

Value-based management in the Real Estate and Development sector: Financial indicators

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ABSTRACT

Wealth creation is the ultimate goal of companies, shareholders and all other stakeholders. From the shareholders' perspective, the financial performance of the company is of vital importance to the return on their investment. They are further tied in to the affairs of the company by virtue of the fact that shareholders own the company, often fund the capital for running it, are the residual claimants and bear all the risk related to the company.

Growth of wealth for investors is measured in terms of return on the investment made, which includes capital gains or dividend payout or both. In this context, it is important to consider factors that may influence the share price.

Financial indicators used in the assessment of corporate performance should correlate with shareholder's growth in wealth. Initially traditional accounting-based ratios, such as return on equity, earnings per share (EPS), earnings before interest and tax and net operating profit after tax were used for evaluating corporate performance. When corporations started to focus on shareholder value as a primary long-term objective, the focus shifted from measurement of financial performance with traditional accounting-based ratios to a more strategic approach which emphasises the identification, measurement and management of key performance indicators.

Diverse new metrics were developed, which include value-based management (VBM). VBM is an important tool that links value drivers used by employees and frontline managers all the way up to decisions made by senior management. Although there are significant differences between the different value metrics, all of them are, unlike the traditional accounting performance measures, essentially based on the free cash flow (FCF) approach and take the cost of capital into account (Madininos *et al.*, 2009:184).

The primary objective of this study was to identify the underlying financial indicators that correlate with value created by management of companies and therefore the subsequent share price, which is the indicator of wealth created for shareholders.

In the quantitative study the correlation of identified financial indicators with share prices in the real estate and development sector of the Johannesburg Stock Exchange was tested. Multiple regressions were developed for each year in the sample period of 2000 to 2010. Average share price (ASP) and change in average share price (CASP), a proxy of company value, were used as dependent variables. Forty-seven financial indicators were identified as independent variables.

Of all the regression models developed for ASP, the variables that occurred most frequently over the sample period were EPS, company free cash flow (FCFC) and economic value added 2 (EVA2), indicating their significance to ASP.

Of all the regression models developed for CASP, the variables that occurred most frequently over the sample period were EPS, change in net operating working capital and asset turn-over, indicating their significance to CASP.

Historical data was used to test the relevance of EPS, FCFC and EVA2 to ASP. The outcomes showed several distinctive correlations.

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LIST OF ABBREVIATIONS

AMEX	American stock exchange	EPS	earnings per share
ASP	average share price	EV	enterprise value
ATO	asset turnover	EVA	economic value added
BVPS	book value per share	EY	earnings yield
CAP	capitalisation rate	FATO	fixed assets turnover
CAPM	Capital Asset Pricing Model	FCF	free cash flow
CASP	change in average share price	FFO	funds from operations
CFO	cash flow from operations	FLEV	financial leverage
CFROI	cash flow return on investment	g	growth rate
CR	capital requirements	GCF	gross cash flow
CR	current ratio	GI	gross investment
CVA	cash value added	IFRS	International Financial Reporting Standards
DCF	discounted cash flow	IPO	initial public offering
DDM	dividend discount models	JSE	Johannesburg Stock Exchange
DPS	dividend per share	k	appropriate discount rate
DTA	debt to assets ratio	k_e	cost of equity
DTE	debt to equity ratio	MPT	modern portfolio theory
DY	dividend yield ratio	NAV	net asset value
EBIT	earnings before interest and tax	NOI	net operating income
EBEI	earnings before extraordinary items	NOPAT	net operating profit after tax
EBITDA	earnings before interest, taxes, depreciation, and amortisation	NYSE	New York stock exchange

EM	equity multiplier	OP	operating profitability
OPM	operating profit margin	ROCE	return on common equity
PM	profit margin	ROE	return on equity
PTE	price-to-earnings ratio	ROIC	return on investment capital
PV	present value	SV	salvage value
QR	quick ratio	TATO	total asset turn over
REIT	Real Estate Investment Trust	TSR	total shareholder return
RI	residual income	VBM	value-based management
RIM	Residual income model	WACC	weighted average cost of capital
RNOA	return on net operating assets	WCTO	working capital turnover

Chapter 1

Valuation of growth in wealth

1.1 Introduction

Investing in equity frequently comprises taking on substantial levels of risk. This is evidenced by the recent global financial crisis of late 2008 and early 2009, which resulted in market turmoil and the dwindling of equity values. Over the past decade, investments made in developed countries performed poorly, as they offered investors almost no return. This is not the case for emerging markets that have offered and continue to offer positive returns for investors (Correia *et al.*, 2011:5-1). Although investments in emerging markets, of which South Africa is one, render positive returns, the question of whether or not investments are worth making should not be considered in isolation from emerging market risk premiums and relatively high interest rates.

Wealth creation is the ultimate goal of companies, shareholders and all other stakeholders. From the company's perspective, the creation of shareholder value is the credo of almost all companies' vision statements nowadays. Corporate executives, it seems, are therefore under increasing pressure to see to the creation of shareholder value and the measurement of this and to communicate the creation thereof to all stakeholders (IMA, 1997:1).

The maximisation of shareholders' wealth can be translated to the maximisation of the price of the common share of a company (Sharma & Kumar, 2010:200; Brigham & Houston, 2007:6). Thus, the financial goal of a company should be reflected in the increase in shares' market price.

An infallible model for determining the value of share is yet to be found. The value of shares is generally determined by the present value of the shares' expected future cash flows discounted at an applicable discount rate. Expected future cash flow, as its name says, considers projected future cash flows and is thus enveloped in much uncertainty. The discount rate should reflect the underlying risk of that investment.

Determining an appropriate discount rate also entails reliance on assumptions, which contributes to the uncertainty.

Some of the more popular valuation methods of share at present are the use of multiples and value-based management (VBM) (Daly, 2011:52). Multiples are usually easily calculated and data from financial statements are used. VBM makes use of forecasted cash flows with an applicable discount rate.

1.2 Valuation of share price by investor

Investors, it seems, generally only purchase shares if the return is higher than what could be obtained from alternative investments. It further needs to be highlighted that the perceived risk involved with investment in equity ownership is tolerated, because the rule of thumb is the higher the risk, the higher the expected return (Megginson *et al.*, 2010:209).

From the shareholder and investor's perspective, wealth is measured in terms of the return on the investment made, which includes capital gains or dividend payout or both. In this context, it is important to consider factors that may influence the share price. Of specific importance for this study is the relationship between the value created and share price.

A variety of methods exist to determine the value of shares; however, it is important to point out that financial information plays an important part in almost all evaluation methods. Sharma and Kumar (2010:200) specifically indicated that stakeholders normally use financial information to assess a company's performance and to forecast expected future performance. In addition to financial information, a number of variables, ranging from company-specific to environment-specific ones to stakeholders' perceived valuation, determine the market value of shares.

It is clearly important to value shares correctly, because errors would most likely result in investment losses. In other words, it is crucial to use the correct performance indicators that would render accurate results from which appropriate valuations could be made.

1.3 Valuation of corporate performance

According to Megginson *et al.* (2010:315), if all the future benefits and/or cash flows of an asset are discounted to its present value, it equals the value of that asset. In the case of common share, its value equals the present value of all future dividends, capital gains and other cash returns that the shareholders expect companies to distribute to them. Therefore, to value shares, investors should firstly determine what the shares' future benefits might be. Secondly, investors should take a view based on risk calculus of what an applicable discount rate to use for discounting future benefits should be. Usually, the higher the risk of a share's future benefits, the higher the appropriated discount rate applied.

Financial indicators used in the assessment of corporate performance should correlate with shareholders' wealth. Initially traditional accounting-based ratios, such as return on equity (ROE), earnings per share (EPS), earnings before interest and tax (EBIT) and net operating profit after tax (NOPAT), were used for evaluating corporate performance. When corporations started to focus on shareholder value as a primary long-term objective, the measurement of financial performance with traditional accounting-based ratios and budgetary control became inadequate (Ittner & Larcker, 2001:350). Reasons for the inadequacy, according to IMA (1997:1), are:

- the use of financial statements under International Financial Reporting Standards (IFRS), which use the accrual basis method;
- accounting that is applied differently, depending on the accounting policy of the company;
- the fact that performance measures can be manipulated without effort based on the accounting profit;
- failure to reflect important issues such as future cash flow and the cost of capital;
- and
- the reality that with the use of return-based measures, managers sometimes make short-term dysfunctional decisions that may lead to underinvestment.

Notwithstanding the criticism against traditional accounting performance measures (also referred to as multiples), several recent studies have reported correlation

between multiples and share prices. Sharma (2011:58) collected data from companies listed on the Bombay Stock Exchange from 1993 to 2009 in six industries in the manufacturing sector. The empirical relationship between share prices and several explanatory variables was examined. The outcomes revealed that dividend per share (DPS), earning per share (EPS) and book value per share (BVPS) have a substantial impact on the market price of a share, the first two mentioned being the strongest determinants of market price. Gill *et al.* (2012:188), with the same research objective as Sharma (2011:53) just mentioned, used a sample of 333 firms in the United States of America (US) listed on the New York Stock Exchange (NYSE), from 2009-2011. The results revealed that the variance in share prices in the US is explained by EPS, BVPS, DPS, the price-to-earnings ratio (PTE), the internationality of the firm and the chief executive officer duality. Soliman (2008:825) found in long-window (several months to years after a specific date or event) association tests that the operating profit margin (OPM) and asset turnover (ATO) are incremental to earnings and earning changes in explaining concurrent returns. Amir *et al.* (2011:326) found that the incremental explanatory power of OPM in explaining concurrent share returns was higher than that of ATO.

Since realising the inadequacy of the traditional accounting-based measures, a more strategic approach has been taken, which emphasises the identification, measurement and management of key performance indicators. Diverse new metrics were developed, such as activity-based costing, strategic accounting, the balanced scorecard and economic value performance measures. Companies integrated these distinct techniques to a comprehensive VBM structure (Ittner & Larcker, 2001:350).

1.4 Value-based Management

The notion of residual income (RI) as a modern-day term that defines value dates back to nineteenth century economic theory. After Rappaport's seminal text, *Creating shareholder value: A new standard for business performance* (1986), was published, the concept of VBM became increasingly popular, but the term VBM only came into use in the mid-1990s (Starovic *et al.*, 2004:4). According to Copeland (quoted by Starovic *et al.*, 2004:4) VBM is defined as: "... an approach to management whereby the company's overall aspirations, analytical techniques and

management processes are all aligned to help the company maximise its value by focusing management decision making on the key drivers of value.”

According to Ittner and Larcker (2001:351), VBM is:

- an extension of control structures and customary management planning;
- consistent with economic models of management accounting;
- a combination of a variety of recently developed new methods in management accounting; and
- in line with changes in practice.

Because VBM identifies the key drivers of value creation and focuses on cash flows, the link between the strategy of management and value created is made and the economic reality of a company is exposed. To measure this value created for the shareholders, several value metrics have been developed, which, for example, include:

- economic value added (EVA);
- cash flow return on investment (CFROI);
- economic margin (EM);
- cash value added (CVA); and
- total shareholder return (TSR).

Since VBM came to the foreground, the benefits of using it have been enhanced by explicit commitments of companies such as Cadbury Schweppes, Boots and Lloyds TSB that promised - and yielded shareholder value. This validated the use of VBM techniques (Starovic *et al.*, 2004:4). VBM metrics have also been researched extensively since VBM became to the foreground and empirical research papers found a positive correlation between value-based measures and share return. These studies since the onset of VBM include those of Stewart (1994: 72); Walbert (1994: 110); O’Byrne (1996: 117) and more recently Worthington and West (2004:220) and Charoendeesawat and Jeng (2011:39).

There are, however, many contradictory results that question whether or not VBM is the most appropriate valuation method. For example, Erasmus (2008:223) reports

that in most of the relative information content tests done on 3 181 complete observations of companies listed on the Johannesburg Stock Exchange (JSE), earnings before extraordinary items (EBEI) outperformed value-based measures, and RI outperformed EVA, CVA and CFROI. Copeland (2002:7) found no correlation between total shareholder return, which includes dividends, capital gains and other distributions, and EVA. According to Biddle *et al.* (1997: 332) EVA is in no way superior to earnings in its relation to firm values and share returns.

1.5 Problem statement

All over the world VBM is recognised as an important tool of management and performance measurement, especially in advanced economies, by implementing it as corporate strategy. However, there are conflicting views about the advantage and use of VBM over traditional accounting-based measures in the valuation of share prices.

Many companies still prefer to use multiples to determine financial performance (and share valuations). This is illustrated in a recent analysis conducted in 2010 by the US National Association of Corporate Directors on approximately 1 300 directors from public companies across 24 sectors, which indicated that the most common financial metrics include EPS and profits weighted 66%, cash flows 36%, share price-based measures 31% and VBM 16% (Daly, 2011:52).

Investors and shareholders want to make the best evaluation of a share's intrinsic value. The purpose of this study is to determine which financial value drivers correlate with share prices. The performance of the identified financial value drivers will then be tested in the real estate and development sector of the JSE for the years 2000 – 2010.

1.6 Objective

From literature it seems that several problems have arisen with the use of traditional accounting measures since the mid-1980s in the valuation of companies and subsequent share prices. Value-based metrics emerged in the mid-1990s in an

attempt to capture the problems with traditional accounting measures and to establish a better manner to define how much value a company creates or destroys. A number of studies have been done to determine the correlation of share prices and these aforementioned different valuation methods; other studies tested the interrelationships between the different valuation methods.

1.6.1 Main objective

The main objective of this study is to identify the underlying financial indicators that correlate with value created by the management of companies and therefore the subsequent share price, which is the indicator of wealth created for shareholders.

1.6.2 Sub-objectives

The sub-objectives of this study include:

- To determine through a literature study the underlying financial indicators of value creation.
- To test the correlation of the identified indicators with share prices in the real estate and development sector of the JSE. If there are value drivers that correlate positively with the share price, it might be useful to investors and company directors who trade in the real estate industry of the JSE.

1.7 Research methodology

The research for this study comprises two main sections, namely a literature study and an empirical research study.

1.7.1 Literature study

The literature study consists of the following:

- A review of academic literature on value, the financial drivers of value and hence the different valuation models used by investors to determine the creation and growth of wealth.

- A review of factors affecting the real estate and development sector and hence their implications for share prices.

1.7.2 Empirical research

The aim of the empirical research is to determine financial indicators that are related to share prices of the real estate and development sector of the JSE. The best-subsets approach for model building will be used to develop multiple regressions.

The population sample will be all the companies listed on the JSE in the real estate holding and development sector. The sample period is from 2000 to 2010.

