

CHAPTER 5

VARIABLES WHICH DETERMINE SHAREHOLDER VALUE

5.1 INTRODUCTION

This study aims to arrive at recommendations and conclusions on the subject of shareholder value. These recommendations and conclusions will be set out in the last chapter called "Value-Based Management". An important prerequisite for the practice of value-based management is a deep understanding of the performance variables that actually drive or determine the value of a business for its shareholders. In order to accomplish this understanding, one must first identify those variables that determine shareholder value (the subject of this chapter). Thereafter, one can shift one's attention to those variables that can be quantified.

There are a number of reasons why an understanding of the key drivers of value is important. Firstly, an organization and its managers cannot change value itself. The manager have to alter those **variables** that they can influence, such as customer satisfaction, cost, capital expenditures, and so on. Of course, there are a number of variables which management have no or very little control over. These "uncontrolled" variables are discussed in more detail in Section 5.3. Secondly, it is through these drivers of value that managers learn to understand not only the rest of the organization, but also the building blocks and cement needed to achieve growth in shareholder value by making use of a synergy effect across all departments and at all levels in the company. Dialogue about what needs to be accomplished can include all involved.

A value driver is any variable that affects the value of a company. As mentioned above, some variables can be quantified, others cannot. Some variables are under the control or influence of management (internal) whilst other external variables are beyond management control.

To be useful, value drivers need to be organized (quantified) in such a way that one can identify which variables have the greatest impact on value and can assign responsibility for their performance to individuals who must then help the organization to meet its targets for the shareholders.

Variables determining a company's value can be expressed using different levels of detail. Copeland, Koller and Murrin (1994:107) categorise value drivers in three levels. Generic value drivers are set out in terms of the typical return on the invested capital tree (ROIC tree), comprising operating margins and invested capital. These calculations can be done for all companies, but they lack specificity and are consequently less useful at grassroots level. The next level of value drivers is business-unit level drivers, which includes variables such as customer mix, sales force productivity or cost allocations. The last level is the operating level at grass roots level where variables such as percentage of capacity utilized (of a plant or a machine), cost per delivery and debtors or creditors terms and timing are directly controlled and altered by the decisions of frontline managers or clerical personnel.

This chapter and its calculations concentrate on the so-called generic variables, for which one can obtain information relatively easily from the financial statements. Examining variables at grass roots level includes collecting a great deal of operating information from the company itself; an activity that is not only very time-consuming but falls beyond the scope of this study. All of these aspects are, however, addressed and explained in more detail with examples in Chapter 8 entitled Value-based management where recommendations are made on these and other issues.

As mentioned above, some variables which determine shareholder value are not under the control of management (external), while others most definitely are (one could also refer to the latter as internal variables). In the discussion below, a clear distinction between these two categories is drawn.

When a quantification of value drivers is attempted in the empirical section of this study, Economic Value Added (EVA) is used as a yardstick for increases in shareholder value. It is therefore necessary to separately identify those quantifiable variables that determine shareholder value as measured by a company's EVA.

At this stage, it should be remembered that the value drivers or variables have actually already been mentioned and illustrated in the previous chapter, when calculations of the various economic models were made. Chapter 5 merely highlights and classifies these variables and presents them in a way which stresses their influence or effect on the value created.

In addition, these variables, whether previously mentioned or not, are analysed or broken down as far as possible to a point where they can be quantified. Special attention is paid to the cost of capital, a figure that has so far in the study been used as a single absolute amount without analysing its components.

The conclusion to this chapter includes a summary of the variables, comments on the link between this chapter and the previous chapters, as well as the way this chapter will be used in the chapters to follow.

5.2 INTERNAL VARIABLES

5.2.1 Introduction

Internal variables are those variables that can be controlled, changed, managed or even manipulated by management of a company. In this chapter, value drivers are included in this category in so far as they can be quantified on the basis of an analysis of the (sometimes adjusted) income statement and balance sheet of the organisation.

In Chapter 3 and Chapter 4 of this study, a number of writers' models or ways to calculate shareholder value were addressed. Whilst there is sometimes only a

slight variation between the models and their underlying principles, they aim to achieve exactly the same goal.

In Section 5.2.2, there is another look at the different approaches. Next those variables that are common in quantifying shareholder value are identified.

5.2.2 The variables

Fruhan (1979:66) states that the way to increase the value of any asset (capital) investment is to influence either the cash flow derived from it or the appropriate discount rate used.

