

**Share price and intrinsic value: An investigation into this  
relationship for food stocks listed on the JSE.**

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## Abstract

Internationally investors are looking at emerging economies such as South Africa, India, China and Mexico to earn high returns on investment. Investments in these markets are due to the possible high returns and the low correlation with developed markets. Individual listed company's performance determines the likelihood of shareholders investment. It is claimed that if a company truly creates value it will be reflected by the rise in share price. The intrinsic value of a share (defined as  $\hat{P}_0$ ) is the fundamental value of the share as seen by the marginal investor performing the analysis. The intrinsic value of a share shows the nature of the shares potential according to the marginal investor. The intrinsic value of a share is specifically determined by the future cash flows generated by the operating activities of the company in which the shares are held. If the intrinsic share values and the market share price are equal it will mean the stock market is efficient. The corporate valuation model is based on determining the value of company operations by calculating the present value of the expected future free cash flows discounted at the weighted average cost of capital. The research sample consists of the thirteen companies included in the JSE Limited Food Producers Index. The study period is over 16 years which starts in 1992 and ends in 2007. The objective is to determine whether a linear relationship exist between the **market share price** as well as the **change in market share price** and the intrinsic share value of the companies listed on the Food Producers Index. The intrinsic share value was determined by using the corporate valuation model. Due to the volatility of the rate of return on the All Share Index three scenarios was set to determine the rate of return. For scenario one the value for the market return rate was that of each year included in the study. For scenario two the market return for the average 40 years (13%) was used as the return rate. For scenario three the market return was set at the average return of the JSE Limited Food Producer Index over the period of the study (1992 to 2007) which was equal to 18.69%. The three scenarios gave three different values for

the weighted average cost of capital and therefore three different intrinsic share values. In order to test the strength of the relationship between the dependent and independent variable a simple linear regression was performed. The regression analysis was first performed on the **change in market share price** and the three different intrinsic values. The analysis was also done for each company over all the years and for each year over all the companies. The second linear regression analysis was performed on the **market share price** and the three different intrinsic values. The analysis was also done for **each company** over all the years and for **each year** over all the companies. The F test for the slope of the linear regression equation was conducted at a confidence interval of 95% as test for a significant linear relationship. The **change in market share price** and the independent variables the three intrinsic share values for the different market return scenarios relationship are not linear for most of the companies and most of the years. The dependent variable, **market share price** and the independent variables the three intrinsic share values did not show significant linear relationships for the companies. The relationship is linear for the majority of the individual years over all the companies. A possible explanation for the significant relationship is that companies of the food producers' index form a portfolio of shares. A portfolio of shares reduces the risk involved with each individual company. Although the companies are all food producers there sub-industries are significantly different. This means that every company will have different cost drivers that influence profits and cash flow. There is therefore a linear relationship between the share price and the share value over the majority of the individual years over all the companies.

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## 1.1 Introduction: Emerging market development

Emerging stock markets are developing at a fast pace with foreign investors seeking high returns on investments and therefore new investment frontiers. The fact of the matter is that developing countries in Africa, Asia and Latin America attract more and more investors from developed countries. The foremost challenge for the emerging stock markets is the sustainable delivery of high returns on investment. As some markets deliver high returns on foreign investment these emerging stock markets are integrated in to the global economy (Magnusson & Wydick, 2002:141).

The stock market forms part of the securities market which is part of the total financial market. According to Fish and Biekpe (2002:11) the financial markets of a country develops in relation with the economy of the country. Thus when the economy is at an early stage of development the financial market will consist of commercial banks. As the economy develop and expand so will the need for financial intermediaries expand and grow. The stock market forms part of this development and is an important part of the development of the economy. The development of the stock market according to Rousseau and Wachtel (2000:1936) is important for four reasons. The first reason is that when an entrepreneur or investor decides to withdraw his capital there is flow of capital to replace the withdrawn capital. This option improves the ability for an investor to access and exit the economy's capital market. Secondly, the stock market creates capital inflow in to the emerging economy which is important for the growth of the economy. If the economy and the equity market are stable and present the investor with a high rate of return on investment then international investors will be attracted. The investment that follows will increase capital inflow and decrease the current account deficit of the economy. The third reason is that

a stock market gives provision of an organised exchange of funds. This presents the foreign and domestic investor with the opportunity to use their short term investments surpluses for long term investments. The long term investments will make more permanent capital available for firms to undertake large projects. The final reason is that stock markets provide a steady flow of information from the traded company to owners. This improves the evaluation of the company and therefore improves the market efficiency.

### **The market at equilibrium**

According to Brigham and Erhardt (2004:269) investors will invest in a market which the investor perceives the required rate of return is lower than the expected rate of return. In the case where the investors start to invest in a stock market demand for the shares will increase. When a limited number of shares are available and the demand for these shares increase so will the price of the shares. If the actual price of a share is lower than the intrinsic value of the share the investor regard it as good investment. The increased number of investors that buy this share will cause the actual price to increase to the level where the actual price and the intrinsic value are equal. At this level the stock market will be at equilibrium for the specific share. If investors however continue to buy the share and actual price increase to a level higher than the intrinsic value of the share the share is regarded as overvalued.

To determine the intrinsic value of a share Brigham and Erhardt (2004:255) state that the value of a share is found the same way as other financial assets. This is by calculating the present value of the expected future cash flow stream. The expected cash flow consists of two parts, the first the dividends expected annually and second the price which the investor expects to receive when they sell the share. According to Brigham and Erhardt (2005:255) the value of a share is calculated by the following formula:

### Exhibit 1.1: The dividend growth model

$$\hat{P}_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + r_s)^t}$$

Where:

$D_t$  = The dividend the shareholder expect to receive at the end of year t.

$\hat{P}_0$  = The intrinsic value of the share today as perceived by the investor doing the analysis today.

t = Number of years.

$r_s$  = The required rate of return or minimum acceptable rate of return when the investor considers the riskiness and the possible returns available on other investments.

The intrinsic value of a share is also estimated by using the corporate valuation model (Brigham & Erhardt, 2004:514). The corporate valuation model as presented by Beneda (2003:250) is:

### Exhibit 1.2: The corporate valuation model

$$V_{op} = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+WACC)^t}$$

Where:

$V_{op}$  = Value of operations.

$FCF_t^*$  = Free Cash Flow year t.

WACC = Weighted Average Cost of Capital.

t = Years.

\*FCF = EBIT\*(1-t) + depreciation and amortisation – increase in operating working capital – capital expenditures.

The value in this case is determined by determining the total value of a company which consist of the value of operations plus the value on non-operating assets. To establish the value of ordinary owner's equity, interest bearing liabilities and preferred stock must be subtracted from the total firm value. The result is divided by the number of outstanding ordinary shares to determine the intrinsic share value (Beneda, 2003:251).

### **The JSE Limited and the Food Producer Index**

The JSE Limited is the largest stock market in Africa (Magnusson & Wydick, 2002:145) and listed with the International Finance Co-operation as an investable market (Fish & Biekpe, 2002:11). In the first eleven months of 2005 foreign investors invested R 45-billion into South African markets (Cobbett, 2005). This investment in the emerging economy of South Africa is not an isolated occurrence but a worldwide phenomenon (Su & Knowles, 2006:18; Durham, 2002:211 & Fish & Biepkpe, 2002:11).

The Food Producers Index of the JSE Limited consists of 13 companies at March 2008. The company with the highest market capitalization is Tiger Brands at nearly R24-billion (Sharedata, 2008). The company with the lowest market capitalization is Intertrading with a market capitalization of almost R18-million (Sharedata, 2008).

#### **1.2 Problem statement**

Is there a relationship between the intrinsic share value and the **change in market share price** as well as the **market share price** of the companies included in the Food Producers Index?

### 1.3 Objective of the study

The main objective of this study is to investigate whether a relationship exists between the **change in the market share price** or **market share price** of the Food Producer Index and the intrinsic value of the shares included in the index.

### 1.4 Research methodology

The study consists of an investigation into the relationship between the intrinsic share value and the **change in market share price** as well as the **market share price** of the Food Producers Index of the JSE Limited. The time period under investigation consists of 16 years (1992 to 2007). The numbers of companies that form part of the index during this period of time were 13. All the necessary data is obtained from McGregor BFA. The data used is submitted to the calculation of the intrinsic share values for each company for each year. The method used to calculate the intrinsic share value is the corporate valuation method as described by Brigham and Erhardt, 2005:547.

The study is designed to investigate the correlation between the **change in market share price** as well as **market share price** with intrinsic value of the individual shares of the Food Producer index. The relationship of the companies **change in market share price** and **market share price** to the intrinsic value of the shares will also be measured: one, for each company over all the years investigated; two, for all companies within each year of the study. In order to measure the relationship between the two variables the intrinsic value of the shares were set as the independent variables. Two dependent variables are used. The first is the **change in the market share price** at the end of each financial year from the previous year. The second dependent variable is the **market share price** from the end of each financial year.

The intrinsic value of each share will be determined by use of the corporate valuation model. Three different return rates will be used to determine the required rate of return. These different rates of return will be set as three different scenarios and therefore three different intrinsic values. The three different rates are:

- The return rate of the All Share Index of the JSE Limited for each individual year.
- The average return rate of the All Share Index for the past 40 years (13%); and
- the average return rate of the Food Producers Index for the period of the study (18.69%).

### **1.5 Scope of the study and limitations**

The study is limited to the companies included in the JSE Limited Food Producer Index (thirteen companies). The time range for the study is sixteen years.

### **1.6 Layout of the study**

The study consists of four chapters. Chapter two will consist of a literature review. The literature review will focus on the relationship between the intrinsic share value and the **market share price**. This includes the corporate valuation model. Chapter three consist of the empirical study and discuss the simple linear regression and significance of the linear relationship between the variables. Chapter four consist of a discussion and the relative theory of the outcomes of the empirical study.

### 2.1 Introduction

Internationally investors are looking at emerging economies such as South Africa (Magnusson and Wydick, 2002:141), India (Mallick *et al.*, 2007:335) China (Rousseau & Xiao, 2007:206), Mexico (Urrutia, 1995:299) to earn high returns on investment (Carvalho & Mendez, 2008:21). An advantage is that cross country portfolio diversification is according to Serra (2000:127) better than cross-industry diversification. Investments in these emerging stock markets are due to the possible high returns and the low correlation with developed markets.

In order for an emerging market to integrate into the international financial system the emphasis is on market performance (Magnusson & Wydick, 2002:142). The performance of a stock market depends on the profitability of the individual companies listed on the stock market. The stock market as a market mechanism mediates the transfer of capital between the saver and the lender (Brigham & Erhardt, 2005:16). The investment by developed country investors in emerging stock markets provides the means to develop strong stock markets in developing countries (Magnusson and Wydick, 2002:154).

Individual listed company's performance determines the likelihood of shareholders investment. De Wet and Hall (2006:57) argue that if a firm truly creates value it will be reflected by the rise in share price. Along with an increased share price it is also important to remember that cash flow generated also creates value for investors through a dividend stream. Beneda (2004:56) argues that a value based management system is the best method for enhancing shareholders wealth. Value based management, it is argued, enhances

shareholder wealth through a complete financial management and an incentive reward system.

## **2.2 Value based management**

In order to increase shareholders value and reduce agency conflicts value based management provide a system of integrated financial controls and strategy for management (Ryan & Trahan, 2007:111). This view is shared by Martin and Petty (2001:2) who states that companies must increasingly focus on unlocking shareholders wealth through performance of company assets and employees. Value based management boils down to the implementation of a business strategy and reward systems which will involve all levels of employees to create profitable business units (Lew & Barnard, 2005:20).

Four advantages exist for firms that focus on value based management. The first advantage is that management do not follow the path of accounting objectives but rather generate cash flows. A second advantage is that when management focus on creating shareholder value as primary objective the reward structure is also structured to support value creation. The third advantage is that non performing assets will be sold. The sale of these assets is necessary because it ties unnecessary funds which could be redistributed to investors or re-invested to generate cash. The fourth advantage is that surplus cash can be invested in activities raising the value of the firm. The surplus funds can also be distributed to shareholders, allowing them to invest in other companies (Arnold, 2005:119).

Value based management will therefore help to create a better return for the shareholders. This is done by selecting projects which create value and provide a steady cash stream. It is also important to note that when value based management is in place the share price could increase and a steady dividend stream to shareholders is possible.

### 2.3 Intrinsic or fundamental value of a share

Brigham and Erhardt (2005:256) states that the intrinsic value of a share (defined as  $\hat{P}_0$ ) is the fundamental value of the share as seen by the marginal investor performing that analysis. This means that there may be many intrinsic values since there are many investors, each with his or her profile. According to the Oxford Learners Dictionary (2005) the word intrinsic means 'belonging to or part of the real nature of something'. It can therefore be argued that the intrinsic value of a share show the nature of the shares potential according to marginal investor. Copeland, Weston and Shastri (2005:360) states that the intrinsic value of a share is the estimate of future return the investor will receive.

Ordinary shares are assets held by the investor. According to Libby, Libby and Short (2005:51) assets are probable future economic benefits owned by an entity as results of a past transaction. In other words a firm needs assets in order to operate and generate cash flow. The same is required for shares held by the investor; these shares must generate a continuous cash flow. Assets are usually financed using mainly two sources of funds namely debt (long term and short term debt) and owner's equity (shareholder equity for public traded companies). The sum of the value of debt (liabilities) and equity (shares) will always equal the value of the total assets of the firm (Libby *et al.*, 2005:51). The cost of the capital to own assets is equal to the weighted average cost of capital. Cost of capital consist therefore (as with the accounting formula of assets) of the cost of equity and the cost of debt.

Asset values are determined by the generation of a steady cash flow. This is true for all types of assets whether it is financial assets such as shares or physical assets such as buildings and equipment (Brigham & Erhardt, 2005:93). The intrinsic value of a share is specifically determined by the future cash flows generated by the operating activities of the company in which the shares are

held. In a number of text books (Copeland, 2007:360; Arnold, 2005:221; Brigham & Erhardt, 2005:509) the method used to value the share is based on the discounted cash flow models. An example is the dividend growth model which consists of the cash flow generated from dividends received and the expected gains when the investors sell the share in future. A second model is the corporate valuation model (derived from the dividend growth model) which determines the value of a firm by the present value of expected future cash flow discounted at the weighted average cost of capital (Brigham & Erhardt, 2005:509; Beneda, 2003:247). The value obtained from the corporate valuation model plus the value of non-operating assets delivers the total value of the firm. To estimate the intrinsic value of the shares the value of the debt and preferred shares is deducted from total value of the firm. This renders the value of common shareholders equity which if divided by the number shares outstanding renders the intrinsic value of a share.

### **2.3.1 Dividend growth model**

The dividend growth model is based on the fact the investors should receive a dividend each year. Added to the dividend the investor should receive a capital gain due to an increase in the price of the share when the share is sold. The present value of a share is therefore calculated as the value of expected future cash flow from dividends and capital gains discounted by the cost of the equity capital (Beneda, 2003:248). Exhibit 2.1 shows the key elements of the dividend growth model. Using the dividend growth model, share prices can be determined for constant and non constant growth firms. Constant growth shares are “defined” as shares of mature companies with a stable growth history (Brealy & Myers, 2003:64). The growth is on average more or less the same as the growth in nominal gross domestic product (Brigham & Erhardt, 2005:261).

### Exhibit 2.1: The dividend growth model

$$\hat{P}_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r_s)^t}$$

Where:

- $D_t$  = The dividend the shareholder expect to receive at the end of year t.
- $\hat{P}_0$  = Expected intrinsic value of the share today as perceived by the investor doing the analysis today.
- t = Number of years.
- $r_s$  = The required rate of return or minimum acceptable rate of return when the investor considers the riskiness and the possible returns available on other investments.

The growth rate can however differ during certain periods due to periods of high profitability and periods of low profitability (Brealy & Myers, 2003:67). Estimating the share value by using the constant growth model can be biased due to the fact that the dividend growth is assumed (Plenborg, 2002:308). A possible reason why the growth rate can cause this biased estimation is possibly due to the scenario created by the analyst performing the analysis (Jennergren, 2008:1561). In other words when the analyst sets out to determine a share value the estimation is based on historical values of growth.

The second option is that of share price estimation for non-constants growth firms. This occurs especially in cases where firms experience a term of supernormal growth, no growth or even negative growth (Brigham & Erhardt, 2005:264). The non-constant growth model can also be biased according to Plenborg (2002:308) reason is that the growth rate is assumed.

**Exhibit 2.2: The constant growth model**

$$\hat{P}_0 = \frac{D_1}{r_s - g}$$

Where:

$\hat{P}_0$  = Expected intrinsic value of the share.

$r_s$  = Required rate of return.

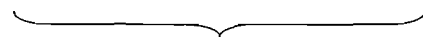
$g$  = The constant growth rate for dividends.

$D_1$  = Expected dividend receivable for the next year.

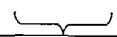
The dividend growth model is sometimes unsuitable for start-up firms and for firms which do not declare a dividend (Brigham & Erhardt, 2005:507; Plenborg, 2001:304). According to Rutherford (2004:141) the model is very sensitive to changes in dividend as input variable. The latter is specifically true for high value shares with a relative low dividend yield. Especially in situations where the company decide to keep funds for investments for other projects or to repurchase shares (Beneda, 2003:248).

**Exhibit 2.3: The non constant growth model**

$$\hat{P}_0 = \frac{D_1}{(1+r_s)} + \frac{D_2}{(1+r_s)^2} + \dots + \frac{D_N}{(1+r_s)^N} + \frac{\hat{P}_N}{(1+r_s)^N}$$



Present Value of  
 dividends during the  
 non-constant growth  
 period  
 T= 1. ...N



Present value of the  
 horizon value  

$$\hat{P}_N = \sum_{t=N+1}^{\infty} \frac{D_N(1+g)}{r_s - g}$$

Where:

$\hat{P}_0$  = Expected intrinsic value of the share.

$r_s$  = Required rate of return.

$g$  = Constant growth rate for dividends.

$D_1$  = Expected dividend receivable next year.

$D_N$  = The dividend at the end of the super normal growth period.

$\hat{P}_N$  = Expected horizon value of a share in a supernormal growth period.

### 2.3.2 The corporate valuation model

The corporate valuation model is based on determining the value of a firm operations by calculating the present value of the expected future free cash flows discounted at the weighted average cost of capital (Brigham & Erhardt, 2005:507; Beneda, 2003:249). According to Correia *et al.*, (2007:6-23) the corporate valuation model is based on the discounted cash flow model.

#### Exhibit 2.4: The corporate valuation model

$$V_{op} = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+WACC)^t}$$

Where:

$V_{op}$  = Value of operations.

$FCF_t^*$  = Free Cash Flow year  $t$ .

WACC = Weighted Average Cost of Capital.

$t$  = Years.

\*FCF =  $EBIT \cdot (1-t) + \text{depreciation and amortisation} - \text{increase in operating working capital} - \text{capital expenditures}$ .