1.8 Limitations of the study

- Only companies listed on the JSE will be used in the sample. The information is therefore only applicable to the South African market.
- The number of companies listed in the real estate and development sector is limited and varies from 12 in 2000 to 25 in 2010.
- Not all the financial information for some of the listed companies is available.
- During the sample period the US had a real estate bubble that burst. The burst of the real estate bubble led to a worldwide recession. The bubble, burst and recession had an impact on the South African real estate market. It also reduced the number of years under consideration in this study of “normal” trading in the real estate sector.

1.9 Layout of the study

The study will consist of the following:

Chapter 1: Valuation of growth in wealth – gives a synopsis of the total dissertation.

Chapter 2: Value creation and its measurement – consists of an in-depth literature study of the meaning of value, the drivers of value creation, current investment theories and different valuation models.

Chapter 3: Real estate investment – presents a short discussion of the factors that might influence real estate investment.

Chapter 4: Empirical research of financial indicators in the real estate and development sector of the JSE – consist of a systematic breakdown of the steps followed in the multiple regression model building process and a test done on the outcomes of one set of multiple regression models.

Chapter 5: Conclusion and recommendations – comprises a summary of the literature study and empirical research. Some of the results of the empirical study are placed in context in the macro-economy. The suggested recommendations will yield better understanding of the subject being discussed.

List of references.

Chapter 2

Value creation and its measurement

2.1 Introduction

To establish a business operation for goods and services rendered to consumers and clients, capital investment is necessary for the procurement of assets and business infrastructure that will generate these goods and services. If the necessary capital to finance the business operation must come from investors, the investors may only invest in the business after a prediction of what the expected future value of the business will be, has been made. Normally risk is taken into account and the projected outcome is compared to the projected outcomes of other alternatives before a choice of investment is made. When the investor has transferred his funds into a business operation, with the anticipation that a sufficient return will be generated, the obligation rests upon the management of the business operation to ensure that the expected returns will be yielded. According to Copeland (2002:8), value is created when a company attains returns that are higher than capital market expectations, which include the cost of capital. As long as value is created that is higher than market expectations, investors such as shareholders, banks and financial institutes will continue to capitalise in the company.

In the quest to improve profitability, improve quality, reduce costs and create value for shareholders, several new concepts have been implemented in companies, such as value added, value chain, customer value and value stream mapping. It is therefore important to have a clear perception of exactly what is understood by value for the company, as well as the stakeholders and shareholders.

When considering the above-mentioned, it comes as no surprise that renewed emphasis is placed on value creation and value management. IMA (1997:1) states that the reasons for this are:

The emergence of a new generation of shareholders, much more assertive than ever before; Accountability is demanded from corporate executives, as well as

justification of sometimes extremely high compensation levels. Corporate governance is thus shifting.

The globalisation of capital markets; This means that investors can readily shift investments to higher-yielding propositions. Shareholder value is globally published in performance ratings. This publicly known information, together with comparatives, has led to investors flocking to the better performing companies, away from the underperformers.

The loss of corporate control in the case of underperformance; Nowadays weak financial performance is unacceptable and may lead to take-over. In this fight for self-preservation, many managers make a significant effort to understand the importance of measuring and managing shareholder wealth.

One of the primary objectives of a financial manager is therefore to oversee the growth of the business value and to ensure that all the stakeholders benefit from the value added to the business. According to ThyssenKrupp (2011:4), results of efficient value management are:

- improved judgment of the company by analysts, rating agencies and banks;
- increased shareholder gratification;
- improved innovation, market-orientated products and customer services that satisfy the interests of clients; and
- suppliers that are secured by purchasing volumes and liquidity.

In the case of listed companies, what goes along with the primary objective of value creation is the objective to attain the highest share price possible. Although a lower share price may be the result of high dividend payouts or share splits, the decision on high dividend payouts or share splits should also have been made with the purpose of value creation in the long term (Correia *et al.*, 2011:1-13).

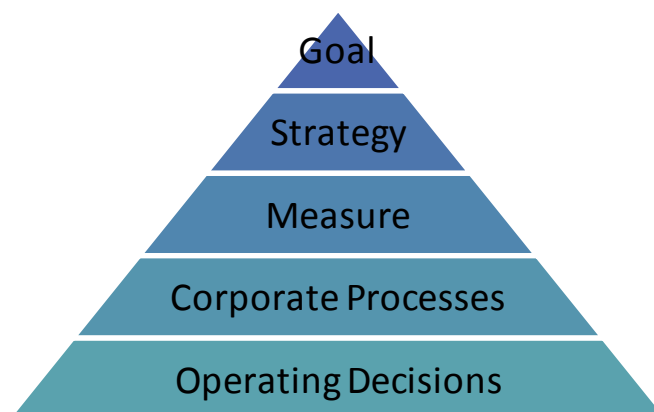
2.2 Value creation

The ability to manage successfully for value maximisation depends on a mind-set of value creation to be integrated in the manner in which decisions are made in a

company. The process begins with the primary goal of value creation and uses financial and nonfinancial performance measures to attain the goal (Knight, 1998:2).

According to Knight (1998:3), value management should be divided into five categories, as shown in figure 2.1. The goal of a company should underpin the creation of value for the shareholders, while balancing the interests of all other important constituents, including employees and customers. The strategy should indicate how the company's objectives will be achieved. The appropriate performance indicators the company selects should reinforce and support the company's strategy and should also capture the results of the strategy. Four key management processes should be considered, namely strategic planning, reporting, budgeting and incentives, all of which should be applied consistently. Wise decisions in the allocation of human and physical resources in the management of operations, together with investment decisions, should be the building blocks of value creation (Knight, 1998:4-7). Shareholder value can be created or damaged at any level of company decision-making (Knight, 1998:3).

Figure 2.1: Categories of value management



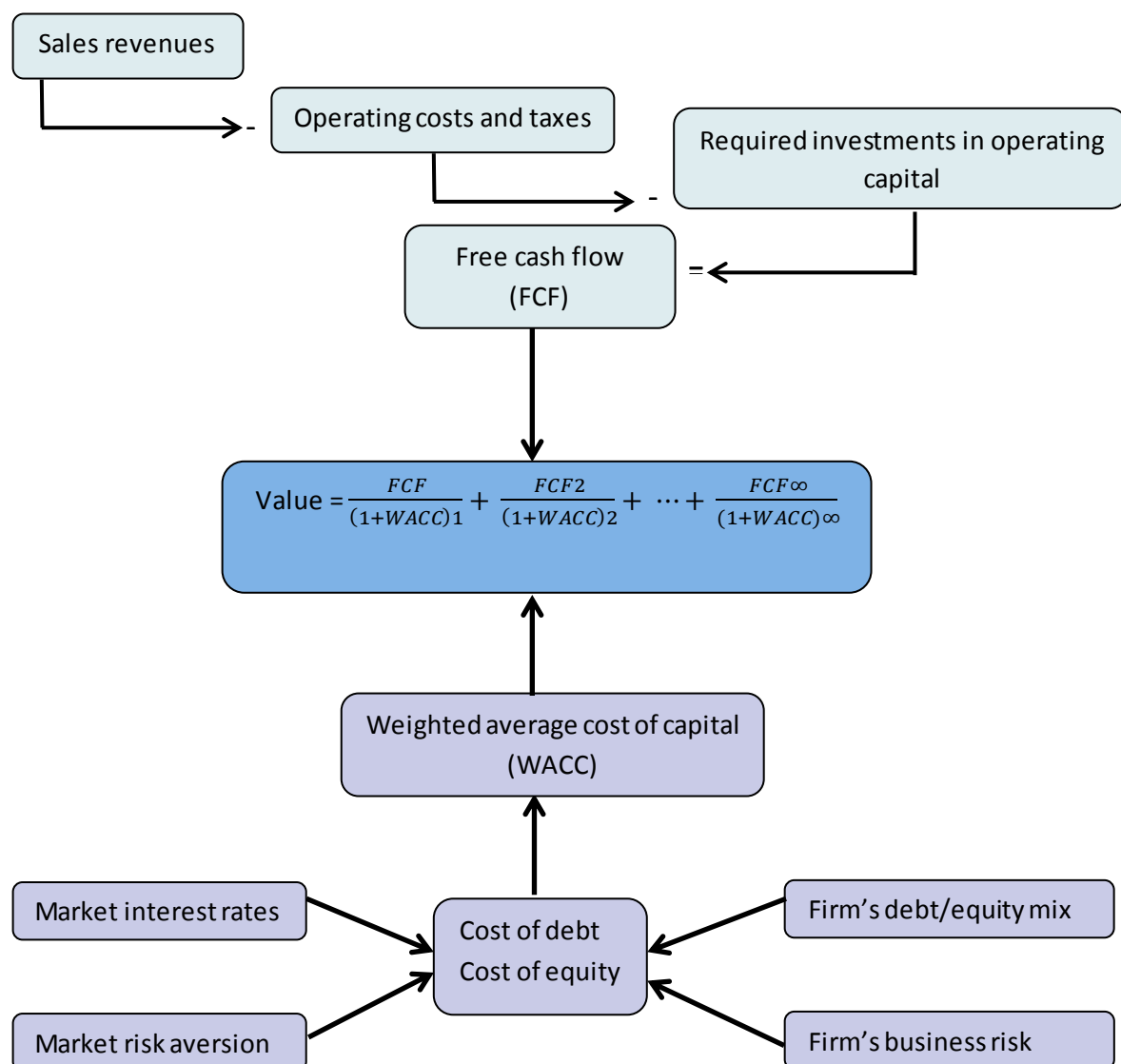
Source: Knight (1998:3)

2.3 Drivers of value creation

When a company is analysed to determine if value has been created or not, several factors should be incorporated in the evaluation process. According to Ehrhardt and Brigham (2011:42), all the determinations of the intrinsic value of a company converge to two variables, namely expected FCF, discussed in 2.8.2, and the

weighted average cost of capital (WACC), discussed in 2.3.2. The intrinsic value of a company is therefore expressed by the present value of the company's expected FCF, discounted at the WACC, and is shown in the equation in figure 2.2. There are therefore two approaches to increase intrinsic value management: either reduce WACC or increase the FCF. Several factors affect both the WACC and FCF and are indicated in figure 2.2.

Figure 2.2: Determinations of value

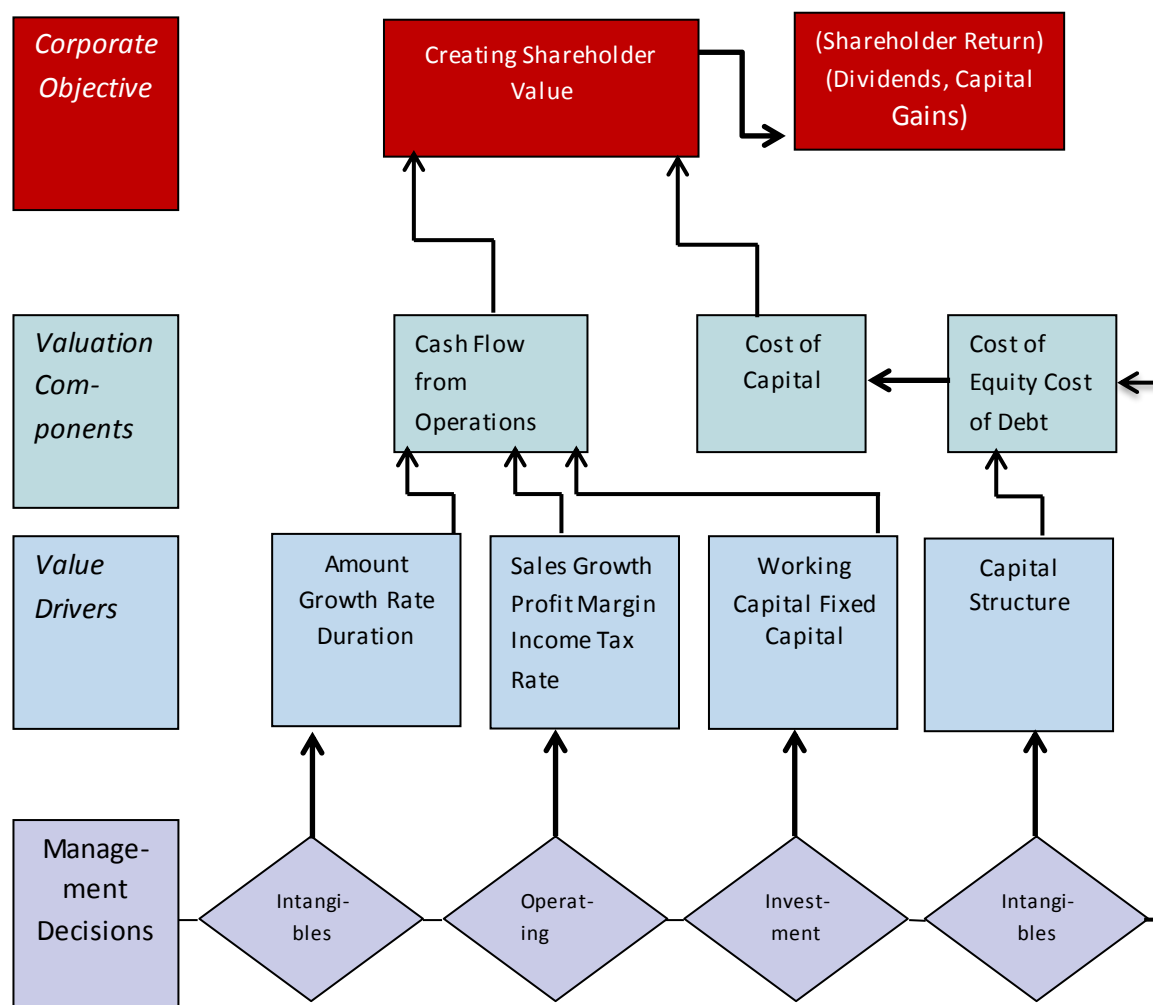


Source: Ehrhardt and Brigham (2011:43)

The same objective, namely the creation of value, is articulated by IMA (1997:3) in another way and is displayed in figure 2.3. Almost the same variables are used as those used by Ehrhardt and Brigham (2011:42). Unlike Ehrhardt and Brigham (2011:42), IMA (1997:3) links the created value directly to shareholder return. Value drivers, such as intangibles, operating and investment, all influence the cash flow from operations (CFO). The financial value driver influences the cost of capital. Increasing CFO and minimising the cost of capital determine the value created and may lead to positive shareholder return. Figure 2.3 shows how management's decisions determine value drivers and how value drivers in turn influence shareholder return and the share price. If figure 2.3 is compared to figure 2.2, the valuation components of cost of capital and WACC are exactly the same, but CFO (as in figure 2.2) differs from FCF (as in figure 2.3). The FCF of a company is its CFO less the net investments in fixed and current assets (Megginson *et al.*, 2010:35).