The cash flow from an investment can be increased either by consistently increasing the prices of the products sold, or by achieving a cost saving from a lower cost structure than that of competitors, or lastly by reducing capital used in the generation of the cash flow.

The discount rate used to determine the present value of the cash flow stream is the weighted average cost of capital (WACC). A company's WACC depends on a number of factors, namely:

- a) the cost of debt financing;
- b) the cost of equity to the company;
- c) the effective tax rate of the company; and
- d) the specific composition of the company's capital structure.

The calculation of SASOL's WACC in Chapter 4 is a good example of the calculation of WACC:

**FIGURE 5.1 : WEIGHTED AVERAGE COST OF CAPITAL
(WACC)**

	3 YEAR AVERAGE DEBT TO CAPITAL RATIO	AFTER TAX RETURN	WEIGHTED AVERAGE COST OF CAPITAL (WACC) %
Equity	85.72	19.76	16.9
Debt	14.28	8.12	1.2
	100.00		18.1

The cost of equity consists of a number of underlying variables which determine its value. Some of these variables are identified separately in order to quantify them for use in calculations.

There are a number of factors that are beyond the control of management but exercise an influence on the cost of capital, for example, a company's **nominal** tax rate as determined by the fiscus, the prevailing interest rate levels in the country, as well as certain elements of the cost of equity. These factors as applicable to a company can, to a certain extent, be influenced (lowered) by management in favour of the company and its shareholders. In addition, management do have some control over the debt ratio of a firm, a determinant of WACC. From Figure 5.1 above, it should be clear that changes in the components of the WACC will cause a change in the WACC itself. We have to conclude then that most of the factors which determine a company's WACC can be quantified, and can also be controlled by management.

Fruhan (1979:94) states that the profitability (which does not necessarily mean shareholder wealth creation) of any firm can be broken down into three components, namely the **capital intensity** of the firm's operations, its **profit margins** and its use of **leverage**.

The drawback of Fruhan's slightly modified version of the well-known Du Pont formula is that the end result is a company's return on equity (ROE), which has already been discussed in this study as having many disadvantages and which possibly differs from shareholder wealth. What is important, however, is that both the income statement and the balance sheet are combined for the calculations. Methods employed by other writers eliminate the shortcomings of this approach.

The Economic Profit Model of Copeland, Koller and Murrin (1994:149) measures the value created in a company as follows:

$$\text{Economic Profit} = \text{Invested capital} \times (\text{ROIC} - \text{WACC})$$

Economic profit thus translates the value drivers (invested capital, ROIC and WACC) into a single amount. The components of these variables must be examined more closely to show whether other quantifiable "sub-variables" can be identified.

The rate of return on invested capital (ROIC) is the single most important value driver, and therefore the key components thereof should be analysed. A very useful way to organize an analysis of the rate of return is to develop what Copeland, Koller and Murrin (1994:171) calls a "return-on-invested-capital tree". The tree begins by dividing ROIC into its key components:

$$\text{ROIC} = \frac{\text{NOPAT (Net operating profit after tax)}}{\text{Invested capital}}$$

Since NOPAT can be expressed as EBIT (Earnings before interest and tax) $\times (1 - T)$, ROIC can be expressed as a pretax ROIC as follows:

$$\text{ROIC} = \frac{\text{EBIT}}{\text{Invested capital}} \times (1 - T)$$

If one relates EBIT and invested capital to sales, one gets the equation:

$$\frac{\text{EBIT}}{\text{Invested capital}} = \frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Invested capital}}$$

Pretax ROIC is thus segregated into two components:

- a) operating margin (EBIT/Sales), expressing the efficiency of converting sales into profit; and
- b) capital turnover (Sales/Invested capital), measuring how efficiently the company employs its invested capital.

Each of these components can be broken down further to a point where the more detailed expense or capital items are compared to sales. In order to do these calculations, one has to have information that is not necessarily contained in the published financial statements of a company (the source of information upon which calculations in this study are based), and therefore some of these above variables are excluded as relevant quantifiable variables. This problem is specifically relevant for the first part of the equation (**economic profit**) where the income statement is analysed, and some companies report very little information between **sales** and **operating income**.