According to Beneda (2003:249) the corporate valuation model presents six strengths:

<b>Strength</b>	<b>Key Element</b>
<b>Operating Performance</b>	<i>The corporate valuation model specifically target the valuation of the operating assets of the firm. This establishes a measure for the strategic positioning of long term operating assets.</i>
<b>Division Valuation</b>	<i>A well diversified firm consist of many different divisions and projects. The corporate valuation model entitles the management to measure the performance of the different divisions. This enables the management also to decide between different strategies and different projects.</i>
<b>Debt Changes</b>	<i>Debt can change significantly within the corporate valuation model. The firm's value is determined by discounting the expected free cash flow which means the value of the firm is independent of the amount of debt used as finance.</i>
<b>Return on invested capital and Economic value added</b>	<i>The model generates a large amount of information and therefore it is easy to determine the return on invested capital and economic value added.</i>
<b>Alternative Strategies</b>	<i>It is easy for management to determine whether new strategies will enhance the company value or not. It is easy to use the corporate valuation model to determine whether a project or division will be adding value to the firm. The model is also highly effective in value based management.</i>
<b>Corporate Governance</b>	<i>The key issue for managers is to maximise shareholders wealth. Corporate valuation and value based management helps in determining whether management created value or destroyed value.</i>

The expected free cash flow is the cash flow available after all the operating expenses and reinvestments are deducted. It is therefore the cash flow available to all the investors in the firm be it shareholders or debt holders (Correia *et al.*, 2007:6-22; Beneda, 2003:249). The weighted average cost of capital is the cost of all components of the capital the company use to finance assets. It is called a cost due to the fact that all investors seek a return on investment. Finance can be obtained using bank loans, bonds, preference shares or ordinary equity the fact remains these types of finance each requires a return on invested capital.

Each firm according to Correia *et al.*, (2007:6-22) and Brigham and Erhardt (2005:509) owns operating assets which can produce a stream of cash flows. Firms such as Tiger Brands own factories, equipment, inventory and other physical assets. These combined with knowledge, know-how and experience give Tiger Brands the opportunity to grow. The growth options of the firm create the opportunity for assets to grow and the generation of more cash flow. The end result is that the firm creates value and return on investment. Capital as indicated previously is normally obtained from either operating activities, investors (shareholders) or from credit suppliers. To maximise the firm value the management must choose the best capital structure in order to achieve the optimum value of the firm (Brigham & Erhardt, 2005:547). This means the assets acquired by means of the raised capital should produce the highest possible free cash flow. The corporate valuation model can help management to evaluate the investment in new projects and in ongoing operations (Beneda, 2003:250).

### **2.3.3 Steps in share valuation with the corporate valuation model**

To determine the value of a firm's shares with the corporate valuation model three steps is necessary. The first is to determine the free cash flows, second is to establish the weighted average cost of capital and third calculating the value of current operations.

*Step 1:*

The first step to value the shares of a firm is to calculate the free cash flow of the firm. According to Correia *et al.*, (2007:6-22); Beneda (2003:250) free cash flow is defined as cash available after the deduction of all investments in new fixed assets (used in operations) and working capital necessary for ongoing operations. The cash available after the mentioned deductions is therefore available for distribution to the investors. The free cash flow equation is as follow:

$$FCF = \text{Earnings before interest and taxes} \times (1 - \text{tax rate}) + \text{depreciation and amortization} - (\text{increase in operating working capital} + \text{capital expenditure}).$$

The earnings before interest and taxes are the generated income from operations. If the firm tax is deducted from the above the answer renders the net operating profit after taxes (Correia *et al.*, 2007:6-23). Depreciation and amortization is added back to the after tax profit due to the fact these are non-cash expenses and do not influence the cash flow. Investment in new fixed assets (used in operation) and funds required as working capital for ongoing operation is deducted from the sum of net operating profit after taxes and the non-cash expenses. The answer of these calculations is the free cash flow of firm operations.

*Step 2:*

Capital is used to fund assets which in turn is used in operation to produce and therefore to generate income. The capital a firm require to fund its assets is obtained through investment by the owners and/or shareholder and/or borrowings from financial institutions (Brealey & Myers, 2003:222). All these investors or debt holders have a required rate of return. The weighted average

cost of capital is the rate of return that debt holders and investors require to make them willing to supply funds to the firm. Exhibit 2.5 shows the equation for calculating the weighted average cost of capital. The equation consists of three components: cost of debt, cost of preference shares and cost of ordinary equity (Brigham & Erhardt, 2005:321).

### Exhibit 2.5 Weighted average cost of capital

$$\text{WACC} = w_d r_d (1-T) + w_{ps} r_{ps} + w_{ce} r_s$$

Where:

$w_d$  = Weight of debt.

$w_{ps}$  = Weight of preference shares.

$w_{ce}$  = Weight of ordinary equity.

$r_d$  = Interest rate on debt.

$r_s$  = Required or minimum rate of return on common shares.

$r_{ps}$  = Component cost of preferred shares.

The cost of debt and the required rate of return of debt holders is not equal due to the fact that the interest paid on debt is tax deductible and therefore reduce the effective interest rate the firm pays. (Brealey & Myers, 2003:230). The cost of preference shares is calculated as: the dividend for preference shares divided by the net issuing price of the preferred share (Copeland *et al.*, 2005:624). There is however no tax shield for preferred shares and therefore the firm must carry the full burden of this funding cost (Arnold, 2005:457). It is relatively easy to determine the cost of debt and preference shares since a contractual obligation determines what the interest on debt is and what the rate of return on preference shares is.

The required rate of return or cost of ordinary shares is more complex to determine. Brigham and Erhardt (2005:311) discuss three methods which are

used in the estimation of the required rate of return for a specific share. These are the Capital Asset Pricing Model, discounted cash flow method and the bond-yield-plus-risk-premium approach. To estimate the required return of a share in this study the Capital Asset Pricing Model will be used. The Capital Asset Pricing Model is used due to the fact that the model predicts different returns for shares which differ in risk as well as supply a measure for the risk for the specific share (Polk *et al.*, 2006:102).

To estimate the required return of a share using the capital asset pricing Model the following equation is used:

**Exhibit 2.6: The capital asset pricing model**

$$r_s = r_{RF} + (RP_M) * b$$

Where:

- $r_s$  = Required or minimum rate of return on common shares.
- $r_{RF}$  = The risk free rate.
- $RP_M$  = Risk Premium of the stock market.
- $b$  = Beta coefficient for the specific firm.

To determine the required rate of return the first step is to determine the risk free rate which is normally equal to the rate of return on a risk free asset or investment. Brigham and Erhardt (2005:312) argues that there is no asset which is without risk even the United States of America's treasury bonds can fluctuate in return due to interest rate hikes. Most companies in the United States use long term Treasury bond or Treasury bill rates with 3 months before maturity as a proxy of the risk free rate (Polk *et al.*, 2006:111). It can therefore be argued that the "appropriate" risk free rate for use in South Africa should be equal to the rate of return on RSA government bonds, preferably long term bonds such as the ten year government bonds. Due to the period covered in the study the focus is on long term investments. If an investor decides to invest for the long run the

investment should be compared to the long term risk free investments such as the RSA government bonds.

The second step is determining the market risk premium ( $RP_m$ ) which is the difference between the expected rate of return of the whole stock market and the risk free rate (Correia *et al.*, 2007:7-20; Polk *et al.*, 2006:111; Brigham & Erhardt, 2005:312). The market risk premium can be estimated from historical data or forward looking data (Correia *et al.*, 2007:7-20; Arnold, 2005; Brigham & Erhardt, 2005:313). In practice it is accepted that the market risk premium for South Africa is around six percent.

The third step in estimating the required return of a specific share with the Capital Asset Pricing Model is to estimate the beta coefficient for the specific share. The beta can be seen as the normalised covariance between the return of the share and that of the whole stock market (Karandikar *et al.*, 2007:804; Correia *et al.*, 2007:4-31; Brealy & Myers, 2003:173). The share's beta coefficient is also its risk benchmark relative to the market. The market as a portfolio has a beta of one therefore when a share has a beta of 0.5 it is only half as risky as the market. If a share has a beta of 2 it means it has twice the risk of the market. If all the components of the Capital Asset Price Model are determined it is possible to estimate the required rate of return of a specific share.

### *Step 3:*

The next step is to determine the value of operation for the specific firm.

## Exhibit 2.6: The corporate valuation model for non-constant growth

$$V_{op} = \sum_{t=1}^{\infty} \frac{FCF_t}{(1+WACC)^t} \quad \left. \vphantom{\sum_{t=1}^{\infty}} \right\} \begin{array}{l} \text{Step 1 to determine} \\ \text{non-constant growth} \\ \text{years present value.} \\ \text{Shown in exhibit 2.4.} \end{array}$$

$$V_{op} = \sum_{t=N+1}^{\infty} \frac{FCF_{N+1}}{(WACC-g)} \quad \left. \vphantom{\sum_{t=N+1}^{\infty}} \right\} \begin{array}{l} \text{Step 2 to determine the} \\ \text{horizon value after non-} \\ \text{constant growth} \end{array}$$

Where:

$V_{op}$  = Value of operations at time N.

$FCF_{N+1}$  = Free Cash flow year N.

WACC = Weighted Average Cost of Capital for year N.

g = Constant growth rate.

This involves using answers obtained for steps one and two which is the free cash flow from operations and the weighted average cost of capital. To determine the value of operation the free cash flows from operations is discounted at the weighted average cost of capital as shown in exhibit 2.4 (Beneda, 2003:250).

To determine the value of a firm with a non-constant growth rate the formula of the corporate valuation model is changed. This mean it is necessary to determine the non-constant growth years present value by means of the formula in step 1 in exhibit 2.6. The next step is to calculate the present value of the horizon value where the growth normalises. For this calculation the formula in step 2 of exhibit 2.6 is used. The horizon value is equal to the estimated cash flow for the year after the normalisation of growth discounted by the weighted average cost of capital (minus the constant growth rate). Now the values of the non-constant growth period and the horizon valued are added together. The answer is the value of operation at the time when the firm reaches the stable growth rate.

#### *Step 4:*

If the value of operations is determined the next step is to determine the value of common equity (Beneda, 2003:251). The value of operations plus the value of non-operating assets (includes: investment in shares, other securities and long term investments) will give the total value of the firm. To establish the value of equity, interest bearing liabilities and preference stock must be subtracted. The answer renders the value of the ordinary shareholders claim to the firm. The intrinsic per share value is equal to the value of shareholders equity divided by the number of ordinary share outstanding.

### **2.4 The market price and expected rate of return**

The market price of a share is the same for all investors however the intrinsic value of a share may differ between investors (Copeland *et al.*, 2005:360). This difference is due to the different investor's perception valuing a specific share (Brigham & Erhardt, 2005:256). If investors perceive that the intrinsic value of a share to be higher than the market price the investor will consider buying the share. This is due to the fact that the investor perceives that the market price of the share is low. According to Karandikar *et al.*, (2007:804) when a specific share is in high demand the price will go up due to the demand. The same logic is used for a share that seems less in demand; investors will sell these. This will continue till demand and supply matches.

The investor can determine the required rate of return for the share by using the Capital Asset Pricing Model (Copeland *et al.*, 2005; Brigham & Erhardt, 2005:267). If the firm's shares expected rate of return is higher than the required rate of return the investor will buy the share. The opposite is true for a share where the required rate of return is higher than the expected rate of return. In these conditions the investor will not buy the share or the shareholder will rather sell his or her shares (Arnold, 2005:221).

When investors perceive the market price of the shares of a specific firm to be higher than the intrinsic value of that firm, the investor will tend to sell the share. This is true for all investors (Brigham & Erhardt, 2005:267), this will reduce the demand for the specific share until the market share price and the intrinsic value is equal. The equilibrium state where the required rate of return and expected rate of return is the same is called stock market equilibrium. For a stock market to be in equilibrium the following two conditions must hold:

- A share's expected rate of return as perceived by a marginal investor must at least equal the required rate of return; and
- the actual market price of a share must be equal to the intrinsic value that as estimated by the marginal investor.

Stock market equilibrium is an important aspect to consider within the context of the efficient market hypothesis. The efficient market hypothesis simply deals with the effectiveness of the pricing of assets on the stock market. If the body of theory called the efficient market hypothesis was wrong, investors would have had an unlimited money making machines due to forecast models (Timmermann & Granger, 2004:15). According to Brigham & Erhardt (2005:269) it is not possible for investors to beat the market consistently if the EMH holds. Brigham and Erhardt (2005:270) indicate that any new information which is readily available will have a direct effect on the share price. The effect is due to the fact that analysts generally receive and analyse new information immediately. The net effect is that when the analyst receives the new information about the firm (whether good or bad) the analyst can make a decision to buy or sell the share. This implies a chain of buying or selling of shares which in return will either raise or lower the market price until a new equilibrium is reached. If investors perceive the intrinsic value to be lower than the market price selling of shares is quite possible. Investors may buy shares if it is perceived that the intrinsic value is higher than the market price. Ultimately the effect of the transactions will result in

establishing equilibrium between the market price and intrinsic value (Brigham & Erhardt, 2005:271).

## 2.5 The efficient market hypothesis

The marginal investor makes decisions to invest based on perceptions towards a specific share. The share according to the investor can be relative cheap when value which is based on valuation of the intrinsic value is compared to share price. If the value is high and the price low is true buying the share may be a good investment. The inverse is also true a share can be perceived as overpriced and the shareholder may want to sell. All these changes in prices and preferences in buying and selling of shares are directly related to the information available about the specific firm and the shares of the firm performance. The price of a share reacts on all available information as it is revealed (Brigham & Erhardt, 2005:268). Reaction can also easily be an overreaction which can lead to a landslide fall in a share's price (Shaub, 2006:1163). This is argued due to the selling of these shares by investors in reaction to negative information. The measure efficiency of the stock market is how the market adjusts to new information (Brigham & Erhardt, 2005:269). According to Copeland *et al.*, (2005:354) traded share prices accurately direct capital allocation. This means that the funds from savers are directly directed to investment opportunities which deliver the highest possible returns.

Three forms of market efficiency are described by the literature:

*Weak-Form Efficiency* The weak-form implies that all information which is part of historic price movements is already reflected in the price of the shares currently (Brigham & Erhardt, 2005:270). This means that historic stock market information will have no effect on the future movements in the share price (Magnusson & Wydick, 2002:143).

*Semi-Strong-Form Efficiency* The semi-strong-form claims that all public available information will be incorporated into the share price immediately (Brigham & Erhardt, 2005:270; Magnusson & Wydick, 2002:143). The insider within the firm can effectively beat the market due to the possession of private not publicly available information. Another implication is that the share price will only react to information that is different from what was expected (Brigham & Erhardt, 2005:271).

*Strong-Form Efficiency* The strong-form is the ultimate situation where all public and private information is immediately incorporated in to the share price. This means the no investor will be able to beat the market returns with explicit inside information (Magnusson & Wydick, 2002:143).

According to Magnusson and Wydick (2002:143) there is no stock market in the world that presents the strong-form efficiency of the efficient market hypothesis. The authors suggest that most of the developed countries have a semi-strong-form stock market and that most of the developing or emerging economy countries present the weak-form market efficiency.

Weak-efficient markets might not reflect all information immediately however the information will be incorporated into the market price rapidly. Thus even if there is a slight gap between the public availability of information and the incorporation of the information into the market price the marginal investor will still “struggle” to beat the market. According to Timmermann and Granger (2004:15) stable forecast models never stay successful for long periods. The reason is simple with more investors buying a share, the higher the demand and with a limited supply the market price will increase and eventually the market price and the intrinsic value will be equal.

If the above argument is true; why then are so many investment companies and financial analyst seeking above average returns? The answer is in the estimation of the intrinsic value of a share. Moolman and Du Toit (2005:80) argue that financial analyst will estimate the intrinsic value of share in order to determine the value proposition of investment in the specific share. The analyst will therefore watch the macro-economic fundamentals such as inflation, interest rates and economic growth. This analysis will estimate which industries will benefit from the current conditions. Analyst will then decide to invest in companies from the chosen industries with a high intrinsic value and low market share price.

The market will eventually correct the difference in intrinsic value and share price (Moolman & Du Toit, 2005:80). Key to earning better than average profits is however estimating the intrinsic value of the share. Timmermann and Granger (2004:19) also argue that a market can still be efficient even though the value and the price of a share are not equal. The argument is that the efficiency of market can also focus on the size of deviation between the share price and share intrinsic value. The deviation will however change over time due to the fact that the market price and intrinsic value will move closer and eventual through buying and selling it will be equal.

## **2.6 The emerging markets**

Emerging markets give a high return on investment with a low correlation with developed markets (Carvalho & Mendez, 2008:21). Investing in emerging markets can be risky due to the volatility of these stock markets (Carvalho & Mendez, 2008:21; Pavabutr & Yan, 2007:345).

According to El-Wassal (2005:38) emerging markets have grown dramatically due to three factors. Reasons are: One the majority of emerging economies expanded rapidly since the start of the 1980's. Two, the economies has undergone financial liberation and therefore different barriers of entry were

lowered and access to these markets was simplified. This increased the competition within these markets. Three, it is claimed by El-Wassal (2005:38) that the emerging markets give higher returns than developed markets. The net effect is that an emerging market therefore will attract more investment than the developed markets from both foreign and domestic investors.

African stock markets are regarded as emerging markets with a few markets being listed by the International Finance Co-operation as investable markets (Fish & Biekpe, 2003:11). Emerging markets are assumed to be risky and highly volatile. The high growth potential in these markets however, establishes the platform for foreign investors to increasingly invest (El-Wassal, 2005:38; Fish & Biekpe, 2003:11; Durham, 2002:212; Rousseau & Watchel, 2000:1937).

African stock markets are mostly seen as weak-form efficient markets by researchers (Mlambo & Biekpe, 2007:5). The South African, Johannesburg Securities Exchange was also presented as having weak-form efficiency by Magnusson and Wydick (2002:143).

### **2.6.1 JSE Limited**

The Johannesburg Stock Exchange was founded in November 1887 by Benjamin Woollan to help with the finance for mining companies on the Witwatersrand (Correia *et al.*, 2007:13-5). The exchange was setup to primarily finance mining companies. The companies listed grew to 151 companies in 1932 (Moolman & Du Toit, 2005:10). The companies listed in 1932 included mining, industrial and commercial companies, the JSE were therefore no longer just the capital market for the mining industry. By 1998 there was 659 companies listed on the stock exchange. According to the JSE market profile for May 2008, there are 482 shares listed on the exchange. Table 2.3 shows the change in the number of securities listed since 2004.

**Table 2.3:** The JSE Market Profile

	2008	2007	2006	2005	2004
Companies -					
Main Board	348	347	364	373	394
Listed					
Companies -					
AltX	78	75	37	15	10
Securities					
Listed JSE	1208	1174	1047	984	873
Market	R 6 262.8	R 1 174	R 1 047	R 984	R 873
Capitalisation	(billion)	(billion)	(billion)	(billion)	(billion)

The name of the Johannesburg Stock Exchange changed to JSE Securities Exchange South Africa on 8 November 2000 (JSE, 2008). The JSE acronym is still used in the name due to the exchange's heritage. South Africa was included into the name in order to justify that the exchange is a national exchange and not limited to one region or province. The name of the stock exchange was finally changed to the JSE Limited in 2005.