To create value, management should act directly on the things they can influence, such as cost, capital expenditure, stakeholder satisfaction and financial leverage, as these factors form the value drivers and are the variables that significantly affect the value of the company (IMA, 1997:3).

Figure 2.3: Corporate objectives and management decisions



Source: As adapted in IMA (1997:3) from Rappaport (1986)

2.3.1 Cash flow from operations

Cash flows and marketable securities of companies are important to analysts, as they are indicators of a company's liquidity. The total cash flow of a company can be divided into operating, investment and financing flows. This is portrayed as part of the lowest level of figure 2.3. The combination of operating and investment cash flows forms CFO (also in figure 2.3).

If external funds are needed for projects for growth, the financial deficit could be raised through borrowing or issuing new equity securities. Approximate external

funding needs are calculated by CFO minus cash dividend payments (Megginson *et al.*, 2010:395). Therefore, CFO may have an effect on equity securities.

The Du Pont model gives valuable insights into the impact that operating changes have on returns on share holders' investment in the company (Ehrhardt & Brigham, 2011:107).

The Du Pont model is a tool that can be used to express the amount of wealth created on the shareholders' funds with the calculation of ROE. This model uses information from both the balance sheet and income statement to arrange many possibly confusing multiples into three multiplicative ratios of profit margin (PM), total asset turnover (TATO) and equity multiplier (EM). The indicative ability of the model helps to focus attention on the problem areas indicated by it (Correia *et al.*, 2011:5-21).

$$\text{ROE} = (\text{PM})(\text{TATO})(\text{EM})$$

$$\text{ROE} = \frac{\text{net profit}}{\text{sales}} \times \frac{\text{sales}}{\text{total assets}} \times \frac{\text{total assets}}{\text{equity}} \quad (2.1)$$

$$\text{or ROE} = \text{ROA} \times \text{EM}$$

$$\text{ROE} = \frac{\text{net profit}}{\text{total assets}} \times \frac{\text{total assets}}{\text{equity}} \quad (2.2)$$

$$\text{or ROE} = \frac{\text{net profit}}{\text{equity}} \quad (2.3)$$

Since equity influences all three the above-mentioned multiplicative ratios, Nissim and Penman (2001:116) attempted to separate operating and financing operations. The reason for the separation, according to Nissim and Penman (2001:112), is based on the view of Modigliani and Miller that value is mostly generated from operating activities and also from an appreciation that financial liabilities and assets are close to market value in the balance sheet and are therefore already valued. They used the residual income model (RIM) as basis, doing algebraic computation to arrive at:

$$\text{ROCE} = \text{RNOA} + [\text{FLEV} \times \text{SPREAD}] \quad (2.4)$$

where:

ROCE = return on common equity, which entails the weighted average of the return on operating activities and the return on financing activities

RNOA = return on net operating assets

FLEV = financial leverage

Spread = the difference between return on borrowed capital and the cost of that borrowing; therefore

$[FLEV \times SPREAD]$ = return on financing activities.

Nissim and Penman (2001:116) decomposed RNOA further into operating profit margin (OPM) x asset turnover (ATO) to arrive at:

$$\mathbf{ROCE = OPM \times ATO \times [FLEV \times SPREAD]} \quad (2.5)$$

where:

OPM = operating income/sales

ATO = sales/average net operating assets.

Equation 2.5 again follows the standard Du Pont analysis.

According to Soliman (2008:824), different concepts about a company's operations are indicated by OPM and ATO. Factors that determine the pricing power, such as product positioning, product innovation, first mover advantage, strength of brand name recognition and product niches, often have an impact on the OPM. The efficiency of asset utilisation, that includes all forms of working capital management, such as efficient inventory processes and efficient use of equipment, plant and property, are measured by ATO. Soliman (2008:824) also expects that OPM and ATO will be affected differently by competitive forces. The consequence of high OPMs could be new entrants into the marketplace or the rapid imitation of new inventions by rivals in the same industry. Hence, this competition could lead to the reversion of high OPM to normal levels. On the other hand, efficient deployment of assets is much more difficult to imitate, as it often goes along with costly overhauls of current practices and factories. Therefore a high ATO is less susceptible to competition. Soliman (2008:825) examines the effect of RNOA and its Du Pont

components, OPM and ATO, on current and subsequent share returns. It was found in long-window (several months to years after a specific date or event) association tests that OPM and ATO are incremental to earnings and earning changes in explaining concurrent returns. Short-window (a few days around a specific date or event) return tests revealed that OPM and ATO are incremental to earnings surprise and are informative to investors. Only change in ATO, but not change in OPM or RNOA, is significant in explaining short-window share returns around earnings announcements - an annual abnormal return of almost 5% was the result of future return tests. The argument is that only changes in ATO are significant in predicting future changes in RNOA.

Amir *et al.* (2011:326) drilled deeper into decomposing the Du Pont analysis and state that the hierarchal level of the multiple in the decomposition is central in the analysis process and hence in valuation. A further decomposition of the Du Pont model with the subsequent hierarchal levels is shown in figure 2.4.

Figure 2.4: The Du Pont decomposition

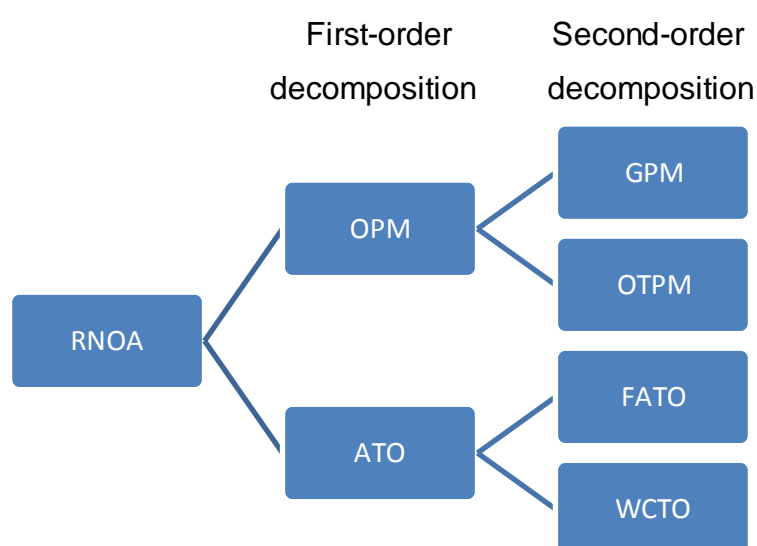


Figure 2.4: The Du Pont composition. RNOA = quarterly operating income after-tax/net operating assets; OPM is the core operating profit margin after tax; ATO = quarterly sales/net operating assets; GPM (gross profit margin after tax) = quarterly gross profit margin after tax/sales; OTPM (other profit margin after tax) is the difference between OPM and GPM; FATO (fixed assets turnover) quarterly sales/net property, plant and equipment; WCTO (working capital turn over) quarterly sales/net working capital.

Source: Amir *et al.* (2011:308)

Amir *et al.* (2011:326) measured the market reactions to the quarterly information to which market participants were exposed at the time of the earnings announcements. It was found that both OPM and ATO are significant in explaining excess share returns. Amir *et al.* (2011:326) also introduced a new measure, namely conditional persistence. Conditional persistence occurs where the persistence of a variable higher in the hierarchy is conditionally dependent on the marginal input of a variable's persistence lower in the hierarchy. The conditional persistence of OPM and ATO were measured. OPM was found more conditionally persistent than ATO to the persistence of RNOA, hence the incremental explanatory power of OPM in explaining concurrent share returns was higher than that of ATO (after controlling for earnings and revenue surprises). When OPM was decomposed into its two second-order components, GPM and OTPM, there were no difference in conditional persistence, and it was therefore found that the market reaction to unexpected changes was similar. In the same manner the decomposition of the two second-order components of ATO, FATO and WCTO, revealed that only FATO is conditionally persistent and market reaction was higher to unexpected changes in FATO than to unexpected changes in WCTO. Furthermore, Amir *et al.* (2011:326) used portfolio analysis to examine the market reaction of conditional persistent components. It was concluded that the conditional persistent measures OPM and FATO dominate the conditional non-persistent measures ATO and WCTO respectively, in terms of market reaction.

From the three above-mentioned studies it can be seen that the market reacts to OPM and to ATO and its components in the case of unexpected RNOA. Since OPM provides information on production prices and on the sensitivity of operating income, the management of companies should create value to both shareholders and the company if OPM is managed efficiently. Where change in ATO is used as indicator of future RNOA by market participants, the efficient management of assets is also a creator of value to both shareholders and companies.

2.3.2 Cost of capital

If all the assets of a company are not fully financed by shareholders, the capital comprises the various sources of finance. Deciding on a company's capital structure is a function of management, which must select the option that will create maximal wealth for shareholders. The underlying principle is that the consequence of using of debt, which is normally less pricey than equity, results in leverage and is considered to increase the value of the company. As the leverage increases, so do the risks of the company. As the risks increase, it will eventually lead to a decrease in company value. An optimum debt ratio must therefore be chosen to enhance value maximisation. According to Correia *et al.* (2010:7-2), the composite WACC is a formula used to determine the cost of capital for a levered company and WACC is used for:

- evaluation of capital projects;
- valuation of companies;
- determination of a company's economic profit; and
- determination of fair value for company reporting.

The method reflects the after-tax cost of each source of finance weighted by its impact on the value of the company:

$$\text{WACC} = w_d r_d (1-T) + w_e r_e + w_{ps} r_{ps} \quad (2.6)$$

where:

- w_d = weight of debt
- r_d = cost of debt
- T = marginal company tax rate
- w_e = weight of equity
- r_e = cost of equity
- w_{ps} = weight of preferred shares
- r_{ps} = cost of preferred shares.

Cost of equity is the term used for the rate of return required to at least uphold the value of the share. From financial literature it seems a number of different methods can be used to calculate the cost of equity, although all the methods involve some estimation (Correia *et al.*, 2011:7-14). Three commonly used approaches to appraising the cost of equity are:

2.3.2.1 Dividend yield and growth method

Constant growth is an assumption made by using this method and implies the use of the Gordon growth model, which is discussed in section 2.8.1.1. If new equity has to be raised, flotation cost should also be taken into account, which leads to the formula:

$$k_e = \frac{D_1}{P(1-F)} + g \quad (2.7)$$

where:

- k_e = cost of equity
- D_1 = next year's dividend
- P = price of share
- g = growth rate
- F = flotation cost.

2.3.2.2 Capital asset pricing method

The assumption that investors hold diversified portfolios underlies the capital asset pricing model (CAPM). The cost of equity is calculated by the sum of the risk-free rate and the product of the market premium and the company's beta (β). A risk-free rate is a return that equals the return offered by government bonds. Market risk premium is the compensation for bearing the risk of volatile returns in the equity market in relation to government bonds. The β is an indicator of a company's level of systematic risk. β is calculated as the ratio of the covariance of the return of an asset with the return of the overall market, divided by the variance of the return of the market. The required return is calculated with:

$$k_r = R_f + \beta(R_m - R_f) \quad (2.8)$$

where:

k_r = the return required by equity holders

R_f = the risk-free rate

β = the beta of the share

R_m = the return on the market portfolio.

The risk faced by shareholders increases as the debt ratio of a company increase, which in turn affects the cost of equity and subsequently WACC. The effect of financial leverage is captured in the Hamada calculated beta and Hamada calculated WACC (Ehrhardt & Brigham, 2011: 622).

2.3.2.3 Bond yield plus a risk premium method

Although the CAPM is widely used, management sometimes chooses not to use it because of the underlying assumptions contained in the model and the difficulty in obtaining accurate β s of companies. Analysts and companies may prefer to calculate the cost of equity by using the interest rate or company's bond yield and add a risk premium to it. The risk premium is based on an analyst's past experience or a judgment made by management (Correia *et al.*, 2011:7-15). The formula is then:

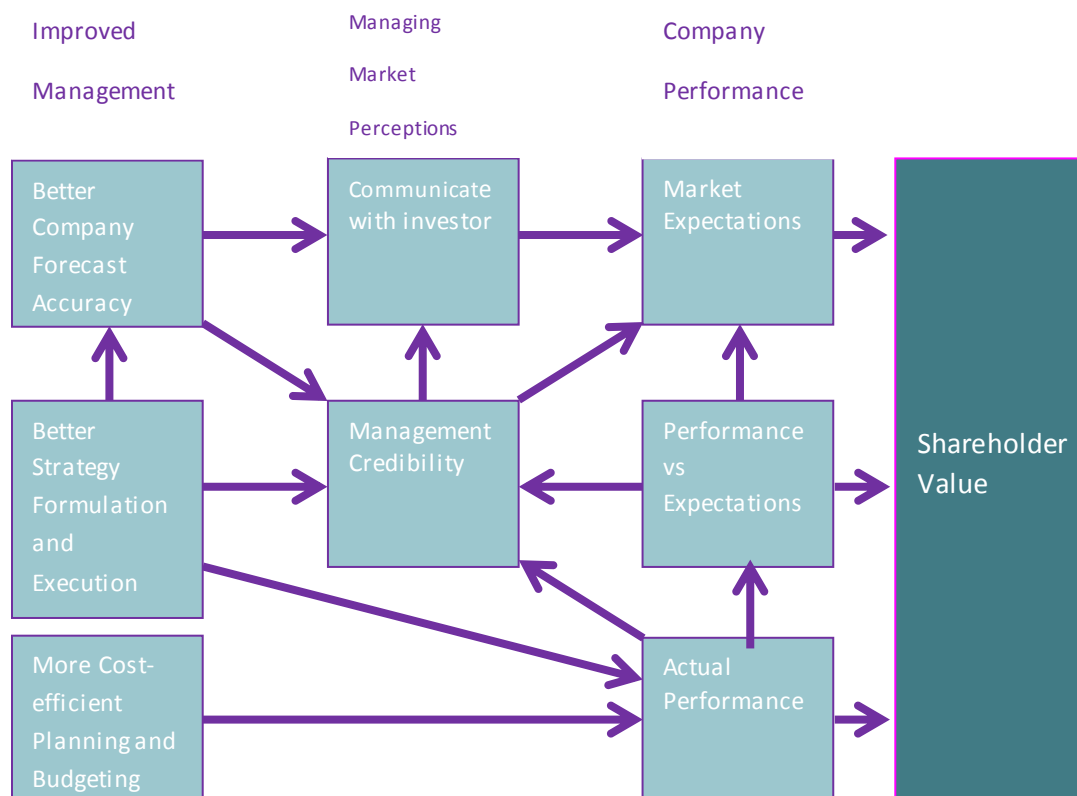
$$\text{Cost of equity} = \text{bond yield} + \text{risk premium.} \quad (2.9)$$

2.4 Shareholder's value

The creation of shareholder value should be one of the primary long-term objectives of a company. For shareholders not to withdraw capital in search of better returns, a fair return must be received on the capital invested, as well as in exchange for the risk taken. If value is destroyed by the management of a company, finding capital for further expansion may become increasingly difficult. It may be constrained by a share price that stands at discount to the underlying value of its assets and higher interest rates on debt by creditors.