However, if the calculation of **invested capital** is analysed, one sees that most of these components of invested capital are contained in the balance sheet. Without going into too much detail, one can say that invested capital can be calculated by adding up the following:

- a) nett working capital;
- b) nett fixed assets; and
- c) goodwill.

The same result should be obtained if the following is added up:

- a) equity;
- b) deferred income taxes; and
- c) all interest bearing debt.

From the above it should be clear that the data on the efficient use of the **total** of invested capital in relation to sales can be broken down to include detail such as the efficiency of working capital, fixed assets, equity and debt as contributing factors to shareholder wealth. Some of these (more detailed) variables, together with the fact that the component measures of the return on invested capital are industry and company specific, are dealt with in subsequent chapters of this study.

One can thus identify, in addition to the components of WACC, the following quantifiable variables which determine shareholder value:

ROIC

NOPAT/Invested capital

EBIT/Invested capital

EBIT/Sales

Sales/Invested capital

Nett working capital/Sales

Nett fixed assets/Sales

Equity/Sales

Debt/Sales

Rappaport (1986:74) developed a formula to measure the value created by a given strategy. Shareholder value creation in his formula is determined by a number of factors, namely:

- a) sales growth;

- b) the profit margin on sales less the minimum required rate to maintain shareholder value, which includes the fixed as well as the working capital investment rates;
- c) the time span of the growth;
- d) the income tax rate; and
- e) WACC.

These factors can be combined in a formula which is recapped from Chapter 3:

Change in shareholder value	=	(Present value of incremental cash flow before new investment)	-	(Present value of investment in fixed and working capital)
	=	$\frac{(\text{Incr sales}) * (\text{Operating profit margin on incremental sales}) * (1-T)}{\text{Cost of capital}}$		
	-	$\frac{(\text{Incr sales}) * (\text{Incremental fixed plus working capital rate})}{(1 + \text{Cost of capital})}$		

More formally the following formula to calculate the present value of an increase in shareholder value in **19x1** can be used:

$$\Delta E_t = \frac{(p_t - p_{t \min})(1 - T) \Delta S_t}{k(1 + k)^{t-1}}$$

Operating profit margin (p_t) is the ratio of pre-interest, pretax operating profit to sales (ΔS). All cost of sales and depreciation are deducted to arrive at operating profit. An **incremental fixed capital investment** (part of p_{\min}) is defined as capital expenditures less depreciation. It is necessary to calculate and forecast this investment as a percentage of incremental sales.

The **incremental working capital investment** (part of p_{tmin}) represents the net investment in debtors, stock and creditors required to support sales growth. This investment can also be expressed as a percentage of incremental sales.

The **cash income tax rate** (T) represents taxes on operating profit paid during the financial year or that are a liability at the end of the financial year. Readers are referred to the calculation of the effective tax rate of SASOL in Chapter 4. Note that the taxes paid on dividends are included as part of the effective cash tax rate.

The calculation and composition of WACC (k) was dealt with above in Figure 5.1.

From the above method of calculating shareholder value by Rappaport, in addition to the components of WACC, one can identify the following quantifiable variables:

- a) sales growth rate;
- b) operating profit margin (Operating profit/Sales);
- c) effective income tax rate;
- d) working capital investment (Net working capital/Sales);
- e) fixed capital investment (Net fixed assets/Sales); and
- f) the time span of the calculation period.

5.2.3 Concluding remarks

The aim of Section 5.2 was to identify quantifiable variables that determine shareholder value as represented by the models of Fruhan, Copeland, Koller and Murrin, and Rappaport.

A notable omission was the discussion of those variables that determine a company's EVA. As mentioned above, the EVA model forms the basis of calculations upon which the results from this study are based, and therefore a separate section in this chapter is devoted to EVA.

What are the quantifiable value drivers determining EVA that are under the control of management?

In the first place, it is clear that the **weighted average cost of capital**, together with its components, as well as the **effective cash tax rate** of the company are central in the wealth creating process. In addition to these two variables, one needs to calculate the **returns** earned on the capital supplied by the shareholders, that is the total **invested capital**.