The JSE is governed by an Act of Parliament (Security Services Act, act 36 of 2004) and by the rules of the exchange (Correia *et al.*, 2007:13-5). The main securities listed on the JSE include: ordinary shares, preference shares, warrants, futures and options.

Ordinary shares are listed on either the Main Board or the Alternative Exchange (AltX). Main Board and AltX listed companies differ in terms of listing requirements that companies must meet to be listed on either of the exchanges. According to Correia *et al.* (2007:13-6) the main board listing requirements include the following:

- Capital of R 25 million.
- Minimum of 25 million shares in issue.
- Before tax profit at a minimum of R 8 million with a satisfactory audit report for the last three years.

- At least 20% of the shares must be held by the public; and
- public shareholders numbers must be at least 500 for ordinary shares (excluding employees) and at least 50 for preference shares if issued.

The Alternative Exchange was created with small to medium size companies in mind. The sole purpose is to create a platform where these types of companies can raise capital (Moolman & Du Toit, 2005:10). According to Correia *et al.* (2007:13-7) the following is the requirements needed to list on the Alternative Exchange of the JSE:

- R 2 million of share capital. The capital must exclude minority interest but include reserves.
- At least 10% of each class of securities must be in public ownership.
- Public shareholders must be at least 100.
- A designated advisor must be appointed by the firm.
- The firm must appoint a financial director. It is the responsibility of the designated advisor to verify to the JSE that the financial director is both qualified and capable of performing such a role.
- For the year of listing and the year following the firm must release a profit forecast; and
- it is required of the directors to complete the Alternative Exchange Directors Induction Programme.

The investor composition of the JSE has changed dramatically during the past 15 years. Changes are due to the new dispensation in-terms of the South African political setup and the liberalisation of the financial systems in the country Moolman and Du Toit (2005:10).

### **2.6.2 The efficiency of the JSE**

According to Correia *et al.*, (2007:4-28) studies on the market efficiency levels of the JSE reveals inconclusive results. It is complicated further more to the fact

that a relative small number of shares are listed on the JSE. Shares are also traded thinly as well as being closely held. Wessels and Krige (2005:71) argues that the portfolio managers on the JSE are able to outperform the market on the short term but are less successful to outperform the stock market in the long term. This statement is in line with the study of Moolman and Du Toit (2005:77) which state that the JSE on the long run returns to an equilibrium state. According to the authors the market will fluctuate on the short term.

Magnusson and Wydick (2002:152) found that the JSE show weak form efficiency along with other African stock markets. Appiah-Kusi and Menyah (2003:265) states that the JSE is inefficient and speculates that insider trading takes place in the market. A separate study by Cubbin *et al.*, (2006:39) found that the JSE share prices show mean reversion. Mean reversion indicates that share prices are predictable (Caporale & Gil-alana, 2002:600). This is in line with the study of Moolman and Du Toit (2005:77) which argues that in the long run the JSE returns to equilibrium. A number of studies investigated the occurrence of mean reversion in the United States stock markets (Serletis & Rosenberg, 2008:8; Gropp, 2004:537; Caporale & Gil-Alana, 2002:599) which showed some evidence of long term reversion.

Mean reversion imply that in practice portfolio managers will in the short term be able to achieve above normal profits by predicting the market trends. As stated before out performing the market is possible in the short term (Wessels and Krige (2005:71). In the long term it seems as if most of portfolio managers struggle to achieve returns higher than the All Share Index average. This implies in the very least that the market has a weak form efficiency.

According to Moolman and Du Toit (2005:77) successful investors identify shares with a high value and a low price. This is done through analysis of the firm and determining the value of the shares. Analysts will therefore keep a close watch on the specific share and as the gap between the share price and share value

decreases the investor will sell the share. This will take place before the value of the share is lower than the price of share for when the market discovers that the share price is higher than the underlying value most investors will be unwilling to buy the share and many will be willing to sell the share. The increased selling of the specific share will increase supply and decrease demand and therefore decrease the share price.

## **2.7 The Food Producer's Index**

The food producer index consists of thirteen companies involved in production of sugar, broiler chickens and other food products. The JSE index code is J043 previously it was IX66. The firm sizes differ considerably from the largest with a market capitalisation of R 26 809 million to smallest with R24.5 million (JSE, 2008). According to the JSE annual report for 2006 the food producers were responsible for 1.38 % of the total market capitalisation (JSE, 2006:50).

According to Correia *et al.*, (2007:4-24) the beta for the Food Producers Index was equal to 0.52 in 2005. This value indicated that the index was less risky than the All Share Index of the JSE.

## **2.8 Conclusion**

Emerging markets present new investment frontiers which present high returns on investment. In order for investors to find real value the focus is on firms which maximise the firm's value. These firms are inclined to practice value based management in order to create value from every division of operation. To determine whether the management created value for the shares holders of the firm a valuation model can be used. The corporate valuation model is equal to the free cash flow from operations discounted at the rate of cost of capital. This model can be used for not only for total firm valuation but also for the different divisions.

In order to see whether a firm's shares do present an investment opportunity investors calculate the intrinsic share value. If the intrinsic share value is higher than the market share price the share presents as an investment. The contrary is also true that if the intrinsic share value is lower than the market share price it will not be a good investment opportunity.

It is also important for investors to know whether a stock market is efficient in reflecting all available information within the share price. The conclusion is that when the stock market is efficient (strong form) the market share price and the intrinsic share value will be equal. A weak form of market efficiency the market will present intrinsic values of shares which differ from market share price. Therefore in a market which presents the weak form of efficient market hypothesis not available information is reflected in the price and it can be assumed that insider trading takes place.

The JSE Limited efficiency is seen as the weak form. The research question for this study is therefore whether this weak form is also present in the JSE Food Producers Index. The test is to determine whether there is and what the relationship between the intrinsic share value and market share price of the firms included in the Food Producers Index.

### 3.1 Introduction

In order to study the relationship between the intrinsic share value and the market share price this chapter is divided into two sections. Section one describe the research design, while section two contains the empirical research results as well as the data analysis.

### 3.2 Research Design

#### 3.2.1 Aim of the study

The main objective of this study is to investigate whether a relationship exists between the ***change in market share price*** and the **market share price** of the companies of the Food Producer Index and the intrinsic share value.

#### 3.2.2 Framework of the Study

In order to obtain measurable results and to answer the research question the following steps were taken:

1. Data sampling.
2. Calculation of the intrinsic share value.
3. Change in share price determination.
4. Statistical analysis with simple linear regression; and
5. test for the significance of the linear relationship.

### 3.2.3 Methodology

#### 3.2.3.1 Data Sample

The research sample consists of the thirteen companies included in the JSE Limited Food Producers Index. The study covered 16 years which starts in 1992 and ends in 2007. The data was obtained from McGregor BFA and consisted of the following:

**Table 3.1:** The data obtained for the study from McGregor BFA

<b>Income statement</b>	<b>Balance sheet</b>	<b>Financial Ratio</b>	<b>Financial Market</b>
Revenue	Total fixed assets	Debt/equity ratio	Real Market Beta
Cost of sales	Total current assets		Market Return per year
Total extra ordinary profit	Total long term assets		Prime Interest Rate
Profit before income tax	Total long term liabilities		Risk free rate per year nominal
	Total current liabilities		Company tax rate per year
	Number of outstanding ordinary shares		Share price at the end of each year
	Preference shares		

McGregor-BFA is the pre-eminent provider is stock market, fundamental research data and news to the financial sector and the corporate market at large. It is also a partner with Dow Jones News Wire to distribute business and financial news to business in the RSA (Dow Jones, 2005). McGregor-BFA is also involved in a partnership with the University of Pretoria's Department of Financial Management (University of Pretoria, 2007). The company provides the university

with the necessary research data. According to Brummer (2008:8) the McGregor BFA database has a fixed standardisation of the company's financial statements in order for the user to compare results.

### 3.2.3.2 Calculation of the intrinsic share value

In chapter two it was stated that the intrinsic share value will be determined with the corporate valuation model Figure 3.1 shows the components of the corporate valuation model and where the data originate from:

#### Exhibit 3.1: The corporate valuation model.

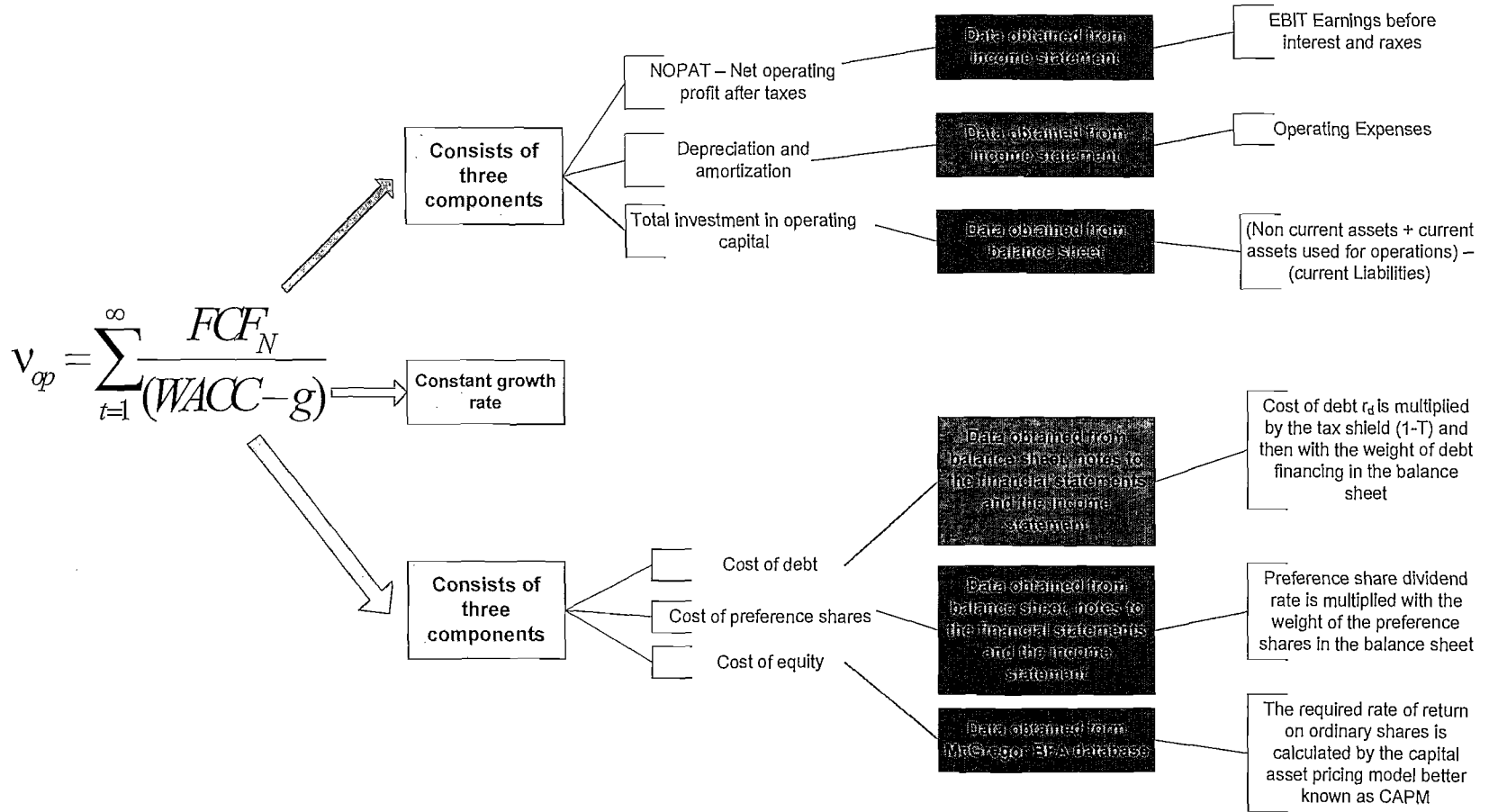
$$V_{op} = \sum_{t=1}^{\infty} \frac{FCF_N}{(WACC-g)}$$

Where:

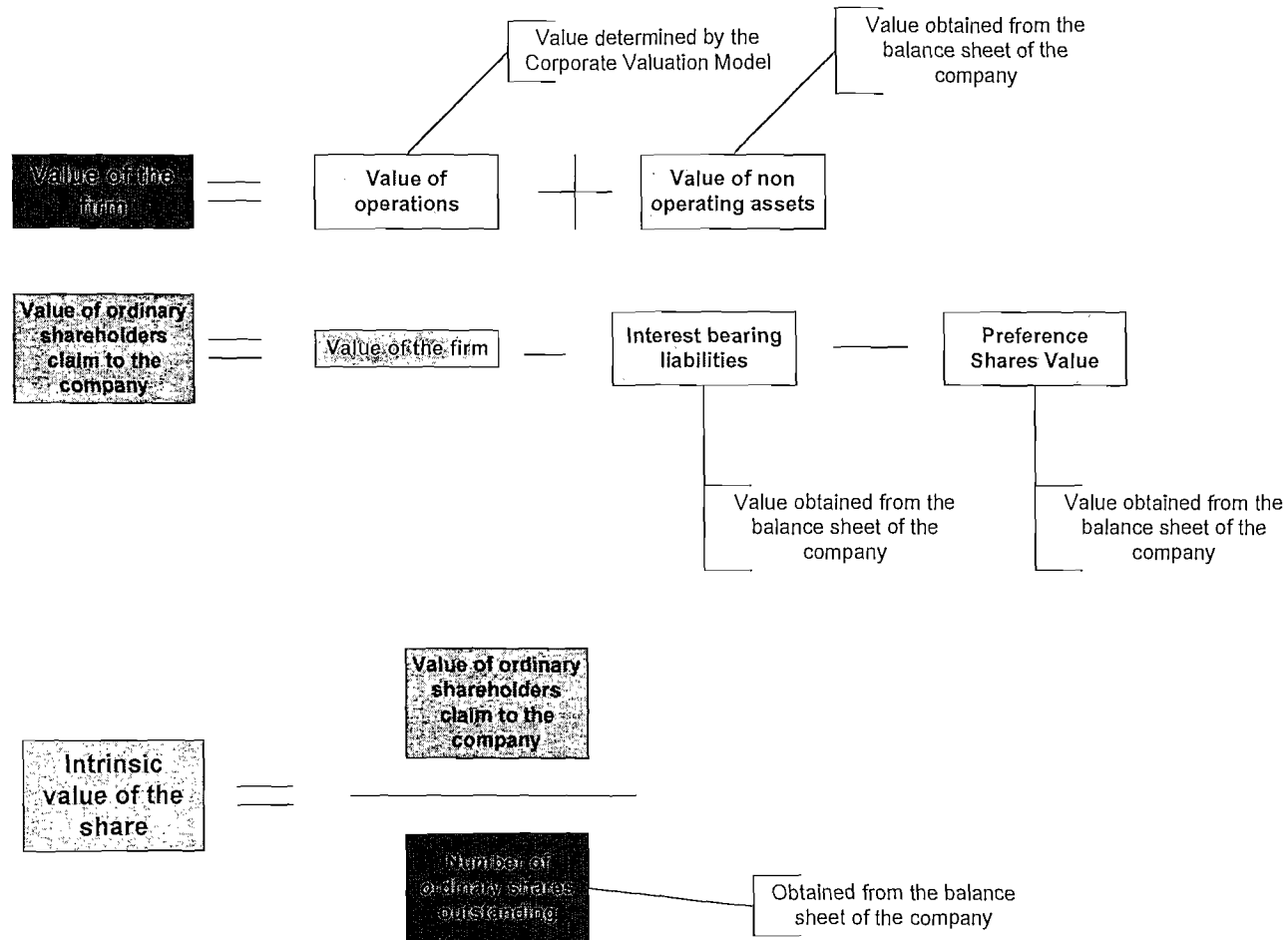
- $V_{op}$  = Value of operations.
- $FCF_N$  = Free Cash flow year t.
- WACC = Weighted Average Cost of Capital.
- g = Constant growth rate.

The intrinsic value of the share was determined as follow and as depicted in figure 3.1 and figure 3.2: The free cash flow from operations was calculated by deducting the company tax rate from the earnings before interest and tax to obtain the net operating profit after taxes (NOPAT). The investment in operating capital was determined by deducting the previous years operating capital from the year under investigations operating capital. Operating capital is equal to non current operating assets plus current operating assets minus current liabilities. The net investment in operating capital was calculated by deducting the previous financial years operating capital from the specific years operating capital.

Figure 3.1: The components of the corporate valuation model.



**Figure 3.2:** The process involving the determination of the intrinsic valuation model.



All asset values used in the determination of the operating capital values were net of depreciation and amortization. Therefore depreciation and amortization was not added to net operating profit after taxes. The calculation of free cash flow was done for each year.

The weighted average cost of capital was determined by establishing first the cost of debt, then cost of preference shares and finally the cost of ordinary shares. To calculate the cost of debt, the weight of debt in the balance sheet was calculated first. The prime interest rate for the specific year was used to determine the cost of debt. The company tax rate for each year was used as the tax rate to establish the effect of the tax shield. Preference shares were not in use for most of the companies. Preference share costs were calculated for the companies that uses this form of capital for that specific year. The last component of the weighted average cost of capital is the cost of ordinary shares. To determine the cost of the ordinary shares or equity the capital asset pricing model was used. The model is as follows:

**Exhibit 3.2: The capital asset pricing model.**

$$r_s = r_{RF} + (RP_M) * b$$

Where:

$r_s$  = Required or minimum rate of return on ordinary shares.

$r_{RF}$  = The risk free rate.

$RP_M$  = Risk premium of the stock market.

$b$  = Beta coefficient for the specific company.

To determine the required rate of return for each company's shares the following data was obtained from McGregor BFA: real market beta (5 year average), average return on the JSE Limited All Share Index for each year. The risk free rate was set at the return rate of government ten year bonds for each year. The risk premium of the stock market is determined by deducting the risk free rate from the market portfolio required rate of return for each year. Due to the volatility of the rate of return on the All Share Index three scenarios was set to determine the required rate of return. The first value for the rate of return on the All Share Index was that of each year included in the study. The second value the rate of return on the All Share Index was set at the 40 year average of 13%. The final rate of return on the All Share Index was set at the average return of the JSE Limited Food Producer Index over the period of the study (1992 to 2007) which was equal to 18.69%. The three scenarios gave three different values for the weighted average cost of capital. The reason for the three different scenarios will be dealt with in a later section.

The final component of the corporate valuation model is the constant growth rate which was set at 6%. The constant growth rate was derived from the risk premium of the stock market. This means that a marginal investor holding a portfolio of the All Share Index would have earned 6% more than the risk free rate for the last forty years.

Due to the fact that three different market return averages were used the corporate valuation model calculated three different intrinsic values. This was for each company over each year of the study.