The perception of value is subject to information about companies' internal performance details, such as products and markets, strategy and the creditability of the manager. This inter-relation between internal conditions, the communication of these and shareholder value is demonstrated in figure 2.5.

Figure 2.5: Theoretical link between internal conditions and shareholder value



Source: adapted from Neely *et al.* (2001:19)

As portrayed in figures 2.2 and 2.3 and in figure 2.5, creating shareholder value is the optimum corporate objective. According to figure 2.5, shareholder value is created from:

- improved forecasting accuracy;
- improved strategy formulation and its execution; and
- more cost-efficient budgeting and planning.

All three of those factors support the management's decisions, stated in both figures 2.2 and 2.3, where it is shown that shareholder value is achieved if:

- CFO is increased; and
- the cost of capital is minimized.

The investment and operational decisions management makes to achieve this will determine the amount of value created.

The external conditions that influence the value of a company are factors such as the economic, industrial and political climate. According to Elton *et al.* (2011:488), forecasts of economy- and industry-wide changes might be helpful in estimating companies' incomes. It was stated that changes in industry earnings may contribute on average 21% to changes in companies' earnings, although there is great variance in the strengths of these influences. However, according to Chari and Mohanty (2009:13), value is a dynamic concept and differs across time from company to company, customer to customer and product to product. Value must therefore be reviewed continually, as it is subjected to changes. Change might happen over time or suddenly; for example, after the 9/11 attacks the Dow Jones promptly fell 7,13%, the worst one-day drop ever (Arnadao, 2012).

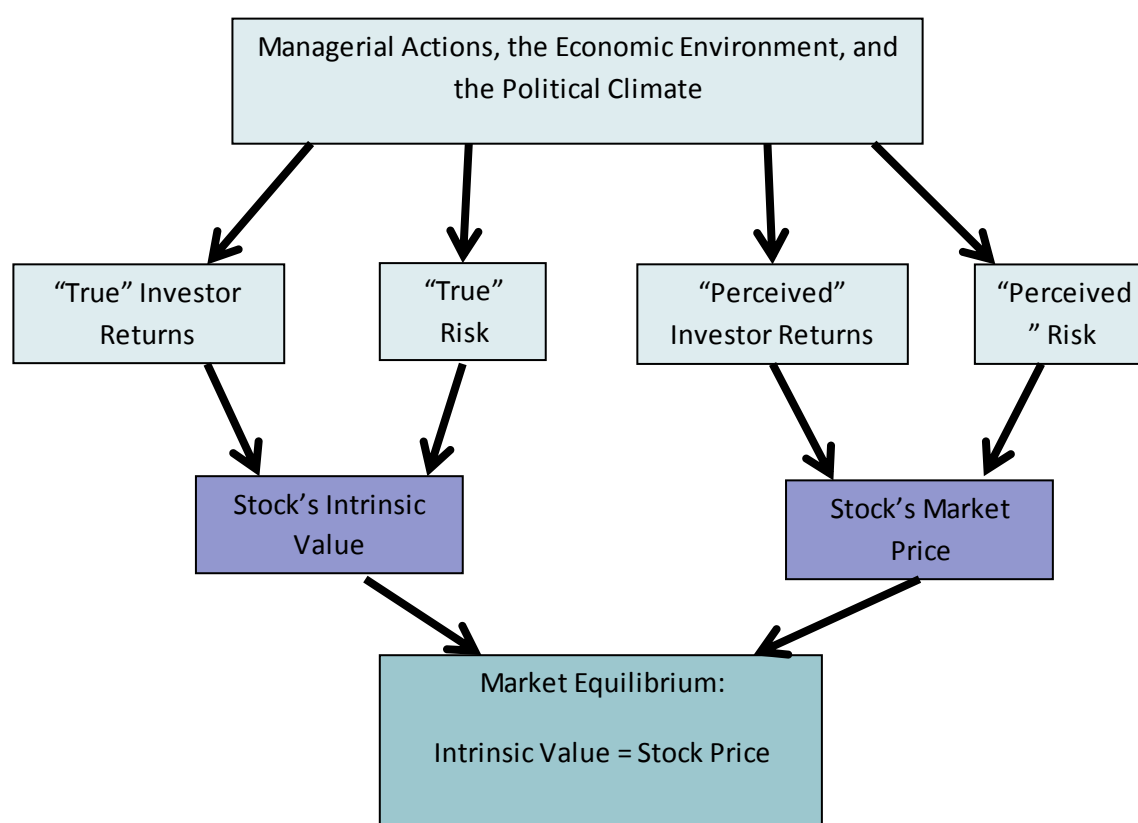
2.5 Share valuation

Share valuation comprises the theoretical value of a company and its share. It is used to forecast future market prices and to profit from subsequent price changes.

If it is possible for an investor to obtain all the information about a company, the intrinsic value of the share could be estimated. The intrinsic value of a share, according to literature, reflects the "true" value of the share. It is a derivative of the "true" risk expectations and the "true" return expectations of the share. According to Ehrhardt and Brigham (2011:271), this "true" value can only be estimated and not precisely measured. However, because of the limited information that investors and analysts have, only a perceived value of share price originates from perceived risk

and perceived return expectations (Ehrhardt and Brigham, 2011:271). Perceived risk and perceived return expectations form the shares' market price. Figure 2.6 illustrates the concept. A study done by Mielkartz and Roman (2011:22) is an example of the difference between intrinsic and market value: A research sample consisted of 48 non-financial business entities listed on the Warsaw Stock Exchange was used over a period from 2006 to 2010. The results suggested that at the beginning of 2011 the market valuations of the companies in question greatly exceeded their return on investment capital (ROIC), which was an indicator of the overvaluation of the Polish capital market at the time.

Figure 2.6: Determinants of intrinsic value and market prices



Source: Ehrhardt and Brigham (2011:271)

It is the marginal investor who acts on perceived, but maybe incorrect knowledge, who determines the share's market price. Actual share prices are reported daily and are easily accessed. On the other hand, the intrinsic value of a share, which is derived from the "true" returns and "true" risk (see figure 2.6), is formed by each individual analyst, each with specific information available, an own view of future

cash flows and estimation of share value (Ehrhardt and Brigham, 2011:271). If a share's market price is perceived as underpriced, it would be snapped up by investors, with a subsequent rise in the price of the share and fall of expected return. Conversely, if a share's market price is perceived as overpriced, the inverse will happen (Megginson *et al.*, 2010:209).

If a share's intrinsic value equals a share's market price, market equilibrium is reached. When a share is in market equilibrium, two conditions hold, namely:

- the intrinsic value of a share equals its market price; and
- expected returns equal the required returns.

Both the market's expected return and the market's required return are dependent upon the attitude of the marginal investor, where the former is determined by estimating dividends and capital gains and the latter is determined by estimating the risks of a share and applying the CAPM. Therefore, when a share is in market equilibrium there is no general tendency for investors to buy or sell shares and share prices are relatively stable.

2.6 Investment theories

An investor's belief about market efficiency will determine his investment strategy. Whether the market is efficient or not has been researched extensively and conclusions differ (Megginson *et al.*, 2010:359). Two major investment theories based on the belief of market efficiency have been developed, namely fundamental analysis and the modern portfolio theory (MPT). The former holds the belief of non-efficient markets, while the latter has a strong belief in market efficiency (McClure, s.a.). Technical analysis is yet another method frequently used for making investment decisions.

2.6.1 Fundamental analysis

Fundamental analysis is an investment approach that attempts to find a share's value and growth potential by using existing financial information, such as historical financial statements. It focuses on the underlying factors that influence the company's business and future prospects, such as growth prospects, cash flows and risk profile. A share will be presumed over- or undervalued if there is deviation from its true value (Damodaran, 1996:4). Fundamental analysis can also be applied to industries or countries as a whole (McClure, s.a.).

Fundamental analysis, in its turn, adopts two different approaches that are currently used, namely the top-down approach and the bottom-up approach. The top-down approach starts with analysis of the general performance of the macro-economy, its effect on industry groups and then companies in the industry. The principle is to find shares that will outperform peers in an industry, in the industries that perform best at the time and in a growing stage of a business cycle (Tay, s.a.).

Bottom-up analysis starts with the comparison of a share's market price to measure its value, followed by comparing it to other shares in the same industry. These comparisons are done to find the overvalued and undervalued shares in relation to the industrial norm. The industry and economic factors that might influence the future share price are then taken into account before making investment decisions (Tay, s.a.). The supporters of this approach try to find good companies whose shares are undervalued in relation to fundamentals.

The results of a study done by Wang *et al.* (2011:18) about the preference appraisal methods used in China for share evaluation shows that analysts prefer fundamental analysis, specifically ratio and financial statement analysis, over technical analysis.

2.6.2 Modern portfolio theory

MPT is founded on the idea of efficient markets. Informed investors find mispriced shares immediately, react to the discovery and drive the share to its intrinsic value and consequently an efficient market is formed. Under- and overvalued shares

disappear quickly. Therefore, nobody can persistently outperform the market. The riskiness of a single share is reduced in a portfolio through diversification (McClure, 2010).

In the MPT the price of a share should be equal to its value. The demand for and supply of a share on a share exchange balances its price and the share price is easily obtainable from printed media. However, the intrinsic value of a share must be determined in a valuation process, with the help of one or more valuation models. This process is inherently forward-looking, entails forecasting (Elton *et al.*, 2011:482) and is therefore subjective.

2.6.3 Technical analysis

Technical analysis is founded on the perception that share prices are driven as much by investor psychology as by change in financial and other relevant variables. Information obtained from trading, such as trading volume, price movements and short sales, is used to predict investor sentiment and subsequent future share price movements (Damodaran, 1996:5).

2.7 Valuation models

Although the principles of valuating shares remain constant, it remains a difficult task because (Correia *et al.*, 2011:6-10):

- factors such as the state of the economy, interest and currency rates, operating costs, product acceptance and level of competition in the sector all influence the FCF;
- companies are assumed to have an indefinite life, therefore shares have no maturity; and
- the cost of equity and capital is subject to uncertainty.

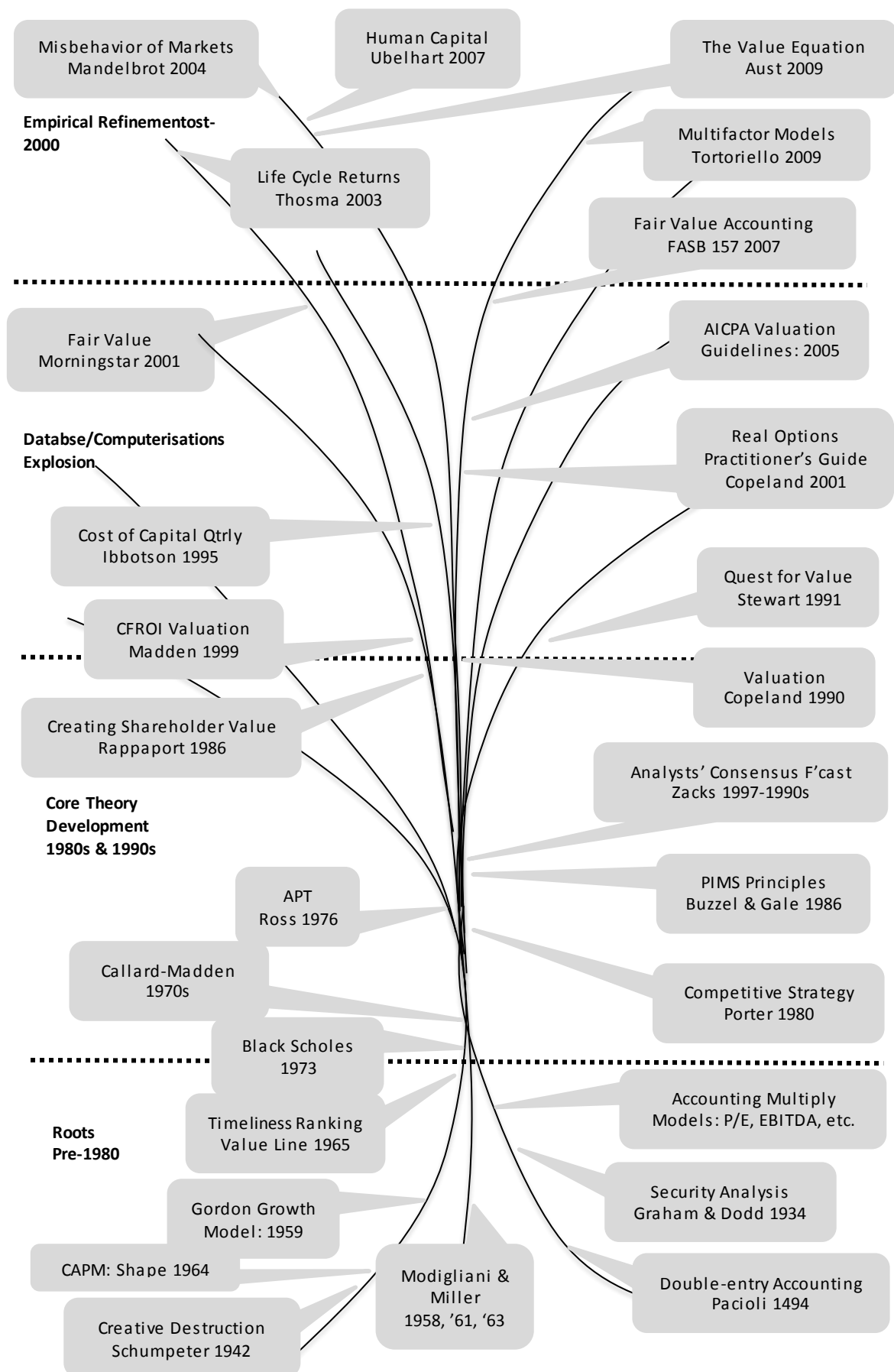
When the determinants of common share prices, such as earnings, cost of capital, dividends, risk and the future growth rate of a company, as well as economic

variables, such as those mentioned above, are used to value or select shares, a valuation model is formed. This model is applied to achieve the expected market value of the share or the expected return from keeping the share or at least a hold, sell or buy recommendation (Elton *et al.*, 2011:455).