More formally, the variables are the following:

ROIC

NOPAT/Invested capital

EBIT/Invested capital

EBIT/Sales

Sales/Invested capital

Nett working capital/Sales

Nett fixed assets/Sales

Equity/Sales

Debt/Sales

WACC

The cost of debt financing

The cost of equity to the company

The specific composition of a company's capital structure, its Debt/Equity ratio

The effective **cash tax rate** of the company

In order to calculate these ratios, one of course, also needs, the underlying amounts that make up the ratios. The values of **invested capital**, **EBIT**, **sales**, **fixed assets** and components to calculate **the cost of equity** for a company are needed. It is, however, at this stage unnecessary to classify these amounts as value drivers

per se, as their values are already contained in the relevant variables themselves.

Before we discuss the value drivers (variables) of the Economic Value Added of a company, let us discuss those variables that are external to a company - over which management have very little or no control, even if some variables are quantifiable.

5.3 EXTERNAL VARIABLES

A country's **macro-economic** and **political** outlook affects both the time horizons of investments and the returns thereon of all the companies that are operating in that country to a greater or lesser extent. There are also a number of **micro-economic** factors which can influence the variables which determine shareholder value. Some of these variables could be unique to a specific company or industry.

The variables that are contained or classified under these headings are seldom under the control of management and are external to the company. The fact of the matter, however, is that these variables do influence shareholder wealth in the organization (some have a direct influence on the quantifiable internal value drivers) and should therefore be included in this study.

The **macro-economic** variables that may influence a company's performance includes the following:

- a) the exchange rate;
- b) the inflation rate;
- c) the interest rate levels in the country;
- d) various factors that the Reserve Bank may take into consideration when it is setting interest rate policy, such as the growth in money supply and levels of saving and investment in the country;
- e) the level of unemployment;

- f) the economic growth rate as measured in terms of the Gross National Product;
- g) regulations governing free trade and exchange controls; and
- h) export incentives.

The **fiscal** variables as determined and set by government that may influence a company's performance include the following:

- a) the company and other tax rates;
- b) levels of disposable income of individuals and companies; and
- c) investment incentives.

If one turns to the **micro-economic** variables that influence the wealth a company creates, Rappaport (1986:81) presents an interesting framework that was, in turn, developed by Porter. The core of this framework is an analysis of five competitive forces that drive industry structure and thereby the rates of return that firms in an industry can expect to earn. These rates of return influence the variables that create wealth and therefore shareholder wealth creation.

These elements of industry structure that influence the **micro-economic** variables that influence shareholder value are the following (Rappaport 1986:81):

- a) Entry Barriers
 - * Economies of scale
 - * Brand identity
 - * Switching costs
 - * Capital requirements
 - * Access to distribution channels
 - * Absolute cost advantages (learning curve)
 - * Government policy
 - * Expected retaliation

- b) Threat of substitute products
 - * Relative price performance of substitutes
 - * Buyer propensity to buy substitute

- c) Determinants of buyer power
 - * Buyer concentration and volume
 - * Buyer information
 - * Substitute products
 - * Product differences
 - * Brand identity

- d) Determinants of supplier power
 - * Differentiation of inputs
 - * Switching cost of suppliers and firms in the industry
 - * Presence of substitute inputs
 - * Supplier concentration
 - * Importance of volume to supplier
 - * Cost structure in the industry
 - * Forward or backward integration possibilities in the industry

- e) Competitors
 - * Industry growth
 - * Fixed costs in relation to value added
 - * Achievement of capacity
 - * Product differences
 - * Brand identity
 - * Concentration
 - * Diversity of competitors
 - * Exit barriers

The above factors reveals the fact that competitors determine only a part of the micro-economic competitive setting. Customers, suppliers, potential entrants and

substitute products also affect competitive structure and thereby industry and individual company rates of return (Rappaport 1986:82).

The relative importance of these factors differs from industry to industry and from company to company. Their importance also changes over time.

The macro-economic, micro-economic and fiscal variables that have been discussed above are the building blocks for the internal quantifiable value drivers of shareholder value. They are, however, very difficult to quantify and are not controlled by the management of a company.

The above list is by no means complete and a detailed discussion of the individual factors falls beyond the scope of the chapter. For the purposes of this study, it is only important to recognize that these factors influence shareholder returns because they influence prices, quantities sold, investment and the riskiness of firms in an industry. The exact influence of these factors and the way the relationships behave, are addressed in Chapters 7 and 8, where recommendations on these aspects are made.

It is, however, now necessary to address the main topic of this chapter: the identification of those quantifiable variables that influence shareholder value and that are used in the empirical analysis of this study.