### **3.2.3.3 Determination of the share price and change in share price**

The financial data for each company was obtained from McGregor BFA for the end of each financial year. The financial year end share price was taken to compare with the intrinsic share value. The change in share price was

determined by subtracting the previous years share price from the current year and divide by the previous year share price. Change in share price:

**Exhibit 3.3: Change in share price formula.**

$$\Delta P = \frac{P_n - P_{n-1}}{P_{n-1}} \times 100\%$$

Where:

$\Delta P$  = Change in share price.

$P_n$  = The current year market share price.

$P_{n-1}$  = The previous year market share price.

**3.2.3.4 Statistical analysis: simple linear regression**

This study is concerned with the relationship between the intrinsic share value and the **change in market share price** and **market share price**. In order to determine whether a relationship exist a simple linear regression was performed. Data was analysed by Statistical Services of the North West University Potchefstroom Campus.

A simple linear regression is a study of the relationship between a dependent variable and independent variable (Levine *et al.*, 2005:512). This relationship can explain the effect that a change in the independent variable has on the dependent variable. The regression equation is:

**Exhibit 3.4: The simple linear regression equation.**

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

Where:

$Y_i$  = The dependent variable.

$\beta_0$  = The y intercept for the population.

$\beta_1$  = The slope for the population.

$X_i$  = The independent variable.

$\varepsilon_i$  = The random error for each observation in Y.

It is however possible to fit a linear regression line for almost any two variables and determine the slope and y intercept. It is therefore important to test the strength of the linear relationship between the two variables. The strength of the linear relationship is calculated by the coefficient of correlation ( $\rho$ ). As the study consists of a sample of 13 companies the notation  $r$  (coefficient of correlation for the sample) will be used (Levine *et al.*, 2005:138 & Steyn *et al.*, 1998:175). In addition to the determining the strength of the linear relationship it is crucial to measure the proportion of variation in the dependent variable which can be explained by the independent variable. The coefficient of determination ( $R^2$ ) measures the proportion of variation in the dependent variable which can be explained by the independent variable.

### **Exhibit 3.5: The coefficient of correlation.**

$$r = \frac{\text{cov}(X, Y)}{S_x S_y}$$

Where:

$r$  = Coefficient of correlation for the sample.

$\text{Cov}(X, Y)$  = The co-variance for variable X and Y.

$S_x$  = The standard error for the independent variable sample X.

$S_y$  = The standard error for the dependent variable sample Y.

(Levine *et al.*, 2005:140)

### Exhibit 3.6: The coefficient of determination.

$$R^2 = \frac{\text{explained variation}}{\text{total variation}} = \frac{\text{Regression sum of squares}}{\text{Total sum of squares}}$$

Where:

$R^2$  = The coefficient of determination for the sample (Levine *et al.*, 2005:525).

Regression sum of squares (SSR) = Represents the variation of the dependent variable which is attributed to the regression relationship with the independent variable (Levine *et al.*, 2005:524).

Total sum of squares (SST) = The variation of observed dependent variables around the mean of the dependent variable (Levine *et al.*, 2005:523).

The value of the coefficient of correlation for the sample can vary from – 1 (perfect negative correlation) to 1 (perfect positive correlation). A value of zero indicates that there is no relationship between the variables. Values for the coefficient of determination will always be positive and will be between zero and one. The coefficient of determination can be expressed in percentage to indicate the measured proportion of variation in the dependent variable that is explained by the independent variable.

#### 3.2.3.5 Test for the significance of the linear relationship

In order to ensure that the relationship between the dependent variable and the independent variable is linear the F test for the slope of the linear regression equation was conducted. A confidence interval of 95% was set as a level of significance. This meant that for all calculated values of the F statistic for the linear relationship to be significant the calculated F should be higher than the critical value of F. The F statistic is calculated as follow:

$$F = \frac{MSR}{MSE}$$

Where:

Regression Mean Square (MSR) = SSR/k. Regression mean square is equal to the regression sum of squares divided by the number of explanatory variables in the regression model.

Error Mean Square (MSE) = SSE/(n – k – 1). The error mean square is equal to the error sum of squares divided by the degrees of freedom n – k – 1.

F = F statistic to test the significance of the slope of the regression equation.

K = The number of explanatory variables in the regression model.

N = The number of observation in the sample.

The F statistic follows an F distribution with k and n – k – 1 degrees of freedom.

### 3.2.4 The simple linear regression

The purpose of this study is to determine whether there is a relationship between the intrinsic share value of the JSE Limited Food Producers index individual shares and the **change in market share price** as well as the **market share price**. Due to the volatility of the required rate of return on the All Share Index three scenarios was set to determine the required rate of return. The first value for the market return on the All Share Index was that of each year included in the study. The second value the market return on the All Share Index was set at the 40 year average of 13%. The final market return on the All Share Index was set at the average return of the JSE Limited Food Producer Index over the period of the study (1992 to 2007) which was equal to 18.69%. The three scenarios gave three different values for the weighted average cost of capital.

To test the possible relationship between the variables the following analysis was performed:

- i. A simple linear regression with the dependent variable the ***change in market share price*** from one year to the next and the independent variable the intrinsic share value. This was done for **each company** over all the years of the study for all three market return scenarios.
- ii. A simple linear regression with the dependent variable the ***change in market share price*** from one year to the next and independent variable the intrinsic share value. This was done for **each year** over all the companies of the study for all three market return scenarios.
- iii. A simple linear regression with the dependent variable the **market share price** and the independent variable the intrinsic share value. This was done for **each company** over all the years of the study for all three market return scenarios.
- iv. A simple linear regression with the dependent variable the **market share price** and the independent variable the intrinsic share value. This was done for **each year** over all the companies of the study for all three market return scenarios.

### **3.3 The data analysis of the empirical study**

#### **3.3.1 The linear regression of the *change in market share price* and the intrinsic share value**

In order to test the strength of the relationship between the dependent and independent variable a simple linear regression was performed. The regression

analysis was first done on the **change in market share price** and the three different intrinsic values. The analysis was also done for each company over all the years and for each year over all the companies.

**3.3.1.1 The change in market share price and the intrinsic share value calculated by the market return rate for each year (scenario 1) for each company.**

The linear regression was performed on the dependent variable the **change in market share price** and the independent variable the intrinsic share value determined with market required rate of return for each year for **each company**.

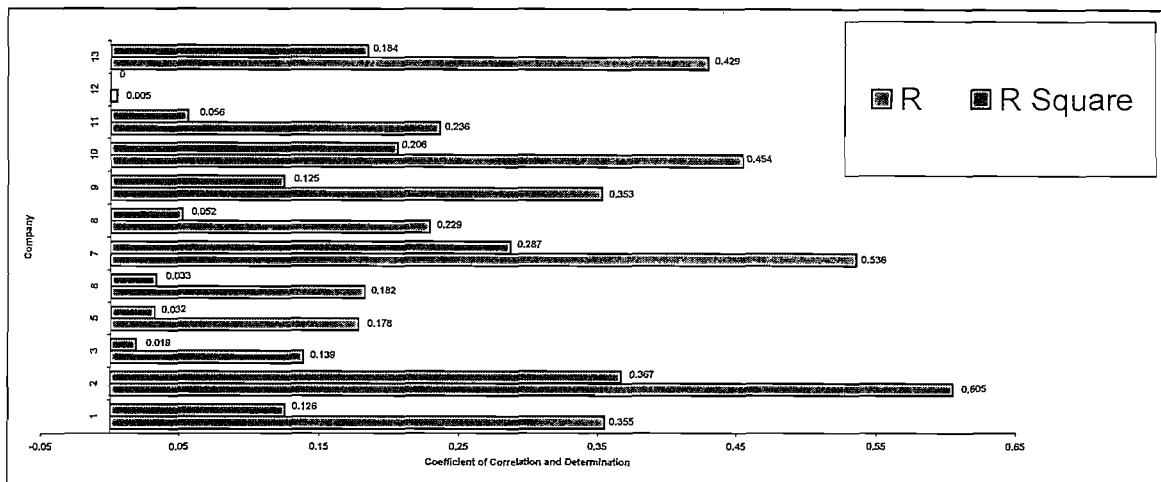
Table 3.2 displays the results of the linear regression of the **change in market share price** and the intrinsic share value determined with the actual market return for every year.

**Table 3.2: Change in market share price and the intrinsic share value calculated with the annual market return (scenario 1).**

Company	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.727	0.529	8.983	0.017	Moderate	Yes
2	0.638	0.407	2.742	0.173	Moderate	No
3	0.001	0	0	0.998	Weak	No
5	0.02	0	0.006	0.941	Weak	No
6	0.095	0.009	0.054	0.824	Weak	No
7	0.094	0.009	0.124	0.73	Weak	No
8	0.363	0.132	2.124	0.167	Weak	No
9	0.002	0	0	0.994	Weak	No
10	0.622	0.386	8.819	0.01	Moderate	Yes
11	0.014	0	0.003	0.961	Weak	No
12	0.647	0.419	10.096	0.007	Moderate	Yes
13	0.27	0.073	1.103	0.311	Moderate	No

There are only three companies which show significant correlation between the variables. These are companies 1, 10 and 12 for which the coefficient of correlation is higher than 0.5.

**Graph 3.1: *Change in market share price* and the intrinsic share value intrinsic share value calculated with the annual market return (scenario 1).**



The value of the dependent variable the ***change in market share price*** is only (with  $R^2 = 0.529$ ) 52.9% dependent on the intrinsic share value for company one. Company ten the dependence is only 38.6% (with  $R^2 = 0.386$ ) and company 12 only 41.9% (with  $R^2 = 0.419$ ). Apart from these three companies not mentionable linear relationships exist between the ***change in market share price*** and the intrinsic value for this scenario. The results are graphically depicted in graph 3.1.

**3.3.1.2 The *change in market share price* and the intrinsic share value calculated by the average market rate from the forty year average (scenario 2) for each company.**

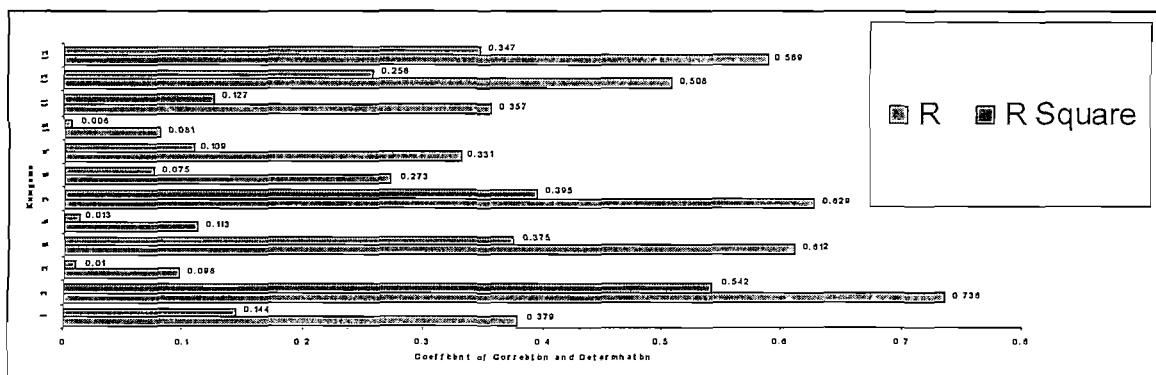
The linear regression was performed on the dependent variable the ***change in market share price*** and the independent variable the intrinsic share value determined with forty year average return rate of the JSE Limited All Share Index (13%).

**Table 3.3: Change in market share price and the intrinsic share value** calculated with the forty year average market return (scenario 2).

Company	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.749	0.561	10.219	0.013	Moderate	Yes
2	0.468	0.219	1.124	0.349	Weak	No
3	0.007	0	0.001	0.978	Weak	No
5	0.096	0.009	0.13	0.723	Weak	No
6	0.052	0.003	0.016	0.903	Weak	No
7	0.122	0.015	0.211	0.653	Weak	No
8	0.348	0.121	1.93	0.186	Weak	No
9	0.179	0.032	0.297	0.599	Weak	No
10	0.084	0.007	0.1	0.757	Weak	No
11	0.221	0.049	0.617	0.448	Weak	No
12	0.164	0.027	0.389	0.543	Weak	No
13	0.068	0.005	0.066	0.801	Moderate	No

From table 3.3 it is evident that only company one show significant correlation between the **change in market share price** and the intrinsic share value based on scenario two calculations. The coefficient of determination suggest that 56.1% (with  $R^2 = 0.561$ ) of the variance in the change in share price is dependent on the intrinsic value. All the other companies show no significant relationships between the variables. The results of the simple linear regression are depicted in graph 3.2.

**Graph 3.2: Change in market share price and the intrinsic share value** calculated with the forty year average market return (scenario 2).



**3.3.1.3 The *change in market share price* and the intrinsic share value calculated by the average market return rate of the Food Producers Index for 16 years (scenario 3) for each company.**

The linear regression was performed on the dependent variable the ***change in market share price*** and the independent variable the intrinsic share value determined with average rate of return on the Food Producer Index of the JSE Limited.

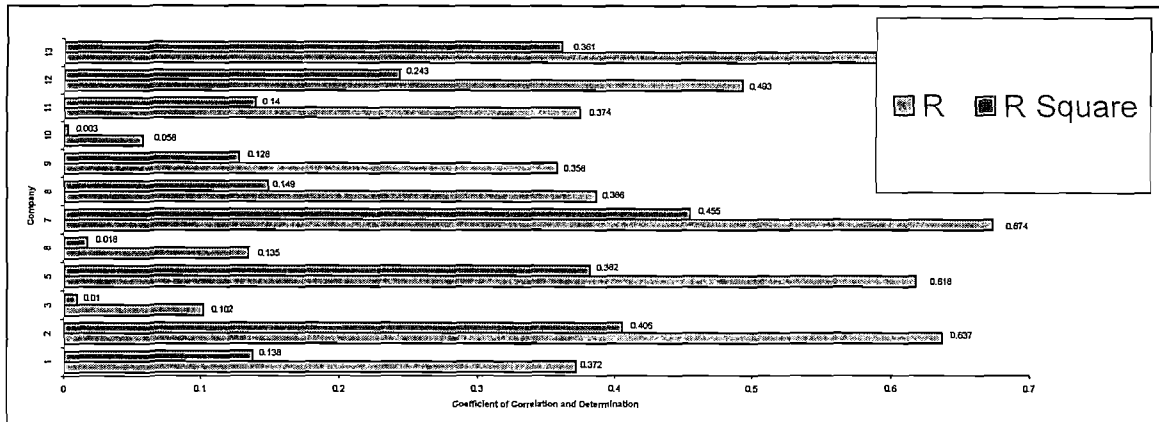
As with the results for scenario 2, only company one shows a linear relationship between the **market share price** and the intrinsic share value. With this scenario the **market share price** is more dependent on the intrinsic value of the share.

**Table 3.4: *Change in market share price* and the intrinsic share value calculated by average return on the Food Producers Index (scenario 3).**

Company	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.763	0.582	11.133	0.01	Strong	Yes
2	0.578	0.334	2.01	0.229	Moderate	No
3	0.004	0	0	0.989	Weak	No
5	0.105	0.011	0.155	0.7	Weak	No
6	0.063	0.004	0.024	0.883	Weak	No
7	0.132	0.017	0.249	0.626	Weak	No
8	0.312	0.097	1.506	0.24	Weak	No
9	0.143	0.021	0.189	0.674	Weak	No
10	0.044	0.002	0.028	0.871	Weak	No
11	0.225	0.051	0.642	0.439	Weak	No
12	0.201	0.04	0.587	0.456	Weak	No
13	0.087	0.008	0.107	0.749	Moderate	No

This is shown by the moderate increased value of the coefficient of correlation with state 58.2% (with R<sup>2</sup> = 0.582) of the variation in the ***change in market share price*** can be related to the intrinsic value. These results are depicted in graph 3.3.

**Graph 3.3: Change in market share price and the intrinsic share value calculated by average return on the Food Producers Index (scenario 3).**



**3.3.1.4 The change in market share price and the intrinsic share value calculated by the market return rate for each year (scenario 1).**

The linear regression was performed on the dependent variable the **change in market share price** and the independent variable the intrinsic share value determined with actual return of the JSE Limited All Share Index for each year of the study.

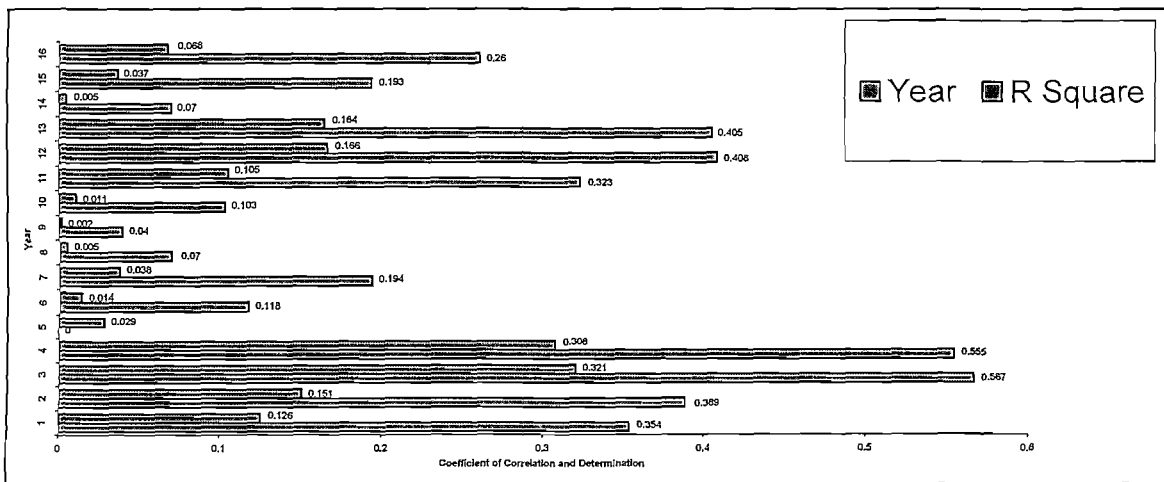
It is evident from Table 3.5 that there is no linear relationship between the **change in market share price** and the intrinsic value for scenario one. Only year 3 and four shows moderate correlation between the variables.

**Table 3.5: Change in market share price** and the intrinsic share value calculated with forty year average market return (scenario 2).

Year	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.354	0.126	0.718	0.435	Weak	No
2	0.389	0.151	0.893	0.388	Weak	No
3	0.567	0.321	2.836	0.143	Moderate	No
4	0.555	0.308	2.671	0.153	Moderate	No
5	0.169 <sup>a</sup>	0.029	0.176	0.689	Weak	No
6	0.118	0.014	0.099	0.762	Weak	No
7	0.194	0.038	0.314	0.591	Weak	No
8	0.07	0.005	0.039	0.848	Weak	No
9	0.04	0.002	0.014	0.908	Weak	No
10	0.103	0.011	0.097	0.763	Weak	No
11	0.323	0.105	1.169	0.305	Weak	No
12	0.408	0.166	1.992	0.188	Weak	No
13	0.405	0.164	1.966	0.191	Weak	No
14	0.07	0.005	0.049	0.829	Weak	No
15	0.193	0.037	0.388	0.547	Weak	No
16	0.26	0.068	0.727	0.414	Weak	No

This correlation is not significant at a 95% confidence interval. The results of the regression analysis are shown in graph 3.4.