According to Elton *et al.* (2011:456) the advantages of the use of an explicit valuation model are the requirement of a definition of relevant inputs, the systematical collection and usage of the relevant inputs over time and the fact that the usage of a valuation model allows for feedback and control. Breaking the process of portfolio analysis up into its compound sections enables a company to measure its ability to make forecasting inputs, value securities and compile portfolios (Elton *et al.*, 2011:456).

Because of the accounting problems encountered with IFRS in terms of creating and reporting value, the weak linkage to market value and the development of the modern finance theory, a number of value-based models and measures have been developed since the mid-1980s. The development of value-based models happened concurrently with the growth of public company databases and personal computing power, which helped in refining these models (Thomas & Gup, 2010:20). The developments of the more prominent approaches to valuation and publication dates are shown on a valuation tree in figure 2.7.

Figure 2.7: Tree of valuation methodologies with major publication dates



Source: Copyright © 2009, Board Resources (as quoted by Thomas and Gup, 2010:21)

Some of the more widely used approaches to security valuation are discussed:

2.8 Discounted cash flow models

The concept on which all the discounted cash flow (DCF) models are based is the present value of all expected future cash flows, where cash flow may include variables such as net profit, dividends and interest. The value of common shares is determined by the stream of expected cash flow to the shareholders in the nominator and the required rate of return in the denominator (Elton *et al.*, 2011:458). If the share is kept for one period, the shareholder will expect to receive a dividend and the value of the share when the share is sold at the end of one period:

$$P_t = \frac{D_{t+1}}{(1+k)} + \frac{P_{t+1}}{(1+k)} \quad (2.10)$$

where:

- P_t = the price of a share at time t
- D_{t+1} = the dividend received at time $t + 1$
- P_{t+1} = the price at time $t + 1$
- k = the appropriate discount rate.

To value this share, the price at which the share will sell one period into the future must be estimated by:

$$P_{t+1} = \frac{D_{t+2}}{(1+k)} + \frac{P_{t+2}}{(1+k)}. \quad (2.11)$$

If (2.11) is substituted into (2.10):

$$P_t = \frac{D_{t+1}}{(1+k)} + \frac{D_{t+2}}{(1+k)^2} + \frac{P_{t+2}}{(1+k)^2}. \quad (2.12)$$

If P_{t+2} is solved and substituted into (2.12), followed by solving P_{t+3} , and one keeps on in the same manner, it follows that:

$$P_t = \frac{D_{t+1}}{(1+k)} + \frac{D_{t+2}}{(1+k)^2} + \frac{D_{t+3}}{(1+k)^3} + \dots + \frac{P_{t+n+1}}{(1+k)^{n+1}} + \dots \quad (2.13)$$

The value of the share can be summarised by:

$$V_0 = \sum_{t=1}^n \frac{CF_t}{(1+k)^t} \quad (2.14)$$

where:

V_0 = value of the share in period $t=0$

CF_t = cash flow generated by asset for the owner of the asset in period t

n = number of years over which the asset will generate cash flows to investors

k = the appropriate discount rate.

Titko and Kozlovskos (2011:1) comment that the DCF model was devised by specialists for use in developed countries. In Latvia, difficulty was experienced using the DCF model, especially with determining the discount rate. Mielcarz and Roman (2012:12) state that the DCF model is subject to non-objective valuation and if used, the outcome of the valuation might be manipulated.

However, if it is taken into consideration that the use of multiples is also subject to manipulation and that one of the main reasons for criticism against the use of multiples as evaluation method is that the value of companies is not taken into account in the calculations the DCF models do, there is much to validate the use of the DCF models.

Three of the most widely used DCF models are:

dividend discount models (DDM);

FCF models ; and

residual income models (RIMs).

According to Lundholm and O’Keeve (2001:325), these models differ only in definition of expected cash flow to shareholders.

2.8.1 Dividend discount models

The assumption of indefinite life for the company entails growth of earnings and dividends over time. It should be kept in mind that common share has cash flows that are unspecified and non-contractual. The use of the DDM therefore requires that future dividends be projected and discounted at the company’s cost of equity. Return from share that shareholders may expect is periodic dividends from the company and the market price of the share when sold at the end of the holding period. The market price is determined by the dividend stream the next owner expects to receive. If sold again, the market price is yet again replaced by the expected dividend stream. Hence, the total value of the share is expressed in terms of its dividend stream (Megginson *et al.*, 2010:132). Therefore:

$$V_0 = \frac{D_1}{(k+1)} + \frac{D_2}{(k+1)^2} + \dots + \frac{D_t}{(k+1)^t} + \frac{P_t}{(k+1)^t} \quad \text{and} \quad P_t = \frac{D_{t+1}}{(k+1)^{t+1}} + \frac{D_{t+2}}{(k+1)^{t+2}} + \dots + \frac{D_n}{(k+1)^n}$$

$$\text{becomes} \quad V_0 = \sum_{t=1}^N \frac{D_t}{(k+1)^t} \quad (2.15)$$

where:

- V_0 = value of the share in $t=0$
- D_t = dividend received in period t
- P_t = market price in period t
- k = discount rate
- n = number of years over which the asset will generate dividends for investors.

Although the model is sound in theory it can be difficult to apply, since both the dividends and discount rate must be estimated for an infinite period of time. As a result, a simplified pattern of dividend growth and a constant discount rate are assumed in practical applications and in empirical studies.

2.8.1.1 Constant growth

One of the best known DDM is the Gordon growth model. This model assumes that the growth rate (g) of dividends will remain constant into the indefinite future. Using the formula for the sum of the geometric progression, it follows:

$$V_0 = \frac{D_1}{k-g} \quad (2.16)$$

where:

- V_0 = value of the share in $t=0$
- D_1 = next year's dividend
- k = discount rate
- g = growth rate.

The price of the share is therefore determined by the expected dividend of the next year, divided by the difference between the appropriate discount rate for the share and its long-run growth rate.

According to Correia *et al.* (2011:6-15) earnings and dividends should grow at the same rate over the long term if the assumption of indefinite life is taken into consideration. A dividend growth rate slower than the growth rate of earnings is not feasible, as the dividend growth rate tends towards zero. This is not in line with shareholders' expectations. If the dividend growth rate surpasses growth in earnings, it is not sustainable. The growth rate of a company is subject to several factors, of which the size of the investments it makes in new and existing projects and the rate of return earned on those investments are the most important (Megginson *et al.*, 2010:137). The former is determined by the retention rate (RR), the fraction of earnings that the company retains. To estimate the rate of return that the new investments will generate, one has to calculate the ROE. The expected growth rate, g , is the product of these two values:

$$g = RR \times ROE. \quad (2.17)$$

Elton *et al.* (2011:461) are of the opinion that this single-period model forms part of

subsequent models. Multi-period growth models assume that constant growth sets in after a number of years of growth. This model is used at the beginning of the constant growth phase.

Limitations of the Gordon growth model are:

- in estimating the required rate of return and growth, these values remain uncertain and make the resultant precise value difficult to estimate. Even slight miscalculations in either of these inputs can lead to the dramatic overvaluation or undervaluation of a share;
- it is only applicable where the required return is higher than the growth rate (Correia *et al.*, 2011:6-14);
- not all companies pay dividends; and
- the amount of the dividends is arbitrarily determined by the management of the company and therefore remains uncertain amounts of cash.

2.8.1.2 No growth

In instances of zero growth, the applicable formula for valuing common share is the same as that for valuing preferred share:

$$V_0 = \frac{D}{k} \quad (2.18)$$

where:

V_0 = value of the share in $t=0$

D = dividend

k = discount rate.

2.8.1.3 Variable growth

The basic DDM formula can be applied for variable growth (Megginson *et al.*, 2010:135). If, for instance, a relatively fast growth period is followed by a more stable growth period, the applicable formula would be:

$$P_0 = \frac{D_0(1+g_1)^1}{(1+r)^1} + \frac{D_0(1+g_1)^2}{(1+r)^2} + \dots + \frac{D_0(1+g_1)^N}{(1+r)^N} + \left[\frac{1}{(1+r)^N} X \left(\frac{D_{N+1}}{r-g_2} \right) \right] \quad (2.19)$$

where:

- g_1 = initial fast growth rate of dividends
- g_2 = subsequent stable growth of dividends.

Olweny (2011:140) tested the reliability of the DDM on the valuation of common share of the Nairobi Stock Exchange (NSE). The conclusion was that the DDM was not reliable for the valuation of common shares on the NSE, owing to factors such as the inefficient market (NSE), information differentials and inappropriate discount factors.

2.8.2 Free cash flow models

The limitations of the Gordon growth model, as well as the non-payment of dividends by companies, necessitate other forms of valuation. Since the 1980s there has been a tendency of fewer companies paying dividends, especially younger companies with excellent growth prospects (Megginson *et al.*, 2010:138). If a company does not pay dividends, it can be valued as a whole, instead of attempting to value its share by using FCF models. Two approaches to value the equity with FCF are possible, namely:

- free cash flow to equity (FCFE); or
- free cash flow to the firm (FCFF).

The FCFE represents the cash amount available for distribution, but is not necessarily distributed to shareholders. The difference between the operating cash flow (OCF) and the amount needed to fund new projects, both in fixed and operating assets, is the FCFE (Correia *et al.*, 2011:6-21). The formula for the FCFE approach is as follows:

$$\text{Value}_{\text{equity}} = \frac{\text{FCFE}_1}{1+k} + \frac{\text{FCFE}_2}{(1+k)^2} + \dots + \frac{\text{FCFE}_n}{(1+k)^n} + \frac{V_n}{(1+k)^n} \quad (2.20)$$

where:

FCFE = net profit after tax (and after financing costs) + depreciation – net capital expenditure – net increase in working capital ± change in debt financing

k = cost of equity

V_n = terminal value of the equity at the end of the explicit forecast period.

In the FCFF approach the estimation of the future operating cash flows is discounted at the company's cost of capital and then the value of non-common share capital - normally debt and preferred share – is subtracted from this value (Correia *et al.*, 2011:6-21). The formula for the FCFF approach is as follows:

$$\text{Value}_{\text{firm}} = \frac{\text{FCF}_1}{1+\text{WACC}} + \frac{\text{FCF}_2}{(1+\text{WACC})^2} + \dots + \frac{\text{FCF}_n}{(1+\text{WACC})^n} + \frac{V_n}{(1+\text{WACC})^n} \quad (2.21)$$

where:

FCF = NOPAT (net operating profit after tax) + depreciation – Δ net capital expenditure – Δ net increase in working capital

WACC = weighted average cost of capital

V_n = terminal value of the firm at the end of the explicit forecasting period.

The difference between FCFE and FCFF is in terms of their respective cash flows. FCFE is the cash flows available to shareholders after all expenses, investments and interest payments to debt holders on an after-tax basis, whereas FCFF is the cash flow available to shareholders and debt holders after expenses and investments have been realised. FCFE therefore considers obligations to shareholders, whereas FCFF considers obligations to both shareholders and debt holders. Table 2.1 highlights the differences between FCFE and FCFF as discussed.

Table 2.1: Differences between FCFE and FCFF

	FCFE	FCFF
Cash flows	Post-debt cash flows	Pre-debt cash flows
Discount rate	Cost of equity	WACC
Expected growth	Growth in net income = RR x ROE	Growth in operating income = reinvestment rate x return on capital (ROC)

In both these above-mentioned approaches, the duration of the forecasting period in practice is usually 10 years or how long it will take for a company to reach a steady state. If constant growth is expected after the forecasting period, the constant growth model is then applicable to determine the value of either the equity or the firm using (Correia *et al.*, 2011:6-22):

$$V_{n(\text{equity})} = \frac{FCFE_{n+1}}{k-g} \quad (2.22)$$

or

$$V_{n(\text{firm})} = \frac{FCF_{n+1}}{WACC-g} \quad (2.23)$$

According to Ehrhardt and Brigham (2011:526) the value of a company in a constant growth phase can be expressed in terms of four fundamental value drivers, namely growth in sales (g), operating profitability (OP), capital requirements (CR) and WACC. Equation (2.24) can therefore be rewritten in terms of these value drivers:

$$V_{n(\text{firm})} = \text{Capital}_n + \left[\frac{\text{Sales}_{(n)}(1+g)}{WACC-g} \right] \left[\text{OP-WACC} \left(\frac{CR}{1+g} \right) \right] \quad (2.24)$$

where:

OP	= NOPAT/sales
CR	= operating capital/sales
WACC	= weighted average cost of capital
g	= growth rate.

Hence the growth rate of sales usually has a positive effect on the value of a company, depending on the cost of capital and capital requirements for growth. The

increase in OP and decline of both CR and WACC will increase the value of a company (Ehrhardt & Brigham, 2011:526).

2.8.3 Residual income models (RIMs)

Cash flows that remain after all the creditors have been paid are residual cash flows and the shareholders are the claimants thereof. RI is based on the principle that value for shareholders is created only if income earned from invested capital exceeds the cost of capital. RIMs are all based on the concept of RI and have been referred to by a variety of names, such as residual income, economic profit, economic value added and abnormal earnings methods of valuation. In the following section the concept of EVA® and the RI model is discussed briefly.

2.8.3.1 EVA model

The true economic profit of a company is captured by the financial performance measure EVA. The concept of EVA® as performance measure that links the creation of shareholder wealth over time was introduced by the New York-based company Stern Stewart & Co during the latter half of the 1980s. EVA is the difference between NOPAT and the cost of capital for both debt and equity, but essentially EVA seeks to measure a company's rate of return against its required rate of return. The RI that remains after the cost of all capital, including equity capital, has been deducted is signified by EVA (Ehrhardt & Brigham, 2011:68). EVA can be applied to an entire company or divisions of a company and evaluates the economics of an investment year by year (Megginson *et al.*, 2010:244).

$$\text{EVA} = \text{NOPAT} - (\text{Invested capital} \times \text{WACC}) \quad (2.25)$$

or

$$\text{EVA} = (\text{Operating capital})(\text{ROIC} - \text{WACC}) \quad (2.26)$$

where:

NOPAT = net operating profit after tax = EBIT(1-tax rate)

WACC = weighted average cost of capital

$$\text{ROIC} = \frac{\text{Net operating profit-adjusted taxes}}{\text{invested capital}} .$$

Based on the EVA model, the value of a company is the sum of the book value of its net assets and the present value (PV) of the company's future EVAs (Correia *et al.*, 2011:6-25).

$$\text{Value}_{\text{firm}} = \text{Book value} + \text{PV of future EVA's} \quad (2.27)$$

$$\text{Value}_{\text{firm}} = B_0 + \frac{\text{NOPAT1} - B_0(\text{WACC})}{1+\text{WACC}} + \frac{\text{NOPAT2} - B_1(\text{WACC})}{(1+\text{WACC})^2} + \dots + \frac{\text{NOPATn} - B_{n-1}(\text{WACC})}{(1+\text{WACC})^n} \quad (2.28)$$

where:

- B = book value of assets
- NOPAT = EBIT(1 – tax rate)
- WACC = weighted average cost of capital.

