998 share prices, the 1997 intrinsic share values were correlated to the 1999 share prices, the 1998 intrinsic share values were correlated to the 2000. The results are stated below.

	1996 : 1998	1997 : 1999	1998 : 2000
Correlation coefficient	0.1529	0.209	0.1532
Calculated t value	0.9907	1.3685	0.9927
Critical t value	2.021	2.021	2.021
Reject or fail to reject the null hypothesis	Fail to reject	Fail to reject	Fail to reject

Table 4.3: Results of correlations during a two-year lag

#### 4.4 Summary

We have tabled the statistical findings of the correlation and significance testing for the same and lagged periods. Having observed the statistical findings, we need to interpret what are the implications of these findings. Further we will now show how these findings relate to the literature reviewed as well as the research assumptions.

## CHAPTER FIVE

### RESULTS INTERPRETATION

#### 5.1 Introduction

In this chapter we will evaluate the resulting correlations from chapter four with regards to the same and lagged periods. We will also give consideration to factors such as the assumptions, the socio-political and the economic conditions that may have affected our results.

#### 5.2 Correlations during the same period

The first sub-hypothesis that we tested stated that there is no correlation between the intrinsic share values as calculated using the EVA valuation model and the share prices as quoted on the JSE Securities Exchange, when compared in the same period.

All the results showed that a positive correlation exists between the intrinsic share values and the share prices as quoted on the JSE, when measured in the same period. However it was found that the results were only significant for the 1996 and the 1999 tests. Both the 1997 and 1998 results were not significant hence we failed to reject the sub-hypothesis in 1997 and 1998. These mixed results suggests that in the years 1996 and 1999, based on the sample, the market had taken the effects of EVA in the current share price. Yet the same market fails to take into account the effects of EVA for 1997 and 1998. These results are not in line with the efficient market hypothesis which states that the current share price reflects the forecasts by investors of all future cashflows from an investment.

The result is therefore consistent with all previous literature on business performance that found that year on year changes do not results in meaningful correlation. For example research conducted by Zimmerman (1997) warned company management not to look for year on year correlations.

These results are in line with the findings of Kramer and Pushner (1997) which examined the correlation between the changes in MVA and the levels of EVA in the same period and found that there was a negative correlation. Kramer and Pushner (1997) concluded that profit was a better indicator of share price than EVA.

### **5.3 Correlations during lagged periods**

This sub-hypothesis that we tested stated that there is no correlation between the intrinsic share values as calculated using the EVA valuation model and the share prices as quoted on the JSE, when compared during a subsequent period.

The correlation between the intrinsic share values as calculated using the EVA valuation model and the share prices for a year later, yielded mixed results. There were positive correlations for all data except the 1997 period, which yielded a negative correlation. Except for 1996 data we failed to reject the sub-hypothesis. All the correlations were lower than those that were obtained during the same period, indicating a poorer relationship between EVA share prices and the actual share price a year later.

### **5.4 Factors that must be considered**

We must consider the impact of the following factors in the interpretation of our findings.

#### **5.4.1 Assumptions made**

One of the major drawbacks of the EVA valuation model that was used in calculating the intrinsic share values that were correlated to the share prices, is that several assumptions have to be made. Based on the assumptions that a researcher adopts, the results she finds can differ for same data if these assumptions are modified. Careful consideration was given in making the model assumption we have stated above. It has to be admitted however that the results that were obtained could have been different for a different set of assumptions.

#### **5.4.2 Economic and Socio-political conditions**

The 1995-1999 period which was under review was characterised by high interest rates (with the prime lending rate peaked at twenty five percent) and the sharp depreciation of the South African Rand reaching lows of . The high interest rates may have influenced the capital structure and investment decision of companies. Furthermore the currency situation favoured exporters such as gold mines and adversely affected companies with major dollar denominated costs.

Politically South Africa had just held in 1994 the first democratic elections. However there was serious uncertainty amongst South African companies, who were not sure what the policies of the new government would be and may have postponed or cancelled capital expenditure.

The perceived unfavourable socio-economic period saw significant emigration of skilled South African, mainly to Europe and North America. Although the extent of the emigration is disputed it left many South African companies with skills shortage particularly in management. We highlight this fact because the information that was used to calculate values was provided directly or indirectly by these companies.