**Graph 3.4: Change in market share price** and the intrinsic share value calculated with forty year average market return (scenario 2).



**3.3.1.5 The *change in market share price* and the intrinsic share value calculated by the market return rate from the forty year average (scenario 2).**

The linear regression was performed on the dependent variable the ***change in market share price*** and the independent variable the intrinsic share value. The intrinsic value was determined with the forty year average of the JSE Limited All Share Index.

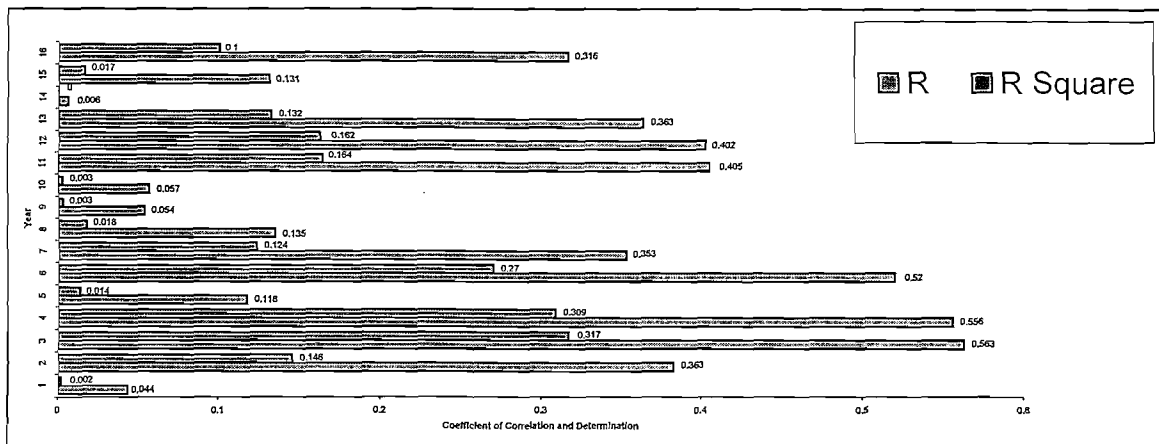
As with the results in section 3.5.4 where there is no correlation over all the years of the study, it is the same with the variables in table 3.6. Once again there is a possible correlation between the variables for years 3 and 4.

**Table 3.6: *Change in market share price* and the intrinsic share value calculated with the forty year average market return (scenario 2).**

Year	R	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.044	0.002	0.01	0.926	Weak	No
2	0.383	0.146	0.857	0.397	Weak	No
3	0.563	0.317	2.782	0.146	Moderate	No
4	0.556	0.309	2.683	0.153	Moderate	No
5	0.118	0.014	0.085	0.781	Weak	No
6	0.52	0.27	2.594	0.151	Moderate	No
7	0.353	0.124	1.135	0.318	Weak	No
8	0.135	0.018	0.149	0.71	Weak	No
9	0.054	0.003	0.026	0.874	Weak	No
10	0.057	0.003	0.029	0.868	Weak	No
11	0.405	0.164	1.961	0.192	Weak	No
12	0.402	0.162	1.929	0.195	Weak	No
13	0.363	0.132	1.521	0.246	Weak	No
14	0.006	0	0	0.986	Weak	No
15	0.131	0.017	0.173	0.686	Weak	No
16	0.316	0.1	1.109	0.317	Weak	No

The correlation is however not significant due to fact that it is not within the 95% confidence interval for both years. Graph 3.5 depicts the values of the simple linear regression.

**Graph 3.5: *Change in market share price* and the intrinsic share value calculated with the forty year average market return (scenario 2).**



**3.3.1.6 The *change in market share price* and the intrinsic share value calculated by the average market return rate of the Food Producers Index for 16 years (scenario 3) for each year.**

The linear regression was performed on the dependent variable the ***change in market share price*** and the independent variable the intrinsic share value. The intrinsic share value was determined with average rate of return on the Food Producer Index of the JSE Limited.

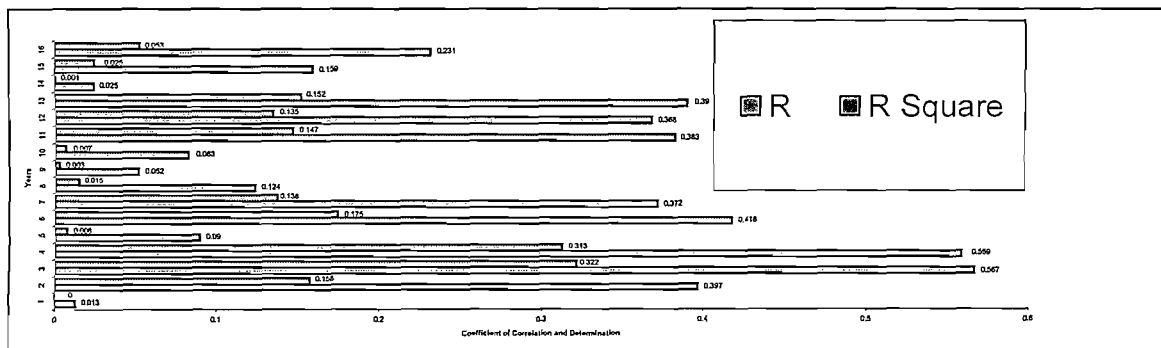
There is no significant linear relationship between the ***change in market share price*** and the intrinsic share value for scenario three.

**Table 3.7: Change in market share price** and the intrinsic share value calculated by average return on the Food Producers Index (scenario 3).

Year	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.013	0	0.001	0.977	Weak	No
2	0.397	0.158	0.936	0.378	Weak	No
3	0.567	0.322	2.846	0.143	Moderate	No
4	0.559	0.313	2.73	0.15	Moderate	No
5	0.09	0.008	0.049	0.832	Weak	No
6	0.418	0.175	1.485	0.262	Weak	No
7	0.372	0.138	1.286	0.29	Weak	No
8	0.124	0.015	0.124	0.734	Weak	No
9	0.052	0.003	0.024	0.88	Weak	No
10	0.083	0.007	0.062	0.809	Weak	No
11	0.383	0.147	1.72	0.219	Weak	No
12	0.368	0.135	1.565	0.239	Weak	No
13	0.39	0.152	1.797	0.21	Weak	No
14	0.025	0.001	0.006	0.938	Weak	No
15	0.159	0.025	0.259	0.622	Weak	No
16	0.231	0.053	0.563	0.47	Weak	No

This is evident from table 3.7 which shows that for all the years tested not one year showed correlation between the variables which was within the 95% confidence interval. This results are depicted in graph 3.6.

**Graph 3.6: Change in market share price** and the intrinsic share value calculated by average return on the Food Producers Index (scenario 3).



### 3.3.2 The results of the linear regression for the market share price and the intrinsic share value.

In order to test the strength of the relationship between the dependent and independent variable a simple linear regression was performed. The regression analysis was first done on the **market share price** and the three different intrinsic values. The analysis was also done for **each company** over all the years and for **each year** over all the companies.

#### 3.3.2.1 The market share price and the intrinsic share value calculated by the market required rate of return for each year (scenario 1) for each company.

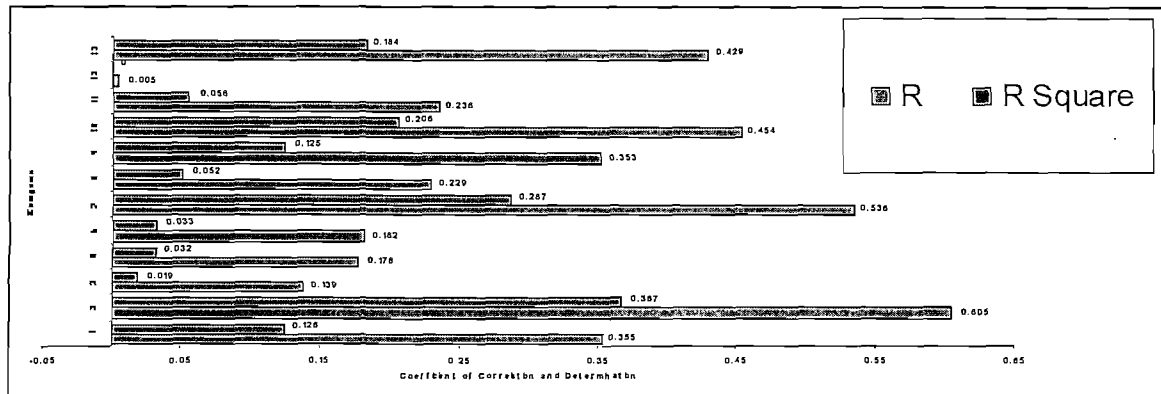
The linear regression was performed on the dependent variable the **market share price** and the independent variable the intrinsic share value. The intrinsic share value was determined with the actual JSE Limited All Share Index rate of return for each year of the study.

**Table 3.8:** The **market share price** and the intrinsic share value calculated with the annual market return (scenario 1).

Company	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.355	0.126	1.294	0.285	Weak	No
2	0.605	0.367	3.472	0.112	Moderate	No
3	0.139	0.019	0.277	0.607	Weak	No
5	0.178	0.032	0.459	0.509	Weak	No
6	0.182	0.033	0.24	0.639	Weak	No
7	0.536	0.287	5.631	0.033	Moderate	Yes
8	0.229	0.052	0.775	0.393	Weak	No
9	0.353	0.125	1.427	0.26	Weak	No
10	0.454	0.206	3.637	0.077	Moderate	No
11	0.236	0.056	0.823	0.38	Weak	No
12	0.005	0	0	0.986	Moderate	No
13	0.429	0.184	3.166	0.097	Moderate	No

Only company seven's **market share price** shows a significant correlation with the intrinsic share value. Only 28.7% of the share price can be attributed to the intrinsic share value. This is according to the coefficient of determination (table 3.8).

**Graph 3.7:** The **market share price** and the intrinsic share value calculated with the annual market return (scenario 1).



No other company shows a significant linear relationship within the 95% confidence interval. The results are depicted in graph 3.7.

### 3.3.2.2 The market share price and the intrinsic share value calculated by the average market required rate of return for forty years (scenario 2) for each company.

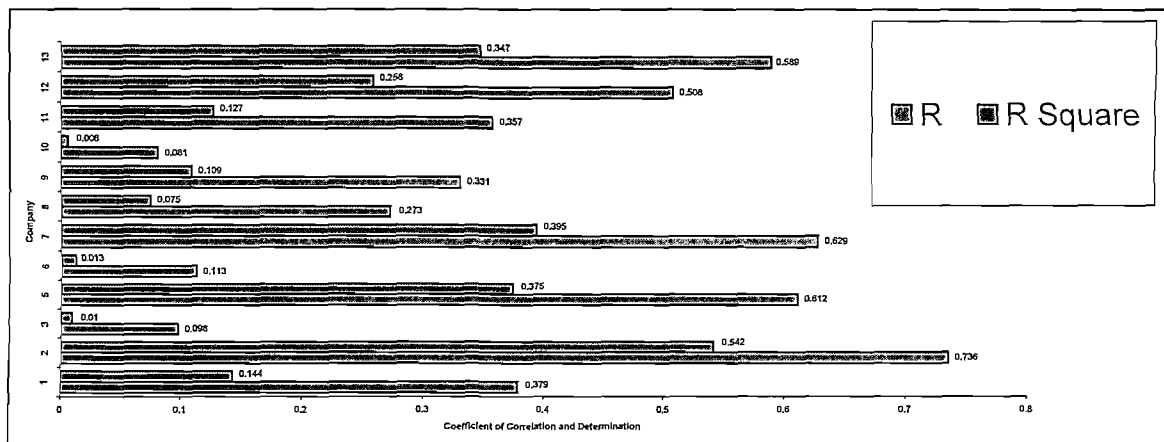
The linear regression was performed on the dependent variable the **market share price** and the independent variable the intrinsic share value.

**Table 3.9:** The market share price and the intrinsic share value calculated with the forty year average market return (scenario 2).

Company	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.379	0.144	1.514	0.25	Weak	No
2	0.736	0.542	7.107	0.037	Strong	Yes
3	0.098	0.01	0.135	0.718	Weak	No
5	0.612	0.375	8.384	0.012	Moderate	Yes
6	0.113	0.013	0.091	0.772	Weak	No
7	0.629	0.395	9.148	0.009	Moderate	Yes
8	0.273	0.075	1.128	0.306	Weak	No
9	0.331	0.109	1.227	0.294	Weak	No
10	0.081	0.006	0.091	0.767	Weak	No
11	0.357	0.127	2.039	0.175	Weak	No
12	0.508	0.258	4.87	0.045	Moderate	Yes
13	0.589	0.347	7.436	0.016	Moderate	Yes

Five companies show significant linear relationships between the variables. These are company 2, 5, 7, 12 and 13. All of these linear relationships are within the 95% confidence interval. Only company two show a value for the coefficient of determination higher than 50% (54.2%). This means that the intrinsic share value explains 54.2% of the share price variation. No other company shows correlation between the variables this is evident from table 3.9 and graph 3.8.

**Graph 3.8:** The market share price and the intrinsic share value calculated with the forty year average market return (scenario 2).



### 3.3.2.3 The market share price and the intrinsic share value calculated by the average market rate of return of the Food Producers Index for 16 years (scenario 3) for each company.

The linear regression was performed on the dependent variable the **market share price** and the independent variable the intrinsic share value. The intrinsic value was determined with average rate of return on the Food Producer Index of the JSE Limited.

Only three companies show a significant linear relationship within the 95% confidence interval. These companies are company 5, 7 and 13. The correlation is however moderate between the variables. Company 7 has a coefficient of 0.455 which shows that the intrinsic value explains the variation in share price by 45.5%.

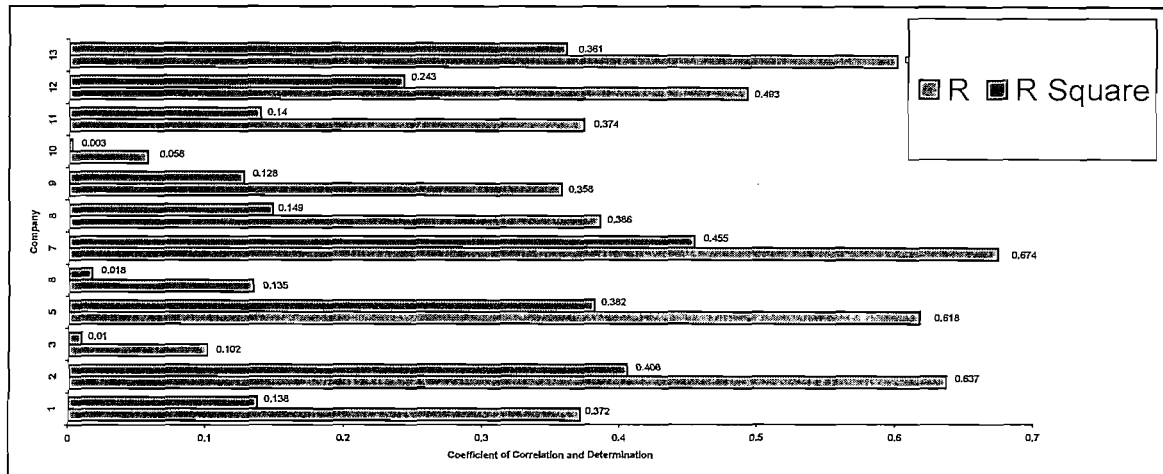
**Table 3.10:** The **market share price** and the intrinsic share value calculated by average return on the Food Producers Index (scenario 3).

Company	r	r <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.372	0.138	1.442	0.26	Weak	No
2	0.637	0.406	4.097	0.089	Moderate	No
3	0.102	0.01	0.148	0.706	Weak	No
5	0.618	0.382	8.668	0.011	Moderate	Yes
6	0.135	0.018	0.129	0.73	Weak	No
7	0.674	0.455	11.671	0.004	Moderate	Yes
8	0.386	0.149	2.446	0.14	Weak	No
9	0.358	0.128	1.469	0.253	Weak	No
10	0.058	0.003	0.047	0.831	Weak	No
11	0.374	0.14	2.282	0.153	Weak	No
12	0.493	0.243	4.496	0.052	Weak	No
13	0.601	0.361	7.9	0.014	Moderate	Yes

Companies 5 and 13 have a coefficient of determination of 0.382 and 0.361 respective. This means that less than 40% of the variance in the share price is

related to the intrinsic value in this scenario. The results are shown in table 3.10 and graph 3.9.

**Graph 3.9:** The market share price and the intrinsic share value calculated by average return on the Food Producers Index (scenario 3).



### 3.3.2.4 The market share price and the intrinsic share value calculated by the market required rate of return for each year (scenario 1) for each year.

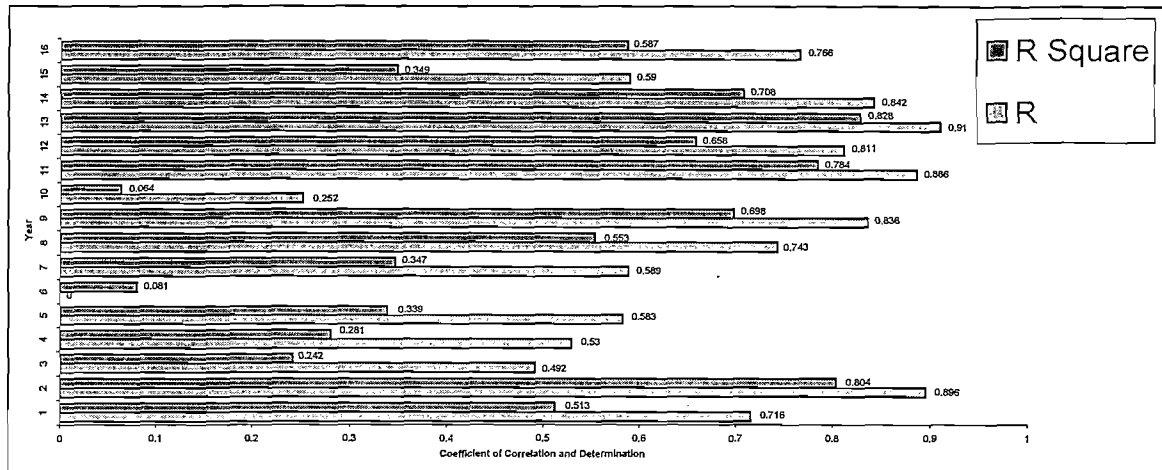
The linear regression was performed on the dependent variable the **market share price** and the independent variable the intrinsic share value. The intrinsic share value was determined with the actual JSE Limited All Share Index rate return for each year of the study.

**Table 3.11:** The **market share price** and the intrinsic share value calculated with the annual market return (scenario 1).