A major disadvantage of using this method is that several adjustments are suggested to undo accounting shortcomings under IFRS, to determine the “true” invested capital and “true” NOPAT. These adjustments require a sophisticated knowledge of accounting principles. If done incorrectly, they will defy the purpose of correction (Thomas & Gup, 2010:174).

In a study done by Lin and Zhilin (2008:75) to analyse the influence factors on EVA, data from 984 companies in China listed in the Shenzhen and Shanghai Stock Exchange were used. The results show that the following factors have a positive relation to EVA: industry return, the company's own capital structure, size, profit ability, growth ability and management ability.

2.8.3.2 Residual income model

RI is the difference between the forecasted accounting and normal earnings. The RI model starts with the same postulation about value as the DDM, namely

$$V_0 = \sum_{t=1}^N \frac{D_t}{(k+1)^t} . \quad (2.29)$$

If the clean surplus relation, $B_t = B_{t-1} + E_t - D_t$ (Clubb, 1996:330) is rearranged to $D_t = E_t - (B_t - B_{t-1})$ and substituted into (2.29), then

$$V_0 = \sum_{t=1}^N \frac{E_t - (B_t - B_{t-1})}{(k+1)^t} . \quad (2.30)$$

It can also be rewritten as

$$V_0 = B_0 + \sum_{t=1}^n \frac{E_t - kB_{t-1}}{(1+k)^t} \quad (2.31)$$

or

$$V_0 = B_0 + \sum_{t=1}^n \frac{(ROE - k)B_{t-1}}{(1+k)^t} \quad (2.32)$$

where:

- V_0 = value of the company in period $t=0$
- E = earnings
- B = book value of assets
- D = dividends
- k = cost of equity
- ROE = return on equity.

2.9 Value-based management

New ways of measuring corporate performance were necessary in reaction to greater awareness among investors and increased competition since the 1990s. Taggart, Kontes and Mankins (1994), according to Chari and Mohanty (2009:20), devised the term 'value-based management' and created a framework that links the strategy of a company to its value in capital markets. Five key institutional value drivers essential for sustainable value creation were identified, namely strategic planning, performance management, resource allocation, governance and top management compensation. Metrics at different levels should be aligned to these institutional value drivers, processes and key functions to form the VBM approach (Chari & Mohanty, 2009:20).

2.9.1 Performance measures

The choice of, implementation and use of performance measures requires a series of decisions that involve the industry, company and company's strategy and should provide management with support in decision-making. According to Knight (1998:187), financial reporting captures the financial results of a company but accounting measures fail to capture its strategic performance. Financial performance measures can, according to Knight (1998:188), be divided into four categories. as indicated in table 2.2. Each category is linked to and builds upon the preceding categories.

Table 2.2: Categories of financial performance indicators

Category	Description	Examples	Further information
Income	Measure the income during a single period's operations	Operating profit (pre- and after tax) EBIT NI EPS	
Cash	Measure the operating results of a single period. Captures non-cash charges such as amortisation, depreciation, deferred taxes	EBITDA Gross cash flow	
Return	Add the aspect of return on the resources required to generate cash flow or income	ROS ROE ROA ROCE RONA ROGI CFROI	Different companies use different definitions of assets peculiar to the specific company

Value	Period measure or a measure at a point in time of several periods that defines the value of a business.	EVA EP SVA CVA SP NPV MVA Cash flow multiples	EVA, EP, SVA basically identical and primarily based on earnings, CVA based on cash. SP, NPV, MVA and cash flow multiples measure value at a point in time
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Legend: EBIT = earnings before interest and tax, NI = net income. EBITDA = earnings before interest, taxes, depreciation, and amortisation, ROS = return on sales, ROCE = return on common equity, RONA = return on net assets, ROGI = return on gross income, SVA = shareholder value added, SP = share price, NPV = net present value, MVA = market value added

The value measurements therefore contain most information and are more complex, but also more accurate (Knight, 1998:200).

According to Knight (1998:195), the selection of financial performance measures should be a structured approach that captures all the issues the company wants to include in a measurement system. The selected structured approach should increase the probability that the measurement system will succeed in providing the sought-after behavioral signals to support the decision-making process.

2.9.2 Measuring shareholder value

Although the corporate goal of maximising the value of shareholders entails increasing the market price of shares, the use of share prices to measure performance should not be used for the following reasons (Chari & Mohanty, 2009:18):

- share prices are an external assessment of a company's value and do not reflect the actual performance of the company;
- because of the limited information that investors have, the shares' prices are subjective statements of beliefs of the company's prospects and do not necessarily indicate the true value created by the company;

- managers may feed the market with misleading information if too much emphasis is placed on share prices; and
- in the short term, share prices are driven by market expectations and by the differences between market expectations and actual performance rather than by the level of the company's performance.

Modern value-based performance measures such as EVA, CFROI, CVA and TSR have been developed by several consulting companies. This was done to shift the emphasis from accounting earnings to cash flows and also to measure the real performance of companies (Bhasin, 2013:186). VBM effectively measures the creation of value and entails the economic profit earned above a company's cost of capital. VBM makes use of DCF principles (Starovic et al., 2004:5). The specifics of the calculation of the respective metrics differ, but all are superior to IFRS metrics as tools for evaluating corporate performance (Geenen et al, 2009:1).

2.9.2.1 EVA[®]

EVA is a trademarked version of RI but differs from RI in modifications made in accounting capital and income to economic capital and income. EVA equals the difference between the adjusted operating income and cost of capital. Assumed value is created if the subsequent profits exceed the cost of capital.

$$\text{EVA} = \text{NOPAT} - \text{cost of capital} \times \text{capital invested} \quad (2.32)$$

$$= (\text{ROIC} - \text{cost of capital}) \times \text{capital invested} \quad (2.33)$$

High levels of correlation of EVA and share returns are reported by proponents of EVA (Worthington & West, 2004:220; O'Byrne, 1996: 117; Walbert 1994:110; Stewart, 1994:72). However, the notion that EVA and other value-based measures are superior to traditional valuation techniques has received widespread criticism. Some of the different outcomes of studies done on EVA and other value-based measures in comparison to other possible valuation variables are summarised in table 2.3.

Tabel 2.3: Comparison of EVA with other valuation variables

Study	Country	Sample	Description	Outcome
Charoendeesawat and Jeng (2011:39)	Thailand	190 listed companies from 10 industries on the Thailand Stock Exchange	Study the explanatory power of EVA, MVA, EPS, ROA, ROE and ROS	EPS, ROA, EVA and MVA are significantly associated with share returns. ROA has better explanatory power than EVA, MVA and EPS.
Erasmus (2008:76)	South Africa	Firms listed in the industrial sector of the JSE from 1991 to 2005 with a final sample of 316 companies.	Evaluate the relative and incremental information content of EVA, CFROI and CVA compared to that of the traditional measures earnings and cash from operations.	EBEI outperforms EVA, CFROI and CVA in explaining the variation in market adjusted share returns. The incremental information content tests of the value-based measures also yield much lower results than the traditional measures.
Palliam (2006:213)	Kuwait	75 companies using EVA for at least five years, 33 companies not using EVA	Test the relationship of each of eight multiples for EVA users and for non-EVA users	Multiples of EVA users are not superior to the multiples of non-EVA users
Kim (2006:46)	US	89 publicly traded hospitality companies	The relative and incremental information content investigates which of EVA, NOPAT and FCF has greater association with company value	NOPAT and FCF were more highly associated with market value rather than was EVA
De Wet (2005:15)	South Africa	89 companies with a trading volume of ordinary share more than 500 000 per year listed on JSE from	Investigate the strength of the relationship between EVA, ROA, ROE, EPS, DPS and Δ CFL with MVA, the	Changes in the standardised CFO explained 38% in MVA, ROA 15%, EVA 8%

		1994 to 2004.	proxy of stakeholder value	
Worthington and West (2004:220)	Australia	110 Australian companies from 1992 to 1998	Investigate whether EVA [®] is more highly associated with share returns than earnings (ERN), net cash flow (NCF) and RI	Relative information content of EVA [®] is 25-38%, 18-23% for RI, 14-17% for ERN, 13-17 for NCF
Biddle <i>et al.</i> (1998:68)	US	Sample of 6 174 firm- years of both EVA users and non-EVA users	Test the relative information content of EVA, EBEI and operating cash flow (CFO) in explaining shareholder wealth	EBEI dominates EVA in comparison with relative information content in explaining share values and company value
Biddle <i>et al.</i> (1997:301)	US	Sample of 219 companies (2 271 observations) from 1983 to 1994	Share market returns were used to compare value relevance of CFO, EBEI, RI and EVA.	Relative information content tests: ERN more highly associated with returns and value than EVA, RI or CFO. Incremental tests: EVA components add only marginally to information content beyond earnings

The results of the above-mentioned studies show no stronger or undisputed evidence of higher correlation between EVA or other VBM and market value increases than traditional financial measurements and market value increases. Also, in a review of empirical literature where the supremacy of EVA over traditional measures was analysed in relation to shareholder returns, Chari (2009:56) found mixed results. Only six out of 10 studies state that EVA is superior to other accounting measures. According to Chari (2009:56), these discrepancies are attributed to the impact of inflation and the methodology.

The benefits of using EVA include that it focuses on value created in excess of cost of capital instead of income. Also, the absolute measure of EVA helps the recognition of value creation or destruction in contemplating taking on new projects or not (Venanzi, 2010:31).

EVA also has shortcomings. If a specified level of EVA of a certain period is a determinant of managers' compensation, managers might manipulate this value to obtain the desired result (Robu & Ciora, 2010:3). Examples of possible manipulation that leads to a higher EVA for a specific period according to Robu and Ciora (2010:3) are:

- manipulating revenues recognised over time by selecting the accepted and delayed orders;
- keeping depreciated equipment, with little or no replacement; and
- reducing costs, such as employee training.

According to Venanzi (2010:30), depreciation is subtracted twice as an expense in the calculation of EVA – in the earnings section, as well as in investment value from which the cost of capital is deducted. Comparisons of companies across industries and time are therefore difficult to make. The dependency in the EVA calculation on “net plant” also leads to the increasing value of EVA as a project gets older. This happens only because the plant is depreciated with a subsequent decrease in capital charge each year. Once again, if a company's reward system is linked to improvement in EVA, managers might resist growth because new projects will proportionally decrease EVA, while not taking on any new projects will increase EVA.

2.9.2.2 Cash flow return on investment

According to Venanzi (2012:24), CFROI is an adjusted version of internal rate of return (IRR) and is intended for investments that have already been made. A comparison between the CFROI and the cost of capital shows whether the investments made are good, mediocre or poor. The more the spread between the CFROI and its cost of capital can be increased, the more value is created. Four

inputs are necessary in the calculation of CFROI, namely gross investment (GI), gross cash flow (GCF), the expected value of the assets at the end of their life, termed salvage value (SV), and the expected life of the assets in place. Several adjustments need to be made to the first two inputs mentioned.

$$GI = GCFa_{n/CFROI} + \frac{SV}{(1+CFROI)^n} \quad (2.34)$$

If an annuity is set aside as coverage for the replacement cost of the asset at the end of the project life, the annuity is termed the economic depreciation and leads to an alternative formulation of the CFROI. It is computed as follows:

$$\text{economic depreciation} = \frac{\text{replacemant costs in current rand}}{((1+k)^n - 1)/k} \quad (2.35)$$

where:

replacement cost = gross investment - salvage value

n = the expected life of the asset.

The CFROI for the company or a division can then be computed as follows:

$$CFROI = \frac{GCF - \text{Economic Depreciation}}{GI} \quad (2.36)$$

where:

GCF = earnings on that investment in the current year, which is usually the after-tax operating income + non-cash charges against earnings.

Without the annuity, economic depreciation is calculated:

$$\text{economic depreciation} = \frac{WACC}{(1+WACC)^n - 1} \quad (2.37)$$

CFROI is based on the assumption that a company can be thought of as a project that generates money over the useful life of its core investments and assets (Chari & Mohanty, 2009:22). According to Barker (2001:212), yet another underlying

assumption of homogeneous investment projects of a company is necessary for a CFROI approach of extrapolating performance into the future, as it is not able to predict an inexact future any more than other valuation models. The disadvantages of CFROI are that it can be increased by taking on leverage (Geenen, 2009:3), if managers' performance is determined on the basis of CFROI, the value of CFROI can be increased in much the same manner as EVA (Venantzi, 2010:27), an increase in CFROI may go hand in hand with lower growth and/or higher risk and therefore be detrimental to value (Venantzi, 2010:27) and it is a complex measure for managers to understand and act upon (Venantzi, 2012:33). However, if CFROI is used by investors, it is easy to compare different companies objectively (Geenen, 2009:3).

2.9.2.3 Economic margin

The advocates of EM consider it as a mixture of both EVA and CFROI that captures the advantages of both methods. Because the numerator of EM is based on economic profit, the focus is on value creation.

$$\text{EM} = \frac{\text{Operating cash flow} - \text{capital charge}}{\text{invested capital}} \quad (2.38)$$

The cash flow component includes depreciation/amortisation and after-tax interest expense and gross assets are inflation-adjusted. Also, it shares with EVA the most common adaptations that clean up the accounting data. If the EM of a company is positive, it should create value; the reverse is also true (Venantzi, 2012:28).