5.4 EVA VARIABLES

5.4.1 Introduction

Quantifiable variables that are internal to the company have been identified in a number of models in Section 5.2. Any of these models with their key variables could be used for the calculations in the empirical analysis of this study. However, the results or outcome of the calculations differ depending on which model is used.

Due to the advantages which the EVA model has over other models (as discussed in Chapter 4) as well as the fact that a reliable database of the EVA of listed industrial companies in the Johannesburg Stock Exchange exists, it helps to identify those variables that are the building blocks of a company's EVA.

5.4.2 Variables determining EVA

Chapter 4 indicated that the formula used to calculate a company's EVA is the following:

$$\text{EVA} = (\text{rate of return} - \text{cost of capital}) \times \text{capital}$$

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

In essence, thus, there are only three "main variables" that determine EVA. In order to analyse variables "r" (the rate of return) and "capital" further, one has to look at the calculation thereof from both an operating and financing perspective.

From an **financing** viewpoint:

$$r = \frac{\text{NOPAT}}{\text{capital}}$$

where

NOPAT

- = Income attributable to ordinary shareholders
- + Increase in equity equivalents

ADJUSTED NET INCOME

- + Preferred dividend
- + Minority interest provision
- + Interest payments after tax savings

Capital

- = Common equity
- + Equity equivalents

ADJUSTED COMMON EQUITY

- + Preferred share capital
- + Minority interest
- + Debt

From an operating perspective:

$$r = \frac{\text{NOPAT}}{\text{capital}}$$

where

NOPAT

- = Sales
- Operating expenses
- Taxes

Capital

- = Net working capital
- + Net fixed assets

From both these two alternatives, one can see that the various amounts needed to calculate the value drivers can be obtained from a company's financial statements.

The amounts or variables used in both approaches are used in the calculations of the empirical analysis in Chapter 7.

The rate of return (r) can be broken down into three components which reflects the operating profit margin, the turnover of capital and the effective cash tax rate on operating income:

$$r = \frac{\text{NOPAT}}{\text{capital}}$$

$$r = \text{operating profit margin} \times \text{capital turnover} \times (1 - T)$$

$$r = \frac{\text{NOPBT}}{\text{sales}} \times \frac{\text{sales}}{\text{capital}} \times (1 - T)$$

Capital turnover can be analysed as a function of the efficiency of working capital management and of net fixed assets (Stewart 1991:107):

$$r = \frac{\text{NOPBT}}{\text{sales}} \times \frac{1}{\frac{\text{net working cap}}{\text{sales}} + \frac{\text{net fixed assets}}{\text{sales}}} \times (1 - T)$$

Although it is the overall rate of return that matters, breaking up the rate of return into the various components can indicate just which component is the biggest contributor to the rate of return, especially in comparison to prior levels and relative to the rate of return of competitors.

The various components of "c", the weighted average cost of capital (WACC) have already been discussed in Section 5.2, and they need not to be added at this stage.

Stewart (1991:299) identifies six variables that account for the intrinsic value of any company. The following four can be controlled by management:

- a) net operating profit after tax (NOPAT);
- b) the tax benefit associated with the use of debt, tD ;
- c) the amount of new capital invested; and
- d) the after-tax rate of return (r) on new capital investments.

Factors which would be very difficult for management to influence are WACC and T , the time period over which investors expect management to have attractive investment opportunities.

In this study it is, however, assumed that WACC can, to some extent, be influenced by management and it is included among the quantifiable variables. A small change in a company's WACC will have a large effect on shareholder wealth due to WACC's important function in the calculation formulae.

5.4.3 Concluding remarks

In Chapters 3 and 4, a discussion of the models which determine shareholder value indicated that a number of the models are based on economic principles (as opposed to accounting-based models). For a number of reasons EVA was selected as the preferred method, and therefore a number of relatively simple calculations were supported by a detailed real life example to demonstrate the mechanics of EVA.

In this chapter, once again, the focus falls on the variables that determine a company's EVA, as these are the value drivers that are used in this study to represent shareholder wealth creation.

The following quantifiable variables were identified:

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

- a) $r = \frac{\text{NOPAT}}{\text{Capital}}$
 $\frac{\text{NOPBT}}{\text{Sales}}$
 $\frac{\text{Sales}}{\text{Capital}}$
Net working capital/Sales
Net fixed assets/Sales
- b) $c = \text{WACC}$
The cost of debt financing
The cost of equity to the company
The specific composition of a company's capital structure, its Debt/Equity ratio
- c) The effective cash tax rate of the company
- d) The amount of capital invested

In addition to these variables a number of other variables are introduced to complete the list. A number of additional variables that can be calculated using the financial statements, but not so directly derived from the basic EVA model are added.