### **5.4.3 The Stock Exchange**

We observed that a number of shares in the sample were thinly traded. This presented certain difficulties in the interpretation of data. It is widely accepted that companies with shares that are widely held and traded, their share prices are more likely to reflect true value of the company. This supported by Philpott (1993) who tested for share anomalies in the JSE Securities Exchange and found that when shares were less liquid they were more likely to be traded at a discount to their value.

### **5.4.4 EVA specific issues**

The investment community in South Africa has not incorporated EVA as a measure of performance. With notable exceptions, in the press releases and in financial statements companies still state their performance using traditional accounting measures. We are also concerned that whilst the data provided in the South African financial statements conforms to the accounting principles of Generally Accepted Accounting Standards (GAAP), it does not necessarily aid investors to calculate a company's EVA. It should also be considered that the quality of the financial statements vary widely between South African companies, making the comparisons of EVA intrinsic share values between companies difficult to compare.

EVA intrinsic share values were calculated for all the companies in the sample regardless of whether they have implemented EVA or not. Stern Stewart argues that companies that have implemented EVA on average perform better than companies that have not. It must be noted that different results could have been obtained if the data had been stratified into companies that have implemented EVA and those that have not.

## **5.5 Summary**

We have linked our results to the current literature on EVA and summarised all the factors that may have influenced the research results that were obtained. We need to discuss the issues of interest that came from the research.

## CHAPTER SIX

### CONCLUSION

#### 6.1 Research highlights

In this chapter the interesting observations we have made from the research conducted are discussed.

##### 6.1.1 Correlation coefficients

The same period correlation and the one-year lag correlation between the intrinsic values and the share prices as quoted on the JSE Securities Exchange provided conflicting evidence. The two-year lag correlation analysis was conclusively insignificantly positive. Further significance testing on the correlation showed that the results were insignificantly different from zero. This came as a surprise considering that similar research conducted on the JSE Securities Exchange showed significant positive correlations for the same and lagged periods of one and two years. However the results confirms the mixed results that characterise the current EVA literature.

##### 6.1.2 The Stock Exchange Market Efficiency

The study did not undertake to determine the stock market efficiency of the JSE Securities Exchange, however the results seem to suggest mixed signals on the efficiency of the JSE Securities Exchange. There were positive correlations between the intrinsic share values and the share prices on the JSE for the same period, which would suggest that the current share prices already factor all the available information. This is the result one would expect in an efficient market. Further the correlations between the intrinsic share values and the share prices as quoted on the JSE Securities Exchange worsened for each of the lagged years. This would suggest that there is no delay in the responsiveness of share prices to reflect known information. However, all near the correlations in the same and lagged periods were insignificant. There were some inexplicable inconsistencies as suggested by the same period correlations, where in some years the correlation coefficients were significant whilst the others were not. This could point to inefficiencies on the JSE Securities Exchange.

##### 6.1.3 The EVA values

It was observed that several companies had contrasting annual EVA values. In one year we observed negative EVA and in subsequent years there were large positive

EVA values. Negative EVA values were obtained when the WACC ( $c^*$ ) exceeded the rate of return ( $r$ ), pointing the erosion of shareholder value. In some instances the intrinsic share value of the company was also negative, and by implication the present value of all future EVA values exceeded the opening capital. The subsequent “correction” of this phenomenon seems to suggest that the capital was either too low, or that the negative EVA were too high. This seems to raise several questions especially with regards to the EVA intrinsic value model itself or the integrity of the data.

#### **6.1.4 The EVA intrinsic value model**

The EVA intrinsic value model was found to be cumbersome and repetitive. The EVA calculations had to be performed for each of the years during the competitive period and discounted to present value. The process was time consuming and tedious. It should also be noted that due to the large number of inputs required by the model that it lends itself to capturing errors. The model was also found to be very restricted because a change in one of the underlying variables required the entire process of calculating EVA values, discounting them to present value and adding the opening capital to get intrinsic share values be repeated again

### **6.2 Research objectives**

The objective of the research was to investigate whether there is a correlation between the EVA intrinsic values of the company shares and the actual share prices as quoted on the JSE Securities Exchange, and therefore, whether EVA is an indicator of share price. We stated two hypotheses:

#### **Hypothesis 1**

There is no correlation between the EVA model intrinsic share values and the share price as quoted on the JSE, when compared in the same period.

Result: We failed to reject the null hypothesis.

#### **Conclusion**

There is no evidence of a positive correlation between the intrinsic share values as calculated using the EVA value model and the share prices as quoted on the JSE Securities Exchange, when compared during the same period.