2.9.2.4 Cash value added

CVA is the residual cash flow minus the implicit cost of reinvestment and the cost of capital. According to Venanzi (2012:27), CVA can be considered a metric equivalent of CFROI, with the difference that it is expressed in absolute terms. It can therefore easily be compared to EVA, but some accounting distortions are avoided.

$$\text{CVA} = \text{gross cash flow} - \text{economic depreciation} - \text{capital charge}$$

or (2.39)

$$\text{CVA} = (\text{CFROI} - \text{cost of capital}) \times \text{gross investment}$$

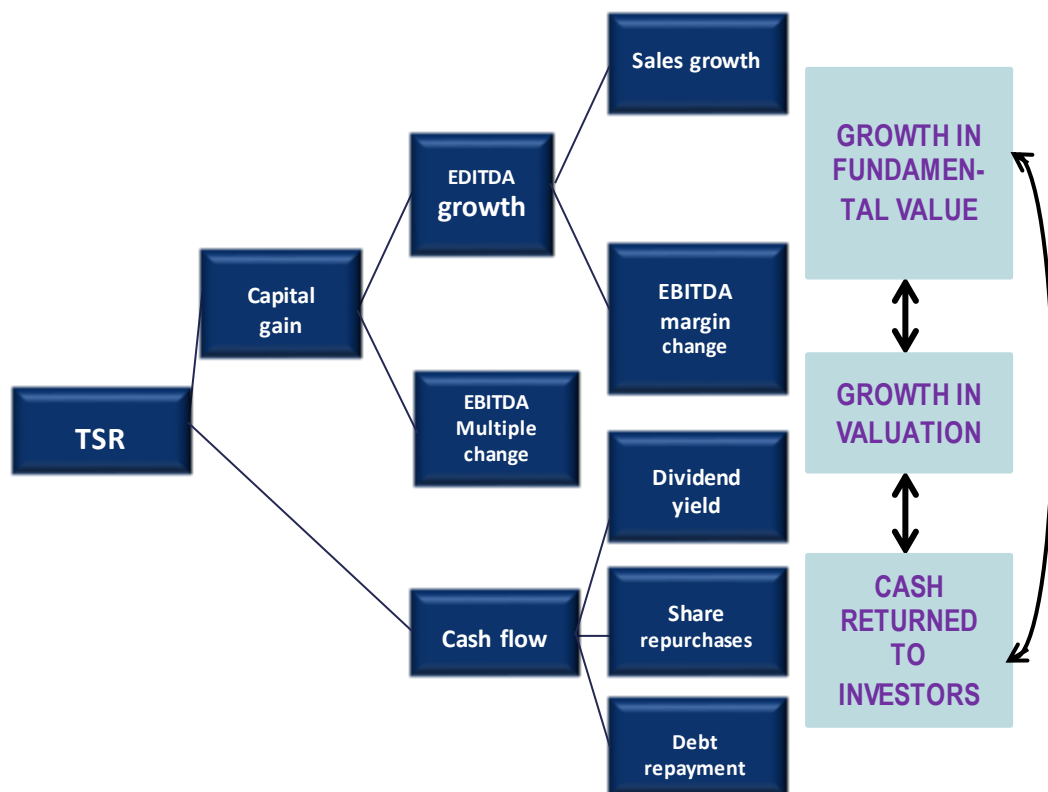
(2.40)

2.9.2.5 Total shareholder return

Recently market value measures, of which TSR is one, as the pre-eminent metric for value creation have been emphasised (Venanzi, 2012:15). These measures rely totally on the share market for calculating value-creation performance. The principle used is that capital markets price all securities efficiently. Therefore the price of shares of any company is determined through the market's expectations about the company's expected value-creation capabilities. Changes in investor expectations about the future performance of a company are reflected in its share price, and these changes are used as an indicator for the annual value-creation performance (IMA, 1997:14).

TSR can be broken down into three key drivers of value creation, namely growth in EBITDA, change in EBITDA multiple and the distribution of FCF to debt holders and investors. Figure 2.8 shows that TSR is a combination of price changes and dividends received, to form the rate of return earned by a shareholder.

Figure 2.8: Financial drivers of TSR



Source: Boston Consulting Group (2008) (as quoted by Venanzi (2010:16))

TSR may be affected by overall market conditions, and is therefore usually compared on a risk-adjusted basis with a widely used benchmark, such as S&P500 or a peer group, to evaluate relative performance (IMA, 1997:14).

TSR is not applicable to private firms or operational units (IMA, 1997:17).

According to the Boston Consulting Group, 2008 (as quoted by Venanzi, 2010:15) the advantages of using TSR are:

- the integration of the value of dividends and other cash pay-outs;
- better incorporation of all the measurements of the value creation system in TSR than other cash-based or accounting based measures; and
- ease of determining the lowest appropriate TSR goal: it can be set by either the expected average TSR of a peer group or the company's cost of equity.

2.9.3 Conclusion of VBM

One of the most critical challenges facing companies nowadays is the choice of performance measures. Performance measurements are important in the development of strategic plans, assessing the organisational goals achieved and compensation of managers. If performance measures are used correctly, a powerful and consistent message is sent to managers on value creation (Knight, 1998:295). Value is created in the investment and operational decisions made daily. VBM is therefore an important tool that links value drivers used by employees and frontline managers all the way up to decisions made by senior management.

A fundamental principle of VBM is that equity capital has a cost. Only after this cost has been taken into account, can a company realise a profit.

Although it can help maximise value, VBM is no simple solution for greater performance. Disadvantages of VBM mentioned by Starovic (2004:24) include costly implementation, the difficulty of applying the discipline of VBM and its disruptive implementation.

2.10 Price multiples models (Relative valuation)

The DCF is emphasised in the theory for the valuation of companies. Because the DCF model is sensitive to a host of assumptions and often cumbersome to calculate, analysts use valuation by multiples as a supplement to, or instead of DCF (Lie & Lie, 2002:44).

Multiples are used to put the data from financial statements into perspective and therefore to normalise size differences. A multiple is simply the ratio of a market price variable (e.g. share price) to a specific value driver (e.g. earnings) of a company. There are an infinite number of ratios available, therefore a clear and understandable relationship between the variables should be used as performance indicators. The type of financial ratios used will depend on the different constituents of companies. To measure performance, ratios may be grouped into five categories, namely:

Liquidity ratios

Liquidity ratios measure a company's ability to satisfy its maturing short-term obligations. Declining liquidity ratios indicate cash flow problems and are therefore leading indicators of financial distress or bankruptcy.

$$\text{Current ratio (CR)} = \text{current assets/current liabilities} \quad (2.41)$$

If a company's inventory can only be converted into cash with more difficulty, the quick ratio is a better indicator of overall liquidity.

$$\text{Quick ratio (QR)} = \text{current assets} - \text{inventory/current liabilities} \quad (2.42)$$

Asset management ratios

The ability of a company's to manage its assets and accounts payable is measured by these ratios. It is an indicator of investment in assets being justified in relation to activity, as indicated by sales revenue.

$$\text{Inventory turnover} = \text{cost of goods sold/inventory} \quad (2.43)$$

$$\text{Total asset turnover (TATO)} = \text{sales/total assets} \quad (2.44)$$

$$\text{Asset turnover (ATO)} = \text{sales/operating assets} \quad (2.45)$$

Debt management ratios

The extent to which money is used from creditors instead of shareholders to finance operations is indicated by debt ratios. If fixed-cost sources of financing such as debt increase, the financial leverage increases and therefore the higher both the risk and expected return on a company's equity.

$$\text{Debt to assets ratio (DTA)} = \text{debt/total assets} \quad (2.46)$$

$$\text{Debt to equity ratio (DTE)} = \text{total debt/ total equity} \quad (2.47)$$

Profitability ratios

The operating results that stem from the combined effect of liquidity, asset and debt management are indicated by profitability ratios. According to Megginson *et al.*

(2010:45), unexpected changes in these measures, as well as market value ratios, lead to a sharp reaction in share prices.

$$\text{Net operating profit margin on sales} = \text{EBIT} / \text{sales} \quad (2.48)$$

$$\text{Net profit margin on sales} = \text{net profit} / \text{sales} \quad (2.49)$$

Market value ratios

The relationship of a company's share price to earnings and dividends is indicated by market value ratios. They are strong indicators of investors' perception of a company's success.

$$\text{Earnings yield (EY)} = \text{Earnings per share} / \text{price per share} \quad (2.50)$$

$$\text{Earnings per share (EPS)} = \text{Earnings available for common shareholders} / \text{number of shares of common share outstanding} \quad (2.51)$$

$$\text{Price to earnings ratio (PTE)} = \text{Price per share} / \text{earnings per share} \quad (2.52)$$

$$\text{Dividend yield ratio (DY)} = \text{Dividend per share} / \text{price per share} \quad (2.53)$$

$$\text{Price to book value (PTBV)} = \text{Price per share} / \text{book value per share} \quad (2.54)$$

where

$$\text{Book value per share} = \text{Common share equity} / \text{number of shares outstanding} \quad (2.55)$$

Multiples may also be categorised in terms of equity and entity. Equity multiples express the value of the shareholders' claims on the cash flow and assets of the company. Entity multiples express the value of all claimants on the business relative to the value driver that relates to the entire enterprise, such as EBIT or sales (Suozzo *et al.*, 2001:3). In a study where the valuation accuracy of equity and entity multiples of listed companies on the JSE from 2001 to 2010 was compared, Nel *et al.* (2013:829) found that equity-based multiples indicated a valuation accuracy of as much as 15,4% higher than that of entity-based multiples. Schreiner and Spremann (2007:22) also found equity-based multiples to outperform entity-based multiples,

based on a dataset of 600 European firms over a period of 10 years from 1996 to 2005.

The most commonly used multiples in terms of equity and entity, according to Schreiner (2007:37), are categorised in table 2.4. These multiples are just a selection from a vast variety of possible multiples. Fernandez (2013:5-1) counted as many as 1 200 different multiples used by 175 companies in Europe.

Table 2.4: Categorisation of multiples

	Accrual flow multiples	Book value multiples	Cash flow multiples	Alternative multiples	Forward-looking multiples
Equity value multiples	P / SA P / GI $P / EBITDA$ $P / EBIT$ P / EBT P / E	P / TA P / IC P / B	P / OCF P / D	PEG $P / (EBIT+R\&D)$ $P / (EBIT+AIA)$ $P / (EBIT+KC)$ $P / (E+R\&D)$ $P / (E+AIA)$ $P / (E+KC)$	$P / SA 1$ $P / SA 2$ $P / EBITDA 1$ $P / EBITDA 2$ $P / EBIT 1$ $P / EBIT 2$ $P / EBT 1$ $P / EBT 2$ $P / E 1$ $P / E 2$
Entity value multiples	EV / SA EV / GI $EV / EBITDA$ $EV / EBIT$	EV / TA EV / IC	EV / OCF	$EV / (EBIT+R\&D)$ $EV / (EBIT+AIA)$ $EV / (EBIT+KC)$	$EV / SA 1$ $EV / SA 2$ $EV / EBITDA 1$ $EV / EBITDA 2$ $EV / EBIT 1$ $EV / EBIT 2$

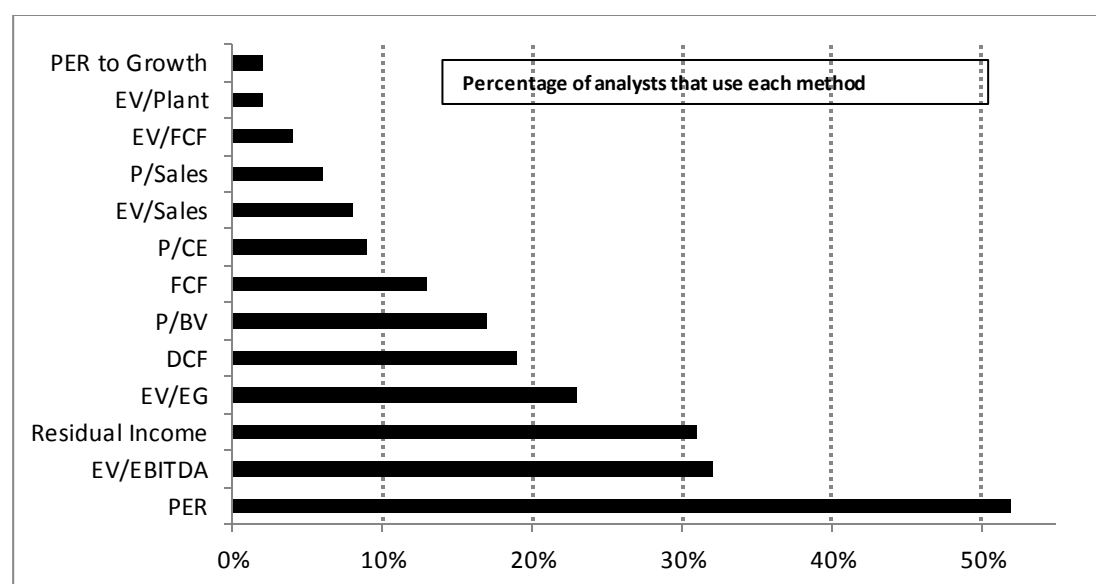
Source: Schreiner (2007:37)

Legend: P = (share) price, EV = enterprise value = (equity value + preferred share + debt – cash), SA = sales, GI = gross income, EBITDA = earnings before interest, taxes, depreciation, and amortisation, EBIT = earnings before interest and taxes, EBT = earnings before taxes, E = earnings or net income available to common shareholders, TA = total assets, IC = invested capital, B = book value of common equity, OCF = operating cash flow, D = (ordinary cash) dividend, R&D = research & development expenditures, AIA = amortisation of intangible assets, KC = knowledge costs = R&D + AIA, and PEG = price to earnings to earnings growth ratio. Forward-looking multiples are based on mean consensus analysts' forecasts for the next two years (1 = one year, 2 = two years)

The popularity of multiples is shown, for example, in the valuation methods most widely used by Morgan Stanley Dean Witter's analysts for valuing European companies in figure 2.9 (the values are weighted by the market capitalisation of the industry in which they are applied). It is noteworthy to mention that from figure 2.9, the PER (also referred to as PTE) is by far the most popular valuation metric used,

and that DCF features only fifth on the list. These statistics echo the finding of Daly (2011:52) mentioned earlier.

Figure 2.9: The preference of valuation methods of Morgan Stanley Dean Witter's analysts



Source: Morgan Stanley Dean Witter research (as quoted by Fernandez, 2013:5-2)

The popularity of some of the valuation methods, that also confirm the ratings of figure 2.9, is mentioned in a number of studies. According to Eberhart (2004:48), the PER is one of the most popular multiples investors use. Loughran and Wellman (2011:1647) note the increased usage of the equity multiple EV/EBITDA by practitioners as a valuation tool. A sample period of 1963 to 2009 with 104 873 company-year observations from the NYSE, American Stock Exchange (AMEX), and NASDAQ firms was used and strong evidence was found that EV/EBITA is related to succeeding share returns, which may explain its widespread usage.