The final list of variables that can determine shareholder value in terms of EVA and that are used in the empirical analysis in Chapter 7 is the following:

- a) **Return on capital employed (ROCE = NOPAT/CE)**
- b) **Net operating profit before tax/Capital employed**
- c) **Net operating profit before tax/Sales**
- d) **Net operating profit after tax/Sales (Margin)**
- e) **Gross profit/Sales**
- f) **Sales growth**
- g) **Retained profit/Capital employed**
- h) **Sales/Capital employed**

- i) **Sales/Net working capital**
- j) **Sales/Average total fixed assets**
- k) **Weighted average cost of capital (WACC)**
- l) **Debt ratio : (Total long-term loan capital
+ short-term borrowings + bank overdraft)/
Capital employed**
- m) **Total owners' interest/Capital employed**
- n) **Total long-term loan capital/Capital employed**
- o) **(Short term-borrowings + bank overdraft)/
Capital employed**
- p) **Investment rate : Change in Capital employed/
Net operating profit after tax**
- q) **Company cash tax rate**
- r) **Operating leverage**
- s) **Financial leverage**

The empirical analysis, therefore, attempts to quantify the above variables as value drivers of the shareholder wealth created by the actions of a company's managers and all other personnel.

5.5 CONCLUSION

Variables that determine shareholder value can either be internal or external to an organisation. Internal variables can be controlled by management while external variables cannot be controlled by management. In addition, some variables are quantifiable whilst others are not.

The variables common to all the models described in this chapter show that the following factors work together to create value:

- a) the return on invested capital (this must exceed the weighted average cost of capital);

- b) the amount of capital invested (this is the shareholder's investment on which the excess return must be earned); and
- c) various external factors, some of which are quantifiable and some of which are not, some of which are under the control of management whilst others are determined by the government.

Various combinations of these factors work together to create value. They are fundamentally forward-looking and are based on future cash flows, which use both income statement and balance sheet information.

Value drivers can be traced down to grass roots level (e.g. number of trips per transaction) and they are not static - they must be periodically reviewed.

The variables which create shareholder value as identified above remain valid over time, they are relevant for most companies and the information needed to calculate them can be obtained from a company's published financial statements.

Chapter 5 marks the end of the literature study and the "literature objectives" have been achieved. In the next chapter, we turn to the empirical research in order to arrive at the primary objective of this study, namely the quantification of the variables that determine shareholder value.

CHAPTER 6

RESEARCH METHODOLOGY

6.1 INTRODUCTION

So far, the theoretical principles under discussion in this study have been dealt with. As a forerunner to the empirical analysis, it is also necessary to develop a blueprint for the collection, measurement and analysis of the data.

In the first place, the data collection method is discussed to indicate which data base was used. The methodology used to determine the final sample are then set out. A list of the companies which were included in the final sample is presented, together with an illustration of the data utilised for a company. Once again, the various variables that are used in the analysis are briefly discussed.

Once the sample has been set out, it is appropriate to describe the statistical techniques used in order to evaluate the data, whereafter the results can be described.

Finally, the hypotheses to be tested must be clearly defined, so that they can be tested against the results from the statistical analysis.

6.2 DATA COLLECTION METHOD

The data base of the Bureau of Financial Analysis (BFA) at the University of Pretoria was used to obtain information about the various companies used in the sample.

In order for an analysis to be performed on the sample of companies selected, those **companies** that meet specified criteria first had to be identified.

Economic value added, as the first criterion can best be calculated by using financial information from industrial companies. The financial statements of mining,

financial and investment companies do not provide the type of financial information required. They pose a number of problems, which means that an EVA calculation can only be done after considerable adjustments (and sometimes problematic and sweeping assumptions) have been made. For the purpose of this study, it was therefore decided to use industrial companies only. When the sample was compiled and the statistical analysis was done (during the last half of 1997) there were 342 industrial companies listed on the Johannesburg Stock Exchange.