Year	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.716	0.513	6.324	0.046	Strong	Yes
2	0.896	0.804	24.542	0.003	Strong	Yes
3	0.492	0.242	1.917	0.216	Weak	No
4	0.53	0.281	2.344	0.177	Moderate	No
5	0.583	0.339	3.595	0.1	Moderate	No
6	0.284 <sup>a</sup>	0.081	0.701	0.427	Weak	No
7	0.589	0.347	4.243	0.073	Moderate	No
8	0.743	0.553	13.584	0.004	Strong	Yes
9	0.836	0.698	20.824	0.001	Strong	Yes
10	0.252	0.064	0.681	0.429	Weak	No
11	0.886	0.784	36.384	0	Strong	Yes
12	0.811	0.658	19.223	0.001	Strong	Yes
13	0.91	0.828	48.062	0	Strong	Yes
14	0.842	0.708	24.268	0.001	Strong	Yes
15	0.59	0.349	5.354	0.043	Moderate	Yes
16	0.766	0.587	15.624	0.002	Strong	Yes

Out of the 16 years included in the study 10 years show a significant linear relationship between the **market share price** and the intrinsic share value for this scenario. This evident form the results depicted in table 3.11 and graph 3.10. The coefficient of determination for seven of the nine years indicate that the intrinsic share value explain 60% or more of the variance in the **market share price**.

**Graph 3.10:** The **market share price** and the intrinsic share value calculated with the annual market return (scenario 1).



**3.3.2.5 The change in market share price and the intrinsic share value calculated by the average market rate of return for forty years (scenario 2) for each year.**

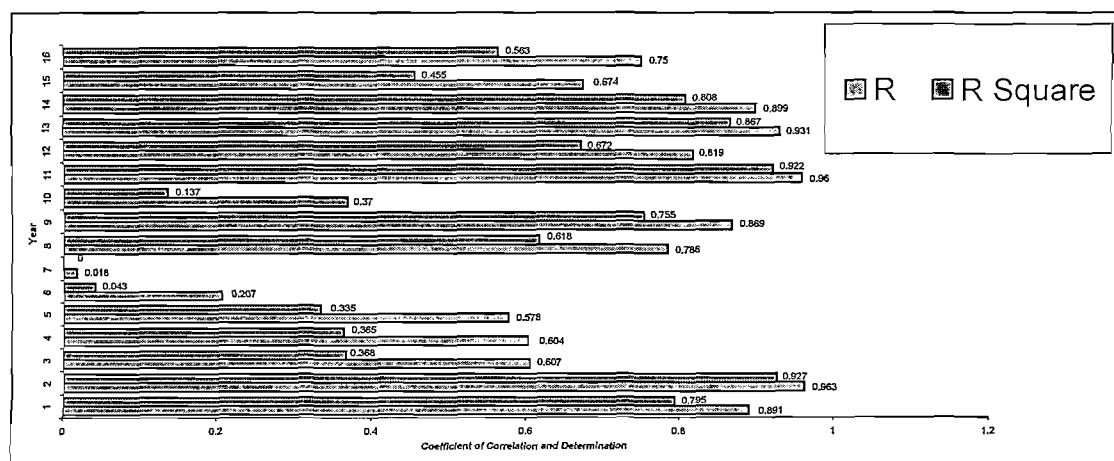
The linear regression was performed on the dependent variable the market share price and the independent variable the intrinsic share value This intrinsic share value scenario delivers another 10 out of 16 years where the **market share price** and intrinsic share vale are linear correlated. All ten of these years coefficient of determination are above 0.6. This means that for these years more than 60% of the variation in the share price is dependent on the variation in intrinsic share value. The results are graphically displayed in graph 3.11.

**Table 3.12:** The market share price and the intrinsic share value calculated with the forty year average market return (scenario 2).

Year	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.891	0.795	23.199	0.003	Strong	Yes
2	0.963	0.927	75.95	0	Strong	Yes
3	0.607	0.368	3.499	0.111	Moderate	No
4	0.604	0.365	3.451	0.113	Moderate	No
5	0.578	0.335	3.519	0.103	Moderate	No
6	0.207	0.043	0.357	0.567	Weak	No
7	0.018	0	0.003	0.961	Weak	No
8	0.786	0.618	17.771	0.001	Strong	Yes
9	0.869	0.755	27.698	0.001	Strong	Yes
10	0.37	0.137	1.587	0.236	Weak	No
11	0.96	0.922	118.411	0	Strong	Yes
12	0.819	0.672	20.448	0.001	Strong	Yes
13	0.931	0.867	64.922	0	Strong	Yes
14	0.899	0.808	41.976	0	Strong	Yes
15	0.674	0.455	8.346	0.016	Moderate	Yes
16	0.75	0.563	14.164	0.003	Strong	Yes

It is evident from the graph that there are also years with no significant correlation between the variables. This is especially true for year 6, 7 and 10 where the coefficient of correlation is less than 0.4.

**Graph 3.11:** The market share price and the intrinsic share value calculated with the forty year average market return (scenario 2).



**3.3.2.6 The market share price and the intrinsic share value calculated by the average market rate of return of the Food Producers Index for 16 years (scenario 3) for each year.**

The linear regression was performed on the dependent variable the **market share price** and the independent variable the intrinsic share value. The intrinsic share value was determined with average rate of return on the Food Producer Index of the JSE Limited.

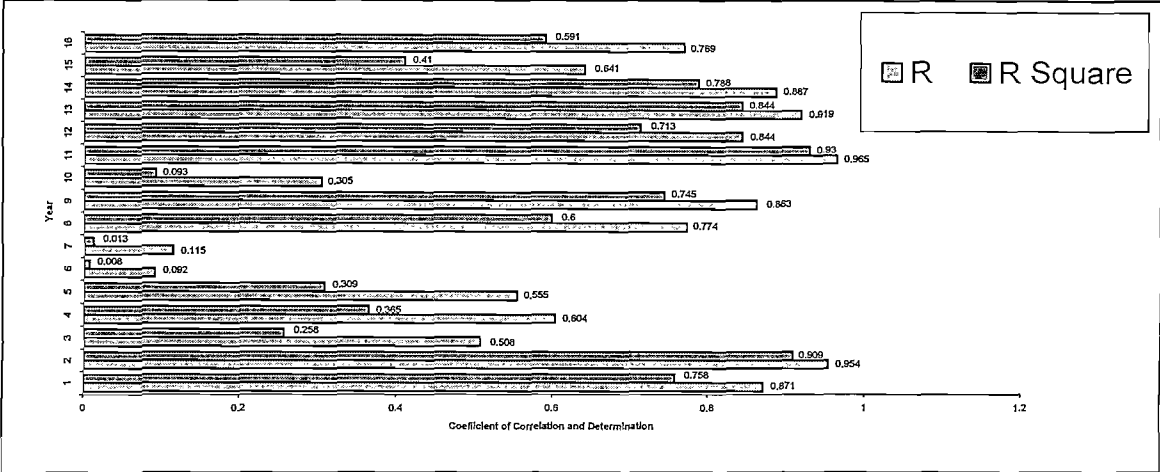
**Table 3.13:** The **market share price** and the intrinsic share value calculated by average return on the Food Producers Index (scenario 3).

Year	r	R <sup>2</sup>	F	Sig.	Correlation	Significance 95%
1	0.871	0.758	18.823	0.005	Strong	Yes
2	0.954	0.909	60.054	0	Strong	Yes
3	0.508	0.258	2.084	0.199	Moderate	No
4	0.604	0.365	3.452	0.113	Moderate	No
5	0.555	0.309	3.123	0.121	Moderate	No
6	0.092	0.008	0.068	0.801	Weak	No
7	0.115	0.013	0.107	0.753	Weak	No
8	0.774	0.6	16.472	0.002	Strong	Yes
9	0.863	0.745	26.242	0.001	Strong	Yes
10	0.305	0.093	1.028	0.334	Weak	No
11	0.965	0.93	133.588	0	Strong	Yes
12	0.844	0.713	24.803	0.001	Strong	Yes
13	0.919	0.844	54.194	0	Strong	Yes
14	0.887	0.788	37.071	0	Strong	Yes
15	0.641	0.41	6.958	0.025	Moderate	Yes
16	0.769	0.591	15.916	0.002	Strong	Yes

For scenario three, ten years show a linear relationship between the variables. Out of the ten year six years display a coefficient of correlation which is larger than 0.8 (graph 3.12). All six years display a coefficient of determination higher than 0.7 (table 3.13). This means that the intrinsic value of the shares explain more than 70% of the market share price. As with scenario 2 there are years for

which the linear relationship is almost non-existing. These are years 6, 7 and 10 were the coefficient of correlation is less than 0.35.

**Graph 3.12:** The market share price and the intrinsic share value calculated by average return on the Food Producers Index (scenario 3).



**3. 4 Summary**

The empirical study was conducted on the thirteen companies of the JSE Limited Food Producer Index. The *change in market share price* and the independent variables the three intrinsic share values for the different market return scenarios relationship are not linear for most of the companies and most of the years.

The dependent variable, **market share price** and the independent variables the three intrinsic share values did not show significant linear relationships for the companies. The relationship is linear for the majority of the years.

The results is discussed in chapter four and compared to the literature and the previous studies.

# Study conclusion and future prospects

## Chapter 4

### 4.1 Introduction

In order to conclude the study it is necessary to align the results with the initial objective of the study. As stated in chapter one the main objective of this study is to investigate whether a relationship exists between the intrinsic share value and the **change in market share price** as well as the **market share price** of the companies shares listed on the JSE Limited Food Producers Index.

In order to simplify discussion of the results obtained from the empirical study it is divided in to two sections. The first section discusses the relationship between the intrinsic share value (for all three scenarios) and the **change in market share price**. The second section discusses the relationship between the intrinsic share value (for all three scenarios) and the **market share price**. In both section the discussion starts with the results for each company over the duration of the study and then for each year over all the companies.

### 4.2. The intrinsic share value and the change in market share price: no clear linear relationship

#### 4.2.1 Study results

The intrinsic share value (each company's over all the years) and the **change in market share price** did not succeed to show significant linear relations. The values of the three scenario regression only showed that for the first scenario only four and for scenario 2 and 3 only one company expresses moderate correlation between the variables.

As stated in empirical study results (table's 3.5.5, 3.5.6 and 3.5.7) there are no linear relationships between the intrinsic share value and the **change in market share price** for each year. This is valid for each year included in the study and for all three intrinsic share value scenarios.

#### **4.2.2 Discussion and future prospects**

The results per company and for each year show significant similarities with the findings of Moolman and Du Toit (2005:88). It is their opinion that in the short term the stock market reacts on the short term different from the long term. The short term fluctuation of the stock market price is based on interest rates, rand and US Dollar exchange rate, Standard and Poor 500 index, the gold prices as well as a risk premium. The long term results in based on the expected present values model and which means the long term share price in determined by the performance of the company. The current study the **change in market share price** does not show a significant relationship with the intrinsic share value. These results show similarity to the results obtained by Appiah-Kusi and Menyah (2003:265). The authors claimed that the shares on the JSE Limited do not react rapidly to new information. A future study can include whether the future price can be predicted from the lagged prices for the shares of the JSE Limited Food Producers Index.

#### **4.3. The linear relationship between the intrinsic share value and the market share price**

##### **4.3.1 Study results**

The relationship between the intrinsic share value and the **market share price** for each company is also very weak. For all three scenarios only 9 companies show a relationship between the variables in total. This means that out of the

possible 39 relationships only 9 shows moderate linear relationship which is significant.

The relationship between the variables for each year of the study is higher than any of the other results already discussed. This means that for each year that there is a linear relationship between the variables the dependent variable variation can be explained by the change in the independent variable. For each intrinsic share value scenario there are six years with no significant relationship with the share price. There is however ten years in each of the scenarios that show significant linear relationships.

#### **4.3.2 Discussion and future prospects**

The relationship between the three intrinsic share values and the market share price is significant for ten years out of the 16 years of the study. This means that for all the companies of the JSE Limited Food Producers Index over each year (of the ten) there is a relationship between the variables. This relationship forms a linear relationship between the share prices of all the companies and all the companies intrinsic share values. This could be judged as relationship between a portfolio share prices and a portfolio intrinsic share value. With a portfolio the risk of investment is easily reduced by means of diversification (Correia *et al.*, 2007:4-17). This diversification of risk is called the diversifiable risk which is unique to each company's industry. These companies are however part of the same industry, the food producers. Although they are in the same industry the companies do not produce the same products. All the companies' end products are diverse. For example companies included in the index produce sugar, fresh produce, canned food, baby food, poultry, and medicinal products. This means for each company different cost driver and different profit margins exist. On the whole everything may differ due to the different sub-industry characteristics.

According to Charles and co-workers (1999:1694) the intrinsic share value and the **market share price** do not necessarily have a static equality. It should rather be seen as a continuous convergence. This argument can explain the relationship between the year results for the simple linear regression of the intrinsic share value and the market share price. According to the results of the empirical study there is a relationship between the variables. This however does not mean that the price and value is the same. It means that these two variables can continuously converge and that the dependent variable is related to the independent. It is only true for the relationship between the intrinsic share value and **market share price** for the complete Food Producers Index over the years.

A future investigation is possible into the similarities of relationship between the intrinsic share value and market share price of companies in the exact same industry. An example would be the poultry industry where number of companies and firms compete with more or less the same company structure as well as the same vertical integration.

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# Intrinsic Values per company for all the years

## Appendix A

Share value and price in ZAR cent

Company Code	Year Code	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
1	1					
1	2					
1	3					
1	4					
1	5					
1	6	707	707	707	522	
1	7	-3,640	-3,640	-3,640	437	-16.28%
1	8	-243	-243	-243	291	-33.41%
1	9	862	862	862	385	32.30%
1	10	7,507	7,507	7,507	569	47.79%
1	11	-2,918	614	474	494	-13.18%
1	12	2,970	2,874	2,442	475	-3.85%
1	13	2,763	3,773	3,055	600	26.32%
1	14	3,150	6,329	5,311	534	-11.00%
1	15	30	69	53	637	19.29%
1	16	1,930	2,054	1,845	698	9.58%
2	1					
2	2					
2	3					
2	4					
2	5					
2	6					
2	7					
2	8					
2	9					
2	10	-12,969	-12,969	-12,969	1,182	
2	11	-317	-317	-317	1,334	12.86%
2	12	7,405	7,405	7,405	2,366	77.36%
2	13	18,759	18,759	18,759	3,945	66.74%
2	14	51,134	51,134	51,134	7,129	80.71%
2	15	6,514	21,882	14,173	8,424	18.17%
2	16	23,728	27,295	21,574	12,110	43.76%

Company Code	Year Code	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
3	1	2,406	2,406	2,406	387	
3	2	937	937	937	270	-30.23%
3	3	228	228	228	953	252.96%
3	4	1,754	1,413	1,216	999	4.83%
3	5	2,214	2,081	1,971	1,700	70.17%
3	6	761	555	515	1,645	-3.24%
3	7	1,181	640	581	1,050	-36.17%
3	8	17	25	23	850	-19.05%
3	9	-162	-148	-144	900	5.88%
3	10	46	50	48	305	-66.11%
3	11	2,765	1,952	1,822	350	14.75%
3	12	-1,107	-1,028	-737	1,000	185.71%
3	13	130	284	161	1,050	5.00%
3	14	60	192	135	1,050	0.00%
3	15	-18,427	-36,964	-30,005	1,000	-4.76%
3	16	-5,350	-6,029	-4,926	1,330	33.00%
4	1					
4	2					
4	3					
4	4					
4	5					
4	6					
4	7					
4	8					
4	9					
4	10					
4	11					
4	12					
4	13					
4	14					
4	15					
4	16	-6,214	-6,214	-6,214	459	
5	1	1,592	-1,014	-672	575	
5	2	-146	-501	-365	470	-18.26%
5	3	178	279	190	605	28.72%
5	4	54	23	16	900	48.76%
5	5	-6,961	-3,370	-2,277	1,310	45.56%
5	6	-671	506	337	1,400	6.87%
5	7	1,024	-834	-593	919	-34.36%
5	8	261	703	577	663	-27.86%
5	9	389	142	116	914	37.86%
5	10	-607	-927	-734	602	-34.14%
5	11	5,003	490	402	1,038	72.43%
5	12	1,785	1,702	1,356	1,249	20.33%
5	13	2,061	3,341	2,387	1,869	49.64%
5	14	563	1,909	1,313	1,427	-23.65%
5	15	1,597	3,072	2,532	2,824	97.90%
5	16	1,985	2,500	1,715	4,014	42.14%

Company Code	Year Code	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
6	1					
6	2					
6	3					
6	4					
6	5					
6	6					
6	7					
6	8	-46	-46	-46	100	
6	9	31	31	31	181	81.00%
6	10	-45	-45	-45	40	-77.90%
6	11	144	144	144	59	47.50%
6	12	308	308	308	60	1.69%
6	13	-29	-49	-34	51	-15.00%
6	14	-99	-386	-249	50	-1.96%
6	15	95	292	198	50	0.00%
6	16	413	455	386	45	-10.00%
7	1	2,297	835	696	1,652	
7	2	1,733	3,797	3,212	2,721	64.71%
7	3	6,453	7,738	6,647	2,600	-4.45%
7	4	228	215	205	496	-80.92%
7	5	324	302	285	419	-15.52%
7	6	1,723	807	700	544	29.83%
7	7	762	437	399	490	-9.93%
7	8	182	420	360	400	-18.37%
7	9	4,019	1,886	1,579	687	71.75%
7	10	861	1,156	988	1,054	53.42%
7	11	6,836	2,424	2,096	1,534	45.54%
7	12	4,560	4,462	3,993	1,646	7.30%
7	13	1,663	1,823	1,717	1,591	-3.34%
7	14	1,421	2,961	2,456	1,559	-2.01%
7	15	3,861	10,507	7,522	1,597	2.44%
7	16	2,633	3,119	2,352	2,124	33.00%
8	1	-530	-530	-530	462	
8	2	521	521	521	228	-50.65%
8	3	139	139	139	362	58.77%
8	4	130	53	35	296	-18.23%
8	5	695	707	719	184	-37.84%
8	6	2,832	-32,963	-7,127	99	-46.20%
8	7	-81	237	126	22	-77.78%
8	8	9	49	31	38	72.73%
8	9	-47	52	30	83	118.42%
8	10	-10	-28	-15	177	113.25%
8	11	-499	953	559	281	58.76%
8	12	-12	-10	-7	354	25.98%
8	13	-110	-226	-135	504	42.37%
8	14	878	3,486	2,229	666	32.14%
8	15	661	2,088	1,394	954	43.24%
8	16	1,374	1,689	1,202	1,417	48.53%