#### **Hypothesis 2**

There is no correlation between EVA model intrinsic values and the share price as quoted on the JSE Securities Exchange, when compared to subsequent periods.

Result: We failed to reject the null hypothesis.

## **Conclusion**

There is no evidence of a positive correlation between the intrinsic share values as calculated using the EVA value model and the share prices as quoted on the JSE, when compared during the same subsequent periods.

### **6.3 Recommendations to companies**

The value based performance measures have changed the landscape of performance measures in the global context. South Africa is operating in global environment and cannot afford to lag behind international trends of using value based performance measures such as EVA. Admittedly the research that has been conducted in South Africa with regards to EVA has not been conclusive. At the very least the available literature gives a broad definition of EVA, how it works theoretically, a summary of the benefits of using EVA and its limitations. However in order to keep up with the competition for capital in global markets South African companies should consider supplying EVA data when releasing performance figures.

### **6.4 Suggestions for further research**

- 6.4.1 Stern Stewart contends that EVA is the only performance measure that ties directly to the share price. Yet previous research in South Africa has yielded mixed results. For example this research was an update of work previously conducted by van Wyk over 1994-1998. The results obtained were contradictory to these initial findings. It would be interesting to test the EVA valuation model by updating of the current research with new data.
- 6.4.2 EVA proponents claim that this performance measure improves the wealth creation ability of a company. It is not clear whether the implementation of EVA has an impact on the share prices in the South African context. There is need to conduct a survey of companies listed on the JSE Securities Exchange that have implemented EVA and compare correlation of the share prices of companies that have implemented EVA to those that have not.
- 6.4.3 Stern Stewart claims that EVA is not only a superior to accounting performance measures but the correlation between the share price and EVA is even better when management compensation plans are tied to EVA. A study of South African companies would be beneficial to academic research by increasing the body of knowledge and South African companies in the value of implementing EVA based compensation plans for management.

6.4.4 The underlying assumption that was stated and never tested in this research was the MVA and EVA relationship. A study investigating the existence and the strength of this relationship in the South African markets would be beneficiary and would increase the body of corporate finance knowledge.

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## APPENDIX

### Companies sampled

Code	Company	SECTOR
AFE	AECI Limited	BASIC INDUSTRIES - CHEMICALS - CHEMICALS SPECIALITY
AFX	African Oxygen Limited (Afrox)	BASIC INDUSTRIES - CHEMICALS - CHEMICALS COMMODITY
ABI	Amalgamated Beverage Industries Limited (ABI)	NON CYCLICAL CONSUMER GOODS - BEVERAGES - SOFT DRINKS
BAW	Barloworld Limited	GENERAL INDUSTRIALS - DIVERSIFIED INDUTRIALS - DIVERSIFIED INDUSTRIALS
BVT	Bidvest Group Limited	CYCLICAL SERVICES - SUPPORT SERVICES - BUSINESS SUPPORT SERVICES
CSB	Cashbuild Limited	BASIC INDUSTRIES - CONSTRUCTION AND BUILD MATERIAL - BUILDERS MERCHANTS
CAT	Caxton Ctp Publishers and Printers	CYCLICAL SERVICES - MEDIA PHOTOGRAPHY - PUBLISHING AND PRINTING
CHE	Chemical Services Limited	BASIC INDUSTRIES - CHEMICALS - CHEMICALS SPECIALITY
CLH	City Lodge Hotels Limited	CYCLICAL SERVICES - LEISURE, ENTERTAINMENT & HOTEL - HOTELS
CNC	Concor Limited	BASIC INDUSTRIES - CONSTRUCTION AND BUILD MATERIAL - OTHER CONSTRUCTION
CKS	Crookes Brothers Limited	NON CYCLICAL CONSUMER GOODS - FOOD PROD & PROCESS - FARMING AND FISHING
DEL	Delta Electrical Industries Limited	GENERAL INDUSTRIALS - ELECTRONIC & ELECTRICAL EQ - ELECTRICAL EQUIPMENT
DDT	Didata Data Holdings Plc	INFORMATION TECHNOLOGY - SOFTWARE & COMPUTER SERV - COMPUTER SERVICES