The second criterion was the number of years for which EVA could be calculated for each company. It was decided that a period of ten years would provide sufficient information. In order to calculate the EVA of a company for ten years, one needs financial information on the company for eleven years, because beginning capital ("ending" capital of the previous year) is used in the calculation. This criterion eliminated 173 companies from the original sample of 342, so that 169 were left.

The last criterion required the elimination of thinly traded shares. This criterion was applied because one of the variables that is calculated by the EVA-program at the BFA is the beta of a company's share, which in turn is used to calculate the cost of equity of that company. The 169 companies remaining in the sample were ranked in descending order of average number of shares traded per year for 11 years. It was decided to set the cut-off point at an average of 500 000 shares traded per year for 11 years. This eliminated another 34 companies, so that a final sample of 135 companies was left. A list of these companies is included as Appendix A at the end of this study.

The next phase in the data collection procedure was to compute the various variables as input into the statistical programmes. The following variables were calculated:

- (a) Market value added (MVA)
- (b) Standardized MVA
- (c) Economic value added (EVA)
- (d) Standardized EVA
- (e) Return on assets (ROA)
- (f) Return on equity (ROE)
- (g) Return on capital employed (ROCE)
- (h) Earnings per share (EPS)
- (i) Dividend per share (DPS)
- (j) Total debt ratio
- (k) Total asset turnover
- (l) Current ratio
- (m) Net operating profit before tax/Capital employed
- (n) Net operating profit before tax/Sales
- (o) Net operating profit after tax/Sales (Margin)
- (p) Gross profit/Sales
- (q) Sales growth
- (r) Retained profit/Capital employed
- (s) Sales/Capital employed
- (t) Sales/Net working capital
- (u) Sales/Average total fixed assets
- (v) Weighted average cost of capital (WACC)
- (w) Total owners' interest/Capital employed
- (x) Total long-term loan capital/Capital employed
- (y) $(\text{Short term-borrowings} + \text{bank overdraft}) / \text{Capital employed}$
- (z) $\text{Investment rate} : \frac{\text{Change in Capital employed}}{\text{Net operating profit after tax}}$
- (aa) Company cash tax rate
- (ab) Operating leverage
- (ac) Financial leverage
- (ad) Discounted EVA

It is important to bear in mind that the above variables were calculated for each of the 10 years as well as for the total 10 year period under review, both with and without inflation adjustments to the relevant data.

6.3 STATISTICAL TECHNIQUES

After the sample of companies had been selected and the relevant variables as described in Section 6.2 above had been calculated, the study moved on to the statistical analyses of this data.

The various variables were classified under the following headings:

(a) **Variables that can correlate with MVA**

<i>Dependent variable</i>	MVA Standardized MVA
<i>Independent variables</i>	Economic value added (EVA) Standardized EVA Return on assets (ROA) Return on equity (ROE) Return on capital employed (ROCE) Earnings per share (EPS) Dividend per share (DPS) Total debt ratio Total asset turnover Current ratio Net operating profit before tax/Capital employed Net operating profit before tax/Sales Net operating profit after tax/Sales (Margin) Gross profit/Sales Sales growth

Retained profit/Capital employed
Sales/Capital employed
Sales/Net working capital
Sales/Average total fixed assets
Weighted average cost of capital (WACC)
Debt ratio : (Total long-term loan capital
+ short-term borrowings + bank overdraft)/
Capital employed
Total owners' interest/Capital employed
Total long-term loan capital/Capital employed
(Short term-borrowings + bank overdraft)/
Capital employed
Investment rate : Change in Capital employed/
Net operating profit after tax
Company cash tax rate
Operating leverage
Financial leverage
Discounted EVA

(b) **Variables that can determine EVA**

- (i) Return on capital employed (ROCE = NOPAT/CE)
- (ii) Net operating profit before tax/Capital employed
- (iii) Net operating profit before tax/Sales
- (iv) Net operating profit after tax/Sales (Margin)
- (v) Gross profit/Sales
- (vi) Sales growth
- (vii) Retained profit/Capital employed
- (viii) Sales/Capital employed
- (ix) Sales/Net working capital
- (x) Sales/Average total fixed assets
- (xi) Weighted average cost of capital (WACC)

- (xii) Debt ratio : (Total long-term loan capital + short-term borrowings + bank overdraft)/
Capital employed
- (xiii) Total owners' interest/Capital employed
- (xiv) Total long-term loan capital/Capital employed
- (xv) (Short term-borrowings + bank overdraft)/
Capital employed
- (xvi) Investment rate : Change in Capital employed/
Net operating profit after tax
- (xvii) Company cash tax rate
- (xviii) Operating leverage
- (xix) Financial leverage

The following statistical calculations were done on the above data:

- (a) A correlation was sought between the independent variables and:
 - (i) MVA;
 - (ii) Standardized MVA.