Company Code	Year Code	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
9	1					
9	2					
9	3					
9	4					
9	5	-2,399	-2,399	-2,399	880	
9	6	-259	-259	-259	477	-45.80%
9	7	-204	-204	-204	310	-35.01%
9	8	130	130	130	168	-45.81%
9	9	-238	-238	-238	74	-55.95%
9	10	508	982	671	124	67.57%
9	11	1,561	-1,297	-898	174	40.32%
9	12	-426	-396	-283	180	3.45%
9	13	-143	-180	-154	144	-20.00%
9	14	-283	-1,249	-758	631	338.19%
9	15	-3,066	-6,688	-5,256	931	47.54%
9	16	912	1,115	801	1,374	47.58%
10	1	22,343	-13,525	-9,018	14,009	
10	2	4,571	15,453	11,324	14,397	2.77%
10	3	4,433	7,002	4,739	20,934	45.41%
10	4	-4,615	-1,748	-1,152	2,580	-87.68%
10	5	1,071	577	404	2,196	-14.88%
10	6	-889	517	356	1,587	-27.73%
10	7	-1,155	4,142	2,045	786	-50.47%
10	8	703	3,734	2,404	748	-4.83%
10	9	-23,574	9,845	6,480	645	-13.77%
10	10	2,214	4,562	2,986	948	46.98%
10	11	-1,026	1,046	702	1,391	46.73%
10	12	3,583	3,328	2,394	1,483	6.61%
10	13	2,797	4,526	3,239	1,741	17.40%
10	14	5,756	22,105	14,362	1,295	-25.62%
10	15	5,094	9,913	8,138	1,447	11.74%
10	16	1,814	2,209	1,595	2,036	40.70%
11	1	-476	-476	-476	351	
11	2	951	951	951	280	-20.23%
11	3	-45	-45	-45	536	91.43%
11	4	501	501	501	687	28.17%
11	5	842	842	842	866	26.06%
11	6	-508	-508	-508	846	-2.31%
11	7	1,044	1,044	1,044	473	-44.09%
11	8	-1,314	-1,314	-1,314	629	32.98%
11	9	949	-250	-171	529	-15.90%
11	10	1,467	2,885	1,948	514	-2.84%
11	11	-844	635	446	805	56.61%
11	12	6,520	6,101	4,506	695	-13.66%
11	13	4,575	7,706	5,352	766	10.22%
11	14	1,645	6,311	4,102	796	3.92%
11	15	3,688	7,964	6,284	1,567	96.86%
11	16	1,360	1,648	1,200	1,916	22.27%

Company Code	Year Code	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
12	1	22,461	-6,553	-4,674	4,287	
12	2	743	2,095	1,639	3,908	-8.84%
12	3	4,363	6,259	4,608	4,187	7.14%
12	4	4,281	2,747	2,116	5,377	28.42%
12	5	13,821	8,635	6,399	6,165	14.66%
12	6	-9,924	2,785	2,037	6,992	13.41%
12	7	-33,679	6,962	5,483	4,395	-37.14%
12	8	5,697	18,093	14,142	5,039	14.65%
12	9	293,557	31,493	23,733	5,820	15.50%
12	10	8,125	14,113	10,328	5,799	-0.36%
12	11	-36,725	15,655	11,631	7,169	23.62%
12	12	19,896	18,694	14,032	7,088	-1.13%
12	13	36,683	54,321	41,494	9,575	35.09%
12	14	55,136	76,545	71,291	13,830	44.44%
12	15	8,739	23,538	16,928	14,766	6.77%
12	16	12,264	14,982	10,771	18,664	26.40%
13	1	-10,855	3,597	2,543	2375	
13	2	-273	-841	-637	2021	-14.91%
13	3	1,593	2,320	1,686	3773	86.69%
13	4	6,791	3,122	2,154	4101	8.69%
13	5	-557	-264	-177	5874	43.23%
13	6	5,793	-5,139	-3,334	7126	21.31%
13	7	6,196	-8,522	-5,565	3695	-48.15%
13	8	417	2,310	1,459	4396	18.97%
13	9	-5,079	5,027	2,908	3527	-19.77%
13	10	-408	-911	-565	5179	46.84%
13	11	-9,924	13,543	8,607	4796	-7.40%
13	12	23,807	21,791	14,871	3132	-34.70%
13	13	5,691	10,287	6,772	5204	66.16%
13	14	3,378	14,246	8,844	7719	48.33%
13	15	11,459	27,951	20,987	10913	41.38%
13	16	23,564	32,577	19,453	9134	-16.30%

# Intrinsic values per year for all companies

## Appendix B

Share value and price in ZAR cent

Year	Company	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
1	1					
1	2					
1	3	2,406	2,406	2,406	387	9.94%
1	4					
1	5	1,592	-1,014	-672	575	15.23%
1	6					
1	7	2,297	835	696	1652	13.46%
1	8	-530	-530	-530	462	46.67%
1	9					
1	10	22,343	-13,525	-9,018	14009	34.24%
1	11	-476	-476	-476	351	
1	12	22,461	-6,553	-4,674	4287	20.25%
1	13	-10,855	3,597	2,543	2375	58.65%
2	1					
2	2					
2	3	937	937	937	270	-23.30%
2	4					
2	5	-146	-501	-365	470	-5.81%
2	6					
2	7	1,733	3,797	3,212	2721	86.88%
2	8	521	521	521	228	-27.62%
2	9					
2	10	4,571	15,453	11,324	14397	37.96%
2	11	951	951	951	280	
2	12	743	2,095	1,639	3908	9.62%
2	13	-273	-841	-637	2021	35.00%
3	1					
3	2					
3	3	228	228	228	953	252.96%
3	4					
3	5	178	279	190	605	28.72%
3	6					
3	7	6,453	7,738	6,647	2600	-4.45%
3	8	139	139	139	362	58.77%
3	9					
3	10	4,433	7,002	4,739	20934	45.41%
3	11	-45	-45	-45	536	91.43%
3	12	4,363	6,259	4,608	4187	7.14%
3	13	1,593	2,320	1,686	3773	86.69%

Year	Company	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
4	1					
4	2					
4	3	1,754	1,413	1,216	999	4.83%
4	4					
4	5	54	23	16	900	48.76%
4	6					
4	7	228	215	205	419	-83.88%
4	8	130	53	35	296	-18.23%
4	9					
4	10	-4,615	-1,748	-1,152	2580	-87.68%
4	11	501	501	501	687	28.17%
4	12	4,281	2,747	2,116	5377	28.42%
4	13	6,791	3,122	2,154	4101	8.69%
5	1					
5	2					
5	3	2,214	2,081	1,971	1700	70.17%
5	4					
5	5	-6,961	-3,370	-2,277	1310	45.56%
5	6					
5	7	324	302	285	496	18.38%
5	8	695	707	719	184	-37.84%
5	9	-2,399	-2,399	-2,399	880	
5	10	1,071	577	404	2196	-14.88%
5	11	842	842	842	866	26.06%
5	12	13,821	8,635	6,399	6165	14.66%
5	13	-557	-264	-177	5874	43.23%
6	1	707	707	707	522	
6	2					
6	3	761	555	515	1645	-3.24%
6	4					
6	5	-671	506	337	1400	6.87%
6	6					
6	7	1,723	807	700	544	9.68%
6	8	2,832	-32,963	-7,127	99	-46.20%
6	9	-259	-259	-259	477	-45.80%
6	10	-889	517	356	1587	-27.73%
6	11	-508	-508	-508	846	-2.31%
6	12	-9,924	2,785	2,037	6992	13.41%
6	13	5,793	-5,139	-3,334	7126	21.31%

Year	Company	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
7	1	-3,640	-3,640	-3,640	437	-112.01%
7	2					
7	3	1,181	640	581	1050	63.98%
7	4					
7	5	1,024	-834	-593	919	-210.24%
7	6					
7	7	762	437	399	490	12.23%
7	8	-81	237	126	22	-90.71%
7	9	-204	-204	-204	310	-252.03%
7	10	-1,155	4,142	2,045	786	-81.02%
7	11	1,044	1,044	1,044	473	-54.71%
7	12	-33,679	6,962	5,483	4395	-36.88%
7	13	6,196	-8,522	-5,565	3695	-143.36%
8	1	-243	-243	-243	291	-33.41%
8	2	0	0	0	0	
8	3	17	25	23	850	-19.05%
8	4	0	0	0	0	
8	5	261	703	577	663	-27.86%
8	6	-46	-46	-46	100	
8	7	182	420	360	400	-18.37%
8	8	9	49	31	38	72.73%
8	9	130	130	130	168	-45.81%
8	10	703	3,734	2,404	748	-4.83%
8	11	-1,314	-1,314	-1,314	629	32.98%
8	12	5,697	18,093	14,142	5039	14.65%
8	13	417	2,310	1,459	4396	18.97%
9	1	862	862	862	385	-55.32%
9	2					
9	3	-162	-148	-144	900	-706.27%
9	4					
9	5	389	142	116	914	542.07%
9	6	31	31	31	181	475.70%
9	7	4,019	1,886	1,579	687	-63.58%
9	8	-47	52	30	83	58.41%
9	9	-238	-238	-238	74	-131.07%
9	10	-23,574	9,845	6,480	645	-93.45%
9	11	949	-250	-171	529	-311.38%
9	12	293,557	31,493	23,733	5820	-81.52%
9	13	-5,079	5,027	2,908	3527	-29.84%

Year	Company	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
10	1	7,507	7,507	7,507	569	47.79%
10	2	-12,969	-12,969	-12,969	1182	
10	3	46	50	48	305	-66.11%
10	4					
10	5	-607	-927	-734	602	-34.14%
10	6	-45	-45	-45	40	-77.90%
10	7	861	1,156	988	1054	53.42%
10	8	-10	-28	-15	177	113.25%
10	9	508	982	671	124	67.57%
10	10	2,214	4,562	2,986	948	46.98%
10	11	1,467	2,885	1,948	514	-2.84%
10	12	8,125	14,113	10,328	5799	-0.36%
10	13	-408	-911	-565	5179	46.84%
11	1	-2,918	614	474	494	-13.18%
11	2	-317	-317	-317	1334	12.86%
11	3	2,765	1,952	1,822	350	14.75%
11	4					
11	5	5,003	490	402	1038	72.43%
11	6	144	144	144	59	47.50%
11	7	6,836	2,424	2,096	1534	45.54%
11	8	-499	953	559	281	58.76%
11	9	1,561	-1,297	-898	174	40.32%
11	10	-1,026	1,046	702	1391	46.73%
11	11	-844	635	446	805	56.61%
11	12	-36,725	15,655	11,631	7169	23.62%
11	13	-9,924	13,543	8,607	4796	-7.40%
12	1	2,970	2,874	2,442	475	-3.85%
12	2	7,405	7,405	7,405	2366	77.36%
12	3	-1,107	-1,028	-737	1000	185.71%
12	4					
12	5	1,785	1,702	1,356	1249	20.33%
12	6	308	308	308	60	1.69%
12	7	4,560	4,462	3,993	1646	7.30%
12	8	-12	-10	-7	354	25.98%
12	9	-426	-396	-283	180	3.45%
12	10	3,583	3,328	2,394	1483	6.61%
12	11	6,520	6,101	4,506	695	-13.66%
12	12	19,896	18,694	14,032	7088	-1.13%
12	13	23,807	21,791	14,871	3132	-34.70%

Year	Company	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
13	1	2,763	3,773	3,055	600	26.32%
13	2	18,759	18,759	18,759	3945	66.74%
13	3	130	284	161	1050	5.00%
13	4					
13	5	2,061	3,341	2,387	1869	49.64%
13	6	-29	-49	-34	51	-15.00%
13	7	1,663	1,823	1,717	1591	-3.34%
13	8	-110	-226	-135	504	42.37%
13	9	-143	-180	-154	144	-20.00%
13	10	2,797	4,526	3,239	1741	17.40%
13	11	4,575	7,706	5,352	766	10.22%
13	12	36,683	54,321	41,494	9575	35.09%
13	13	5,691	10,287	6,772	5204	66.16%
14	1	3,150	6,329	5,311	534	-11.00%
14	2	51,134	51,134	51,134	7129	80.71%
14	3	60	192	135	1050	0.00%
14	4					
14	5	563	1,909	1,313	1427	-23.65%
14	6	-99	-386	-249	50	-1.96%
14	7	1,421	2,961	2,456	1559	-2.01%
14	8	878	3,486	2,229	666	32.14%
14	9	-283	-1,249	-758	631	338.19%
14	10	5,756	22,105	14,362	1295	-25.62%
14	11	1,645	6,311	4,102	796	3.92%
14	12	55,136	76,545	71,291	13830	44.44%
14	13	3,378	14,246	8,844	7719	48.33%
15	1	30	69	53	637	19.29%
15	2	6,514	21,882	14,173	8424	18.17%
15	3	-18,427	-36,964	-30,005	1000	-4.76%
15	4					
15	5	1,597	3,072	2,532	2824	97.90%
15	6	95	292	198	50	0.00%
15	7	3,861	10,507	7,522	1597	2.44%
15	8	661	2,088	1,394	954	43.24%
15	9	-3,066	-6,688	-5,256	931	47.54%
15	10	5,094	9,913	8,138	1447	11.74%
15	11	3,688	7,964	6,284	1567	96.86%
15	12	8,739	23,538	16,928	14766	6.77%
15	13	11,459	27,951	20,987	10913	41.38%

Year	Company	scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
16	1	1,930	2,054	1,845	698	9.58%
16	2	23,728	27,295	21,574	12110	43.76%
16	3	-5,350	-6,029	-4,926	1330	33.00%
16	4	-6,214	-6,214	-6,214	459	
16	5	1,985	2,500	1,715	4014	42.14%
16	6	413	455	386	45	-10.00%
16	7	2,633	3,119	2,352	2124	33.00%
16	8	1,374	1,689	1,202	1417	48.53%
16	9	912	1,115	801	1374	47.58%
16	10	1,814	2,209	1,595	2036	40.70%
16	11	1,360	1,648	1,200	1916	22.27%
16	12	12,264	14,982	10,771	18664	26.40%
16	13	23,564	32,577	19,453	9134	-16.30%

# Correlation table

## Appendix C

### Company results

Correlations							
Company Code			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
1	scenario 1 Intrinsic Value	Correlation	1	0.906	0.923	0.355	0.631
		Sig.		0	0	0.285	0.05
		N	11	11	11	11	10
	scenario 2 Intrinsic Value	Correlation	0.906	1	0.995	0.379	0.491
		Sig.	0		0	0.25	0.149
		N	11	11	11	11	10
	scenario 3 Intrinsic Value	Correlation	0.923	0.995	1	0.372	0.531
		Sig.	0	0		0.26	0.114
		N	11	11	11	11	10
	Price	Correlation	0.355	0.379	0.372	1	0.496
		Sig.	0.285	0.25	0.26		0.145
		N	11	11	11	11	10
	Change in Price	Correlation	0.631	0.491	0.531	0.496	1
		Sig.	0.05	0.149	0.114	0.145	
		N	10	10	10	10	10
2	scenario 1 Intrinsic Value	Correlation	1	.961**	.988**	0.572	0.638
		Sig.		0.001	0	0.18	0.173
		N	7	7	7	7	6
	scenario 2 Intrinsic Value	Correlation	0.961	1	0.987	0.709	0.468
		Sig.	0.001		0	0.074	0.349
		N	7	7	7	7	6
	scenario 3 Intrinsic Value	Correlation	0.988	0.987	1	0.602	0.578
		Sig.	0	0		0.152	0.229
		N	7	7	7	7	6
	Price	Correlation	0.572	0.709	0.602	1	-0.068
		Sig.	0.18	0.074	0.152		0.898
		N	7	7	7	7	6
	Change in Price	Correlation	0.638	0.468	0.578	-0.068	1
		Sig.	0.173	0.349	0.229	0.898	
		N	6	6	6	6	6

		Correlations					
Company Code			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
3	scenario 1 Intrinsic Value	Correlation	1	0.984	0.986	-0.139	0.049
		Sig.		0	0	0.607	0.861
		N	16	16	16	16	15
	scenario 2 Intrinsic Value	Correlation	0.984	1	1	-0.098	0.083
		Sig.	0		0	0.718	0.77
		N	16	16	16	16	15
	scenario 3 Intrinsic Value	Correlation	0.986	1	1	-0.102	0.084
		Sig.	0	0		0.706	0.765
		N	16	16	16	16	15
	Price	Correlation	-0.139	-0.098	-0.102	1	0.241
		Sig.	0.607	0.718	0.706		0.387
		N	16	16	16	16	15
	Change in Price	Correlation	0.049	0.083	0.084	0.241	1
		Sig.	0.861	0.77	0.765	0.387	
		N	15	15	15	15	15
4	scenario 1 Intrinsic Value	Correlation					
		Sig.					
		N	1	1	1	1	0
	scenario 2 Intrinsic Value	Correlation					
		Sig.					
		N	1	1	1	1	0
	scenario 3 Intrinsic Value	Correlation					
		Sig.					
		N	1	1	1	1	0
	Price	Correlation					
		Sig.					
		N	1	1	1	1	0
	Change in Price	Correlation					
		Sig.					
		N	0	0	0	0	0

		Correlations					
Company Code			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
5	scenario 1 Intrinsic Value	Correlation	1	0.65	0.638	0.178	0.19
		Sig.		0.006	0.008	0.509	0.497
		N	16	16	16	16	15
	scenario 2 Intrinsic Value	Correlation	0.65	1	0.997	0.612	0.323
		Sig.	0.006		0	0.012	0.241
		N	16	16	16	16	15
	scenario 3 Intrinsic Value	Correlation	0.638	0.997	1	0.618	0.364
		Sig.	0.008	0		0.011	0.182
		N	16	16	16	16	15
	Price	Correlation	0.178	0.612	0.618	1	0.495
		Sig.	0.509	0.012	0.011		0.06
		N	16	16	16	16	15
	Change in Price	Correlation	0.19	0.323	0.364	0.495	1
		Sig.	0.497	0.241	0.182	0.06	
		N	15	15	15	15	15
6	scenario 1 Intrinsic Value	Correlation	1	0.894	0.949	-0.182	0.125
		Sig.		0.001	0	0.639	0.769
		N	9	9	9	9	8
	scenario 2 Intrinsic Value	Correlation	0.894	1	0.987	-0.113	0.092
		Sig.	0.001		0	0.772	0.828
		N	9	9	9	9	8
	scenario 3 Intrinsic Value	Correlation	0.949	0.987	1	-0.135	0.121
		Sig.	0	0		0.73	0.775
		N	9	9	9	9	8
	Price	Correlation	-0.182	-0.113	-0.135	1	0.755
		Sig.	0.639	0.772	0.73		0.03
		N	9	9	9	9	8
	Change in Price	Correlation	0.125	0.092	0.121	0.755	1
		Sig.	0.769	0.828	0.775	0.03	
		N	8	8	8	8	8