DLV	Dorbyl Limited	BASIC INDUSTRIES - CONSTRUCTION AND BUILD MATERIAL - BUILDING AND CONSTRUCTION MATERIALS
ECO	Edgars Consolidated Stores Limited	CYCLICAL SERVICES - GENERAL RETAILERS - RETAILERS SOFT GOODS
ELH	Ellerine Holdings Limited	CYCLICAL SERVICES - GENERAL RETAILERS - RETAILERS HARDLINES
GRF	Group Five Limited	BASIC INDUSTRIES - CONSTRUCTION AND BUILD MATERIAL - OTHER CONSTRUCTION
HVL	Highveld Steel & Vanadium Corporation Limited	BASIC INDUSTRIES - STEEL AND OTHER METALS - STEEL
HDC	Hudaco Industries Limited	GENERAL INDUSTRIALS - ENGINEERING AND MACHINERY - ENGINEERING GENERAL
ILV	Illovo Sugar Limited	NON CYCLICAL CONSUMER GOODS - FOOD PROD & PROCESS - FOOD PROCESSORS
IPL	Imperial Holdings Limited	GENERAL INDUSTRIALS - DIVERSIFIED INDUSTRIALS - DIVERSIFIED INDUSTRIALS
JDG	JD Group Limited	CYCLICAL SERVICES - GENERAL RETAILERS - RETAILERS HARDLINES
KER	Kersaf Investments Limited	CYCLICAL SERVICES - LEISURE, ENTERTAINMENT & HOTEL - LEISURE FACILITIES
MDC	Medi-Clinic Corporation Limited	NON CYCLICAL CONSUMER GOODS - HEALTH - HOSPITAL MANAGEMENT AND LONG TERM CARE
MTC	Metro Cash & Carry Limited	CYCLICAL SERVICES - GENERAL RETAILERS - DISCOUNT AND SUPER STORES AND WAREHOUSES
MUR	Murray & Roberts Holdings Limited	BASIC INDUSTRIES - CONSTRUCTION AND BUILD MATERIAL - OTHER CONSTRUCTION
NPK	Nampak Limited	CYCLICAL SERVICES - SUPPORT SERVICES - BUSINESS SUPPORT SERVICES
NPN	Naspers Limited	CYCLICAL SERVICES - MEDIA PHOTOGRAPHY - SUBSCRIPTION

		ENTERTAINMENT NETWORKS
NEI	Northern Engineering Ind Africa Limited	GENERAL INDUSTRIALS - ENGINEERING AND MACHINERY - ENGINEERING CONTRACTORS
OMN	Omnia Holdings Limited	BASIC INDUSTRIES - CHEMICALS - CHEMICALS COMMODITY
OZZ	Ozz Limited	GENERAL INDUSTRIALS - ENGINEERING AND MACHINERY - ENGINEERING FABRICATORS
PIK	Pick n Pay Stores Limited	NON CYCLICAL SERVICES - FOOD AND DRUG RETAILERS - FOOD AND DRUG RETAILERS
PPC	Pretoria Portland Cement Limited (PPC)	BASIC INDUSTRIES - CONSTRUCTION AND BUILD MATERIAL - BUILDING AND CONSTRUCTION MATERIALS
PTC	Putco Limited	CYCLICAL SERVICES - TRANSPORT - RAIL, ROAD AND FREIGHT
RBW	Rainbow Chicken Limited	NON CYCLICAL CONSUMER GOODS - FOOD PROD & PROCESS - FARMING AND FISHING
RLY	Relyant Retail Limited	CYCLICAL SERVICES - GENERAL RETAILERS - RETAILERS HARDLINES
RLO	Reunert Limited	GENERAL INDUSTRIALS - ELECTRONIC & ELECTRICAL EQ - ELECTRICAL EQUIPMENT
SAB	SABMiller Plc	NON CYCLICAL CONSUMER GOODS - BEVERAGES - BEVERAGES BREWERS
SAP	Sappi Limited	BASIC INDUSTRIES - FORESTRY AND PAPER - PAPER
SOL	Sasol Limited	RESOURCES - OIL AND GAS - OIL INTEGRATED
SER	Searidel Investment Corporation Limited	CYCLICAL CONSUMER GOODS - HOUSEHOLD GDS & TEXTILE - CLOTHING AND FOOTWEAR
TNT	Tongaat-Hulett Group Limited	NON CYCLICAL CONSUMER GOODS - FOOD PROD & PROCESS - FOOD PROCESSORS

UTR	Unitrans Limited	CYCLICAL SERVICES - TRANSPORT - RAIL, ROAD AND FREIGHT
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