- (b) A stepwise regression analysis was done of the 19 independent variables that can determine EVA and:
 - (i) EVA;
 - (ii) Standardized EVA.

- (c) All these statistical calculations were done under the following conditions:
 - (i) for each of the ten years;
 - (ii) for the total of the ten year period;
 - (iii) without inflation adjustments to the data; and
 - (iv) with inflation adjustments to the data.

It should be clear at this stage that the results obtained from these calculations were in line with the primary objectives of this study, namely the quantification of variables that determine the shareholder wealth, as represented by EVA, of a company.

6.4 HYPOTHESES

In research, a hypothesis serves several important functions. The most important of these is that it guides the direction of the study. It also limits what shall be studied and what not, identifies facts that are relevant and those that are not and, finally, a hypothesis provides a framework for organizing the conclusions that result from the research.

In this study, the following hypotheses are tested:

- (a) (i) H_0 There is a low level of correlation between MVA unadjusted for inflation and EVA unadjusted for inflation.
 H_1 There is a high level of correlation between MVA unadjusted for inflation and EVA unadjusted for inflation.
- (ii) H_0 There is a high level of correlation between MVA adjusted for inflation and EVA adjusted for inflation.
 H_1 There is a low level of correlation between MVA adjusted for inflation and EVA adjusted for inflation.
- (iii) H_0 There is a low level of correlation between standardized MVA unadjusted for inflation and standardized EVA unadjusted for inflation.
 H_1 There is a high level of correlation between standardized MVA unadjusted for inflation and standardized EVA unadjusted for inflation.

- (iv) H_0 There is a high level of correlation between standardized MVA adjusted for inflation and standardized EVA adjusted for inflation.
- H_1 There is a low level of correlation between standardized MVA adjusted for inflation and standardized EVA adjusted for inflation.
- (v) H_0 There is a low level of correlation between MVA unadjusted for inflation and discounted EVA unadjusted for inflation.
- H_1 There is a high level of correlation between MVA unadjusted for inflation and discounted EVA unadjusted for inflation.
- (vi) H_0 There is a high level of correlation between MVA adjusted for inflation and discounted EVA adjusted for inflation.
- H_1 There is a low level of correlation between MVA adjusted for inflation and discounted EVA adjusted for inflation.
- (vii) H_0 There is a low level of correlation between standardized MVA unadjusted for inflation and discounted standardized EVA unadjusted for inflation.
- H_1 There is a high level of correlation between standardized MVA unadjusted for inflation and discounted standardized EVA unadjusted for inflation.
- (viii) H_0 There is a high level of correlation between standardized MVA adjusted for inflation and discounted standardized EVA adjusted for inflation.
- H_1 There is a low level of correlation between standardized MVA adjusted for inflation and discounted standardized EVA adjusted for inflation.

From the above 8 hypotheses it can be seen that it is hypothesised that it is especially the inflation adjustments to fixed assets and profit as well as the standardization process that gives rise to the high correlation between EVA and MVA.

It is therefore hypothesised that without these adjustments the correlation between EVA and MVA should be low.

It is further hypothesised that it is especially the discounting of EVA that gives rise to a high correlation between EVA and MVA.

The second set of hypotheses address the stepwise regression analyses.

(b) H_0 Of the variables under the control of management that could influence EVA, it is especially the income statement variables that drive or explain EVA and not as much the balance sheet variables.

H_1 Of the variables under the control of management that could influence EVA, it is especially the balance sheet variables that drive or explain EVA and not as much the income statement variables.

From the above 2 hypotheses it can be seen that it is hypothesised that it is especially the income statement variables (profit margins) that determine a company's EVA, and therefore shareholder value creation.

6.5 CONCLUSION

The research methodology is one of the most important elements of any empirical research project. In this section, a description of the data and techniques used in order to attain the envisaged empirical results and therefore to achieve the

objective of this study, has been related briefly to the literature overview included in the earlier parts of this study. The all important discussion of the results of the empirical analyses follows in Chapter 7.