		Correlations					
Company Code			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
7	scenario 1 Intrinsic Value	Correlation	1	0.613	0.657	0.535	0.364
		Sig.		0.012	0.006	0.033	0.183
		N	16	16	16	16	15
	scenario 2 Intrinsic Value	Correlation	.613*	1	0.992	0.628	0.106
		Sig.	0.012		0	0.009	0.706
		N	16	16	16	16	15
	scenario 3 Intrinsic Value	Correlation	0.657	0.992	1	0.674	0.117
		Sig.	0.006	0		0.004	0.678
		N	16	16	16	16	15
	Price	Correlation	0.535	0.628	0.674	1	0.346
		Sig.	0.033	0.009	0.004		0.206
		N	16	16	16	16	15
	Change in Price	Correlation	0.364	0.106	0.117	0.346	1
		Sig.	0.183	0.706	0.678	0.206	
		N	15	15	15	15	15
8	scenario 1 Intrinsic Value	Correlation	1	-0.736	-0.584	0.229	-0.373
		Sig.		0.001	0.018	0.393	0.171
		N	16	16	16	16	15
	scenario 2 Intrinsic Value	Correlation	-0.736	1	0.973	0.273	0.328
		Sig.	0.001		0	0.306	0.232
		N	16	16	16	16	15
	scenario 3 Intrinsic Value	Correlation	-0.584	0.973	1	0.386	0.291
		Sig.	0.018	0		0.14	0.293
		N	16	16	16	16	15
	Price	Correlation	0.229	0.273	0.386	1	0.181
		Sig.	0.393	0.306	0.14		0.519
		N	16	16	16	16	15
	Change in Price	Correlation	-0.373	0.328	0.291	0.181	1
		Sig.	0.171	0.232	0.293	0.519	
		N	15	15	15	15	15

Correlations							
Company Code			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
9	scenario 1 Intrinsic Value	Correlation	1	0.795	0.834	-0.353	-0.02
		Sig.		0.002	0.001	0.26	0.952
		N	12	12	12	12	11
	scenario 2 Intrinsic Value	Correlation	0.795	1	0.994	-0.331	-0.166
		Sig.	0.002		0	0.294	0.627
		N	12	12	12	12	11
	scenario 3 Intrinsic Value	Correlation	0.834	0.994	1	-0.358	-0.127
		Sig.	0.001	0		0.253	0.71
		N	12	12	12	12	11
	Price	Correlation	-0.353	-0.331	-0.358	1	0.326
		Sig.	0.26	0.294	0.253		0.328
		N	12	12	12	12	11
	Change in Price	Correlation	-0.02	-0.166	-0.127	0.326	1
		Sig.	0.952	0.627	0.71	0.328	
		N	11	11	11	11	11
10	scenario 1 Intrinsic Value	Correlation	1	-0.307	-0.283	0.454	0.293
		Sig.		0.247	0.288	0.077	0.29
		N	16	16	16	16	15
	scenario 2 Intrinsic Value	Correlation	-0.307	1	0.996	-0.081	0.05
		Sig.	0.247		0	0.767	0.859
		N	16	16	16	16	15
	scenario 3 Intrinsic Value	Correlation	-0.283	.996**	1	-0.058	0.082
		Sig.	0.288	0		0.831	0.771
		N	16	16	16	16	15
	Price	Correlation	0.454	-0.081	-0.058	1	0.278
		Sig.	0.077	0.767	0.831		0.317
		N	16	16	16	16	15
	Change in Price	Correlation	0.293	0.05	0.082	0.278	1
		Sig.	0.29	0.859	0.771	0.317	
		N	15	15	15	15	15

		Correlations					
Company Code			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
11	scenario 1 Intrinsic Value	Correlation	1	0.853	0.867	0.236	-0.142
		Sig.		0	0	0.38	0.614
		N	16	16	16	16	15
	scenario 2 Intrinsic Value	Correlation	.853**	1	0.994	0.357	0.095
		Sig.	0		0	0.175	0.736
		N	16	16	16	16	15
	scenario 3 Intrinsic Value	Correlation	0.867	0.994	1	0.374	0.11
		Sig.	0	0		0.153	0.697
		N	16	16	16	16	15
	Price	Correlation	0.236	0.357	0.374	1	0.43
		Sig.	0.38	0.175	0.153		0.11
		N	16	16	16	16	15
	Change in Price	Correlation	-0.142	0.095	0.11	0.43	1
		Sig.	0.614	0.736	0.697	0.11	
		N	15	15	15	15	15
12	scenario 1 Intrinsic Value	Correlation	1	0.348	0.318	0.005	0.218
		Sig.		0.186	0.23	0.986	0.436
		N	16	16	16	16	15
	scenario 2 Intrinsic Value	Correlation	0.348	1	0.992	0.508	0.586
		Sig.	0.186		0	0.045	0.022
		N	16	16	16	16	15
	scenario 3 Intrinsic Value	Correlation	0.318	0.992	1	0.493	0.582
		Sig.	0.23	0		0.052	0.023
		N	16	16	16	16	15
	Price	Correlation	0.005	0.508	0.493	1	0.485
		Sig.	0.986	0.045	0.052		0.067
		N	16	16	16	16	15
	Change in Price	Correlation	0.218	0.586	0.582	0.485	1
		Sig.	0.436	0.022	0.023	0.067	
		N	15	15	15	15	15

		Correlations					
Company Code			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
13	scenario 1 Intrinsic Value	Correlation	1	0.581	0.573	0.429	-0.235
		Sig.		0.018	0.02	0.097	0.398
		N	16	16	16	16	15
	scenario 2 Intrinsic Value	Correlation	0.581	1	0.994	0.589	-0.047
		Sig.	0.018		0	0.016	0.867
		N	16	16	16	16	15
	scenario 3 Intrinsic Value	Correlation	0.573	0.994	1	0.601	-0.02
		Sig.	0.02	0		0.014	0.944
		N	16	16	16	16	15
	Price	Correlation	0.429	0.589	0.601	1	0.303
		Sig.	0.097	0.016	0.014		0.273
		N	16	16	16	16	15
	Change in Price	Correlation	-0.235	-0.047	-0.02	0.303	1
		Sig.	0.398	0.867	0.944	0.273	
		N	15	15	15	15	15

# Correlation table

## Appendix D

### Year results

Correlations							
Year			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
1	scenario 1 Intrinsic Value	Correlation	1	-0.898	-0.888	0.716	-0.354
		Sig.		0.002	0.003	0.046	0.435
		N	8	8	8	8	7
	scenario 2 Intrinsic Value	Correlation	-.898**	1	0.997	-0.891	0.044
		Sig.	0.002		0	0.003	0.926
		N	8	8	8	8	7
	scenario 3 Intrinsic Value	Correlation	-0.888	0.997	1	-0.871	0.013
		Sig.	0.003	0		0.005	0.977
		N	8	8	8	8	7
	Price	Correlation	0.716	-0.891	-0.871	1	0.163
		Sig.	0.046	0.003	0.005		0.727
		N	8	8	8	8	7
	Change in Price	Correlation	-0.354	0.044	0.013	0.163	1
		Sig.	0.435	0.926	0.977	0.727	
		N	7	7	7	7	7
2	scenario 1 Intrinsic Value	Correlation	1	0.98	0.987	0.896	0.389
		Sig.		0	0	0.003	0.388
		N	8	8	8	8	7
	scenario 2 Intrinsic Value	Correlation	.980**	1	0.999	0.963	0.383
		Sig.	0		0	0	0.397
		N	8	8	8	8	7
	scenario 3 Intrinsic Value	Correlation	0.987	0.999	1	0.954	0.397
		Sig.	0	0		0	0.378
		N	8	8	8	8	7
	Price	Correlation	0.896	0.963	0.954	1	0.4
		Sig.	0.003	0	0		0.374
		N	8	8	8	8	7
	Change in Price	Correlation	0.389	0.383	0.397	0.4	1
		Sig.	0.388	0.397	0.378	0.374	
		N	7	7	7	7	7

Correlations							
Year			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
3	scenario 1 Intrinsic Value	Correlation	1	0.987	1	0.492	-0.567
		Sig.		0	0	0.216	0.143
		N	8	8	8	8	8
	scenario 2 Intrinsic Value	Correlation	0.987	1	0.99	0.607	-0.563
		Sig.	0		0	0.111	0.146
		N	8	8	8	8	8
	scenario 3 Intrinsic Value	Correlation	1	0.99	1	0.508	-0.567
		Sig.	0	0		0.199	0.143
		N	8	8	8	8	8
	Price	Correlation	0.492	0.607	0.508	1	-0.199
		Sig.	0.216	0.111	0.199		0.637
		N	8	8	8	8	8
	Change in Price	Correlation	-0.567	-0.563	-0.567	-0.199	1
		Sig.	0.143	0.146	0.143	0.637	
		N	8	8	8	8	8
4	scenario 1 Intrinsic Value	Correlation	1	0.982	0.964	0.53	0.555
		Sig.		0	0	0.177	0.153
		N	8	8	8	8	8
	scenario 2 Intrinsic Value	Correlation	0.982	1	0.996	0.604	0.556
		Sig.	0		0	0.113	0.153
		N	8	8	8	8	8
	scenario 3 Intrinsic Value	Correlation	0.964	0.996	1	0.604	0.559
		Sig.	0	0		0.113	0.15
		N	8	8	8	8	8
	Price	Correlation	0.53	0.604	0.604	1	0.184
		Sig.	0.177	0.113	0.113		0.664
		N	8	8	8	8	8
	Change in Price	Correlation	0.555	0.556	0.559	0.184	1
		Sig.	0.153	0.153	0.15	0.664	
		N	8	8	8	8	8

Correlations							
Year			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
5	scenario 1 Intrinsic Value	Correlation	1	0.988	0.966	0.583	-0.169
		Sig.		0	0	0.1	0.689
		N	9	9	9	9	8
	scenario 2 Intrinsic Value	Correlation	0.988	1	0.994	0.578	-0.118
		Sig.	0		0	0.103	0.781
		N	9	9	9	9	8
	scenario 3 Intrinsic Value	Correlation	0.966	0.994	1	0.555	-0.09
		Sig.	0	0		0.121	0.832
		N	9	9	9	9	8
	Price	Correlation	0.583	0.578	0.555	1	0.223
		Sig.	0.1	0.103	0.121		0.595
		N	9	9	9	9	8
	Change in Price	Correlation	-0.169	-0.118	-0.09	0.223	1
		Sig.	0.689	0.781	0.832	0.595	
		N	8	8	8	8	8
6	scenario 1 Intrinsic Value	Correlation	1	-0.391	-0.604	-0.284	-0.118
		Sig.		0.264	0.064	0.427	0.762
		N	10	10	10	10	9
	scenario 2 Intrinsic Value	Correlation	-0.391	1	0.938	0.207	0.52
		Sig.	0.264		0	0.567	0.151
		N	10	10	10	10	9
	scenario 3 Intrinsic Value	Correlation	-0.604	.938 <sup>~</sup>	1	0.092	0.418
		Sig.	0.064	0		0.801	0.262
		N	10	10	10	10	9
	Price	Correlation	-0.284	0.207	0.092	1	0.631
		Sig.	0.427	0.567	0.801		0.068
		N	10	10	10	10	9
	Change in Price	Correlation	-0.118	0.52	0.418	0.631	1
		Sig.	0.762	0.151	0.262	0.068	
		N	9	9	9	9	9

Correlations							
Year			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
7	scenario 1 Intrinsic Value	Correlation	1	-0.669	-0.695	-0.589	-0.194
		Sig.		0.034	0.026	0.073	0.591
		N	10	10	10	10	10
	scenario 2 Intrinsic Value	Correlation	-0.669	1	0.984	0.018	0.353
		Sig.	0.034		0	0.961	0.318
		N	10	10	10	10	10
	scenario 3 Intrinsic Value	Correlation	-0.695	0.984	1	0.115	0.372
		Sig.	0.026	0		0.753	0.29
		N	10	10	10	10	10
	Price	Correlation	-0.589	0.018	0.115	1	0.083
		Sig.	0.073	0.961	0.753		0.82
		N	10	10	10	10	10
	Change in Price	Correlation	-0.194	0.353	0.372	0.083	1
		Sig.	0.591	0.318	0.29	0.82	
		N	10	10	10	10	10
8	scenario 1 Intrinsic Value	Correlation	1	0.985	0.991	0.743	0.07
		Sig.		0	0	0.004	0.848
		N	13	13	13	13	10
	scenario 2 Intrinsic Value	Correlation	.985**	1	0.999	0.786	0.135
		Sig.	0		0	0.001	0.71
		N	13	13	13	13	10
	scenario 3 Intrinsic Value	Correlation	0.991	0.999	1	0.774	0.124
		Sig.	0	0		0.002	0.734
		N	13	13	13	13	10
	Price	Correlation	0.743	0.786	0.774	1	0.223
		Sig.	0.004	0.001	0.002		0.536
		N	13	13	13	13	10
	Change in Price	Correlation	0.07	0.135	0.124	0.223	1
		Sig.	0.848	0.71	0.734	0.536	
		N	10	10	10	10	10

Correlations							
Year			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
9	scenario 1 Intrinsic Value	Correlation	1	0.917	0.934	0.836	-0.04
		Sig.		0	0	0.001	0.908
		N	11	11	11	11	11
	scenario 2 Intrinsic Value	Correlation	0.917	1	0.999	0.869	-0.054
		Sig.	0		0	0.001	0.874
		N	11	11	11	11	11
	scenario 3 Intrinsic Value	Correlation	0.934	0.999	1	0.863	-0.052
		Sig.	0	0		0.001	0.88
		N	11	11	11	11	11
	Price	Correlation	0.836	0.869	0.863	1	-0.071
		Sig.	0.001	0.001	0.001		0.835
		N	11	11	11	11	11
	Change in Price	Correlation	-0.04	-0.054	-0.052	-0.071	1
		Sig.	0.908	0.874	0.88	0.835	
		N	11	11	11	11	11
10	scenario 1 Intrinsic Value	Correlation	1	0.968	0.995	0.252	0.103
		Sig.		0	0	0.429	0.763
		N	12	12	12	12	11
	scenario 2 Intrinsic Value	Correlation	.968**	1	0.989	0.37	0.057
		Sig.	0		0	0.236	0.868
		N	12	12	12	12	11
	scenario 3 Intrinsic Value	Correlation	0.995	0.989	1	0.305	0.083
		Sig.	0	0		0.334	0.809
		N	12	12	12	12	11
	Price	Correlation	0.252	0.37	0.305	1	0.066
		Sig.	0.429	0.236	0.334		0.846
		N	12	12	12	12	11
	Change in Price	Correlation	0.103	0.057	0.083	0.066	1
		Sig.	0.763	0.868	0.809	0.846	
		N	11	11	11	11	11

Correlations							
Year			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
11	scenario 1 Intrinsic Value	Correlation	1	-0.841	-0.862	-0.886	0.323
		Sig.		0.001	0	0	0.305
		N	12	12	12	12	12
	scenario 2 Intrinsic Value	Correlation	-0.841	1	0.995	0.96	-0.405
		Sig.	0.001		0	0	0.192
		N	12	12	12	12	12
	scenario 3 Intrinsic Value	Correlation	-0.862	0.995	1	0.965	-0.383
		Sig.	0	0		0	0.219
		N	12	12	12	12	12
	Price	Correlation	-0.886	0.96	0.965	1	-0.334
		Sig.	0	0	0		0.289
		N	12	12	12	12	12
	Change in Price	Correlation	0.323	-0.405	-0.383	-0.334	1
		Sig.	0.305	0.192	0.219	0.289	
		N	12	12	12	12	12
12	scenario 1 Intrinsic Value	Correlation	1	1	0.988	0.811	-0.408
		Sig.		0	0	0.001	0.188
		N	12	12	12	12	12
	scenario 2 Intrinsic Value	Correlation	1	1	0.992	0.819	-0.402
		Sig.	0		0	0.001	0.195
		N	12	12	12	12	12
	scenario 3 Intrinsic Value	Correlation	0.988	0.992	1	0.844	-0.368
		Sig.	0	0		0.001	0.239
		N	12	12	12	12	12
	Price	Correlation	0.811	0.819	0.844	1	-0.125
		Sig.	0.001	0.001	0.001		0.699
		N	12	12	12	12	12
	Change in Price	Correlation	-0.408	-0.402	-0.368	-0.125	1
		Sig.	0.188	0.195	0.239	0.699	
		N	12	12	12	12	12

Correlations							
Year			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
13	scenario 1 Intrinsic Value	Correlation	1	0.986	0.998	0.91	0.405
		Sig.		0	0	0	0.191
		N	12	12	12	12	12
	scenario 2 Intrinsic Value	Correlation	0.986	1	0.994	0.931	0.363
		Sig.	0		0	0	0.246
		N	12	12	12	12	12
	scenario 3 Intrinsic Value	Correlation	0.998	0.994	1	0.919	0.39
		Sig.	0	0		0	0.21
		N	12	12	12	12	12
	Price	Correlation	0.91	0.931	0.919	1	0.529
		Sig.	0	0	0		0.077
		N	12	12	12	12	12
	Change in Price	Correlation	0.405	0.363	0.39	0.529	1
		Sig.	0.191	0.246	0.21	0.077	
		N	12	12	12	12	12
14	scenario 1 Intrinsic Value	Correlation	1	0.963	0.984	0.842	0.07
		Sig.		0	0	0.001	0.829
		N	12	12	12	12	12
	scenario 2 Intrinsic Value	Correlation	0.963	1	0.995	0.899	-0.006
		Sig.	0		0	0	0.986
		N	12	12	12	12	12
	scenario 3 Intrinsic Value	Correlation	0.984	0.995	1	0.887	0.025
		Sig.	0	0		0	0.938
		N	12	12	12	12	12
	Price	Correlation	0.842	0.899	0.887	1	0.053
		Sig.	0.001	0	0		0.869
		N	12	12	12	12	12
	Change in Price	Correlation	0.07	-0.006	0.025	0.053	1
		Sig.	0.829	0.986	0.938	0.869	
		N	12	12	12	12	12

Correlations							
Year			scenario 1 Intrinsic Value	scenario 2 Intrinsic Value	scenario 3 Intrinsic Value	Price	Change in Price
15	scenario 1 Intrinsic Value	Correlation	1	0.989	0.997	0.59	0.193
		Sig.		0	0	0.043	0.547
		N	12	12	12	12	12
	scenario 2 Intrinsic Value	Correlation	0.989	1	0.998	0.674	0.131
		Sig.	0		0	0.016	0.686
		N	12	12	12	12	12
	scenario 3 Intrinsic Value	Correlation	0.997	0.998	1	0.641	0.159
		Sig.	0	0		0.025	0.622
		N	12	12	12	12	12
	Price	Correlation	0.59	0.674	0.641	1	-0.098
		Sig.	0.043	0.016	0.025		0.761
		N	12	12	12	12	12
	Change in Price	Correlation	0.193	0.131	0.159	-0.098	1
		Sig.	0.547	0.686	0.622	0.761	
		N	12	12	12	12	12
16	scenario 1 Intrinsic Value	Correlation	1	0.995	0.998	0.766	-0.26
		Sig.		0	0	0.002	0.414
		N	13	13	13	13	12
	scenario 2 Intrinsic Value	Correlation	0.995	1	0.987	0.75	-0.316
		Sig.	0		0	0.003	0.317
		N	13	13	13	13	12
	scenario 3 Intrinsic Value	Correlation	0.998	0.987	1	0.769	-0.231
		Sig.	0	0		0.002	0.47
		N	13	13	13	13	12
	Price	Correlation	0.766	0.75	0.769	1	-0.031
		Sig.	0.002	0.003	0.002		0.923
		N	13	13	13	13	12
	Change in Price	Correlation	-0.26	-0.316	-0.231	-0.031	1
		Sig.	0.414	0.317	0.47	0.923	
		N	12	12	12	12	12