Any multiple by itself says very little. Only when it is placed into context by comparison to comparable measures, the picture unfolds. The implied value of the company of interest is therefore found based on the benchmark multiples (Lie & Lie, 2002:44). Comparisons can be done with the company's own history, with the industry and with the market (Fernandez, 2013:5-4). Alford (1992:96) used a sample of 4 698 companies and the PER to evaluate how the benchmark companies should

be chosen. He reports that a combination of earnings growth and risk or industry membership are effective criteria for selecting comparable companies. Also, the number of standard industrial classification (SIC) digits used to define an industry up to the third digit improves the accuracy. Goedhart *et al.* (2005:8) suggest finding peers with similar growth expectations and ROIC for better comparisons.

The pricing date used in multiples offers three possibilities. Historical-priced multiples are usually the average for one year and are used to establish a trading range. Current-priced multiples are based upon current year values and can be compared with both historical- and future-priced multiples. One- or two-year forecasts are used in future-priced multiples and are effectively a DCF valuation expressed as multiple (Suozzo *et al.*, 2001:11). Liu *et al.* (2002:163) compare the characteristics and performance of historical and forward industry multiples for a subset of companies trading on the NYSE, the AMEX, and NASDAQ. The results of the research project are that forward-looking multiples promote greater accuracy in pricing for the majority of their sample. The median pricing error for each multiple to measure accuracy was examined. For historical multiples the error was 23%, 18% for one-year forecasted earnings and 16% for two-year forecasts. Also, according to Lie and Lie (2002:53), the estimates of the PER improves if the forecasted rather than the trailing earnings are used. In an extensive study done by Weigand and Irons (2007:88), data from 1871 until 2004 was used, which includes 1 360 overlapping 10-year periods. The relation between PERs and future returns was examined, using two measures of the market PER; the one-year trailing earnings (the PER_1), and the 10-year smoothed earnings (the PER_{10}). The findings include:

- for both measures of the PER, the average relation between returns, future earnings and the market PER is similar, except in the case of PERs higher than 20;
- average real share returns and real earnings growth are negative for the 10 years following a period of a PER_{10} higher than 20. The same finding is echoed by Shiller (as quoted by Correia *et al.*, 2011:6-19);
- a PER_1 higher than 20, however, is followed by strong real earnings growth and positive real share returns; and

- whether future earnings will be disappointingly low or negative is dependent on the key variable earnings, especially whether a temporary dip in earnings contributes to a high PER_1 .

On the other hand, Gupta and Modise (2012:78), who used data from the JSE from 1990 to 2009, found no evidence of either short-horizon or long-horizon predictability, based on PERs and price-dividend multiples.

2.10.1 Advantages of using multiples

The reason for multiples' popularity is their simplicity. Multiples are calculated easily and are therefore an appealing and user-friendly method of valuation. Other considerations include:

- the method is less resource- and time-intensive than DCF valuation, with fewer assumptions (Correia *et al.*, 2011:6-19);
- multiples are also robust tools that provide useful information about relative value and therefore provide a framework for value judgments (Suozzo *et al.*, 2001:3);
- internet platforms, financial newspapers and magazines publish common multiples daily and keep it updated; they are therefore readily available and the principle is known to readers (Correia *et al.*, 2011:6-19).
- no forecasted future cash flow is required; and
- publicly known information of a company is sufficient.

2.10.2 Problems with multiples

The use of multiples looks, on the surface, straightforward. However, in reality it is not as simple as it appears.

Multiple techniques can be sensitive to the ratio chosen. Goedhart *et al.* (2005:8) note that different multiples used for the same comparison can suggest conflicting conclusions. This resonates with the finding of Lie and Lie (2002:53) that for trailing

multiples, the asset value multiple normally yields better estimates of value than measures from the income statement such as sales, EBIT, EBITDA and earnings.

Multiples could be affected by seasonality, especially the inventory turnover ratio. Therefore, when making a comparative analysis, the year-ends should be considered for all of the companies being compared or the industry average (Correia *et al.*, 2011:5-25).

The identification of a peer group consisting of truly comparable companies poses another problem, as no two companies are the same and companies can differ in many ways. For example, if a company has a very old and depreciated plant and equipment, it may have a very high ROA only because of that. It is therefore difficult to compare such a company to another company that has newer assets bought at a higher cost (Correia *et al.*, 2011:5-25). The sensitivity of the choice of comparables is discussed by Eberhart (2004:48). He states that the large differences in share valuation estimates can be ascribed to the great differences in the comparable firm classifications. The difficulty in finding true comparables is also highlighted by Eberhart (2004:49) who notes, for example, that nine different industrial classifications are used in the US in the multiple valuation technique.

Within a multiple, a great deal of information is summarised into a single number or series of numbers, which could also possibly lead to simplistic and/or wrong interpretation (Suozzo *et al.*, 2001:3). High PERs may simply reflect low earnings (Correia *et al.*, 2011:6-19). The PER is also affected by capital structure. The PER increases with increased leverage. Hence, the PER can be increased artificially if an unlevered company exchanges debt for equity (Goedhart *et al.*, 2005:9). To overcome this problem, Goedhart *et al.* (2005:10) suggest the use of EV/EBITDA instead of PER, since changes in capital structure do not affect the EV/EBITDA multiples. Another factor that must be kept in mind when using the PER is that non-operating items such as write-offs and restructuring charges are included in earnings upon which PERs are based. Since these events often happen only once, the PERs can be misleading if this event is not brought into consideration (Goedhart *et al.*, 2005:9).

Differences in accounting policies and the ability to “window dress” financial statements to reflect a better financial position may also skew multiple analyses. Correia *et al.* (2011:6-19) warn that accounting earnings and changes in accounting policies must be monitored, especially for companies that are under pressure to report high increased earnings. To explain this problem, the example of Enron was used, a company that reported rising EPS although simultaneously a negative EVA was reported.

To summarise, Suozzo *et al.* (2001:5) listed the primary reasons why multiples vary:

- *Differences in quality of businesses* - higher-quality businesses have qualitative differences in the fundamental underlying drivers of valuation, such as available investment opportunities, quality of management, branding and strategy. These can be condensed to four quantitative valuation drivers: cost of capital, return on capital and growth and duration of growth.
- *Differences in accounting policies* – a recent study comparing international accounting standards with the US IFRS identified over 250 such differences. Although many of these would have no material effect, it appears that a few key issues are dominant – deferred tax, depreciation and goodwill provisioning, to name some of the most significant.
- *Mispricing* – differences in multiples should fully explain the differences in business quality, accounting differences or profit fluctuations, otherwise the share may simply be mispriced. Differences arising from underlying fundamentals should be identified and justified.
- *Values of cash flow or profit that are unrepresentative of the future* - multiples only have meaning if the profit on which they are founded is indicative of future profit potential.

In the following research studies multiples were used in comparison with other valuation models: Berkman *et al.* (2000:72) found that DCF estimates using market-based estimates and market and transaction PERs valuations had similar accuracy for 45 firms newly listed on the New Zealand Stock Exchange. Both methods explained around 70% of the variation in market price and had median absolute

valuation errors of almost 20%. Roosenboom (2012:1678) compared the valuation methods used in initial public offerings (IPOs) by investigating how the fair value of IPOs of companies is set by underwriters, their market value estimation and the subsequent use of the fair value estimation as a basis for IPO pricing. From a dataset comprising 228 underwriter reports on IPO firms on NYSE Euronext Paris, it was found that DCF, DDM and multiples valuation were used to value IPO companies. No single valuation technique was distinguishable as being more accurate or less positively biased than the others.

Maditinos *et al.* (2009:182) used a sample of 163 companies, with a total of 977 year-observations, from 1992 to 2001 to compare two value-based measurements, EVA and SVA, with three traditional multiples, namely EPS, ROI and ROE, in explaining share market returns on the Athens Stock Exchange. The results indicate that share market returns are more closely related with EPS than with EVA or other performance measures in relative information content tests. However, incremental information content tests suggest that the pairwise combination of EPS with EVA increases the explanatory power meaningfully in clarifying share market returns.

2.10.3 Conclusion of price multiples

In conclusion, there are no clear-cut answers on which multiples are uniformly accepted as those upon which to base valuation. Although insight is gained into a company's operations, the interpretation thereof remains subjective and relies on the interpretation of the analyst. It seems though that if multiples are thoughtfully analysed, they still remain a valuable tool in the valuation toolkit of financial analysts and the management of companies.

2.11 Conclusion of valuation methods

If the different valuation methods are counterbalanced against one another, there are no definite answers either on which one to use. While traditional financial indicators such as EPS and ROE remain the most common performance indicators, they have been criticised for not taking the cost of equity or the risk of the earnings into account.

If the notion holds that the value of an asset is determined by its expected future cash flows and the DCF method is used in an attempt to forecast the future cash flows, the most profound criticism against the DCF models is opened up. The cash flow of a company depends on many factors, such as the state of the economy, changes in currency rates, actions of competitors, the ability of a company to grow its market share and operating costs, some of which a company can influence and some not. Therefore the estimation of future cash flows remains complicated. Also, although the DCF models are a thorough analysis of value creation, they may become complex with an increase in inputs.

Most VBMs make use of cash flows discounted at cost of capital. From literature it seems that many adjustments need to be made on inputs as well as estimations of future cash flows, which makes the computation thereof difficult. It also seems that the principles of VBM are difficult to comprehend for employees, which also hampers their usage. From empirical studies it seems as if VBMs have internal value for the company, for example to analyse the managers of individual divisions of a company and their relative performance, determining the incentives of managers, determining and managing value drivers and strategic planning. However, it is not clear if VBM is superior to traditional accounting measures in the determination of future share prices. Some of the most outspoken comments about the superiority of VBM came from the developers of these measures, who are representatives of financial consulting companies. It may be that these comments were used as advertisement for these financial consulting companies.

Chapter 3

Real estate investment

3.1 Introduction

Since the early 1990s there has been a dramatic shift in commercial real estate from the private sector to public markets, contributing to the extensive growth of the global real estate securities market. The main reason for this shift is the increasing adoption of the Real Estate Investment Trust (REIT) structure concurrent with growing demand by investors for listed properties, as well as global property allocations (Cohen & Steers, 2013:5).

Investing in real estate is unique because of the inherent characteristics of illiquidity, heterogeneity and inflation hedging (Chin *et al.*, 2007:1). This type of investment can be direct real estate investment or indirect investment. The former is investment in real estate operating companies that engage in real estate development or invest in tangible real estate. Indirect investment uses pooled investment vehicles in the form of listed property companies (securities), listed or unlisted property funds or unlisted syndicates, where the majority of publicly traded real estate owners are structured as REITs. From 2000 until 2012 year end the global real estate securities market tripled in size, comprising 423 companies in 37 countries. By December 2012 the listed real estate market had grown to \$1.5 trillion. Emerging markets showed the largest growth in the listed property market; from 2000 until 2012 year end their growth was from 2% to 19% of the global market (Cohen & Steers, 2013:6).

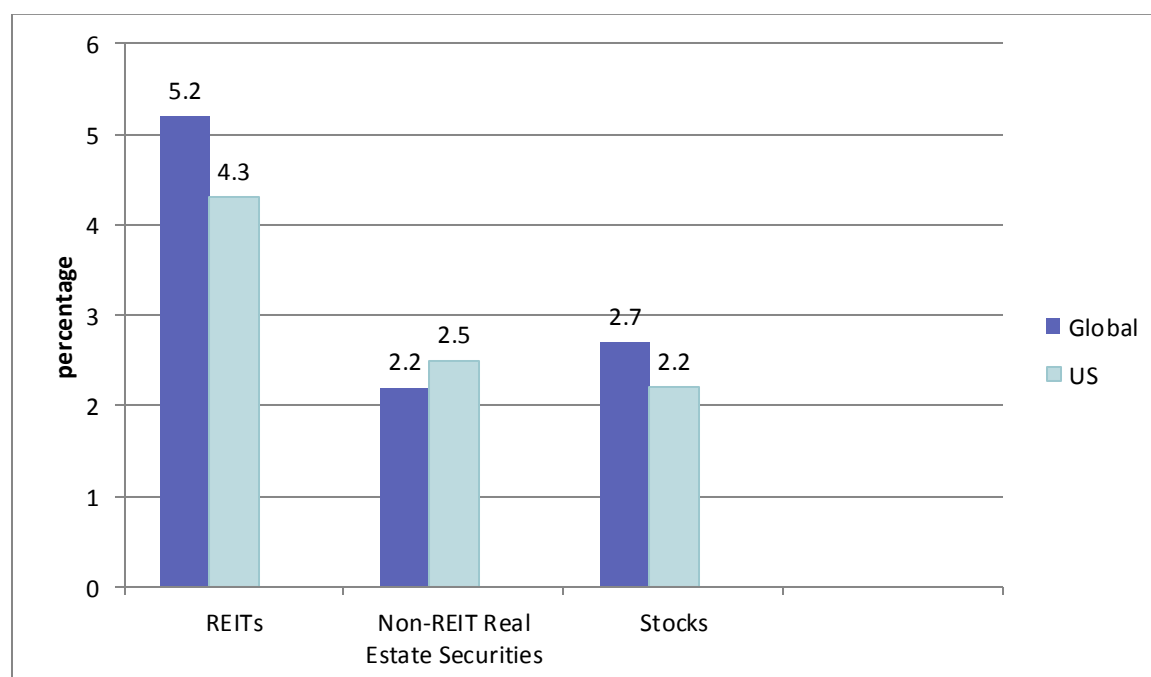
The underlying assets of REITs are real estate that comprises land and buildings that derive their intrinsic value from their quality, location and the income stream coming from tenants. REITs also have all the structures of publicly traded equities (Cohen & Steers, 2013:2).

3.2 Performance of real estate investment

Modest long-run returns that are regularly positive lead to the slow accumulation of wealth for the direct real estate investor. However, the benefits of investing in direct real estate include tax deductibility of mortgage interest, diversification opportunities owing to low correlation between share market and real estate returns and in the USA also federal mortgage subsidies (Francis & Ibbotson, 2009:152). REITs, on the other hand, are traded on major share exchanges and provide investors with sector divisibility, liquidity and diversification with low transaction costs. Also, if tax-transparent entities, such as restrictions on investment activities and earnings composition, pay-out ratios and limitations on gearing, are within certain parameters, no taxes is paid in the REITs vehicle itself (SA REIT Association, 2013:1) This is not the case with direct real estate investment.

Based on the historical values, REITs outperform direct real estate companies and the broad market (Cohen & Steers, 2013: 4). The historical global and US dividend yield of REITs, non-REITs real estate companies and the broad market from March 2006 until year end 2012 is compared in figure 3.1.

Figure 3.1: Annual dividend yield by asset class, since 2006



Source: Cohen and Steers (2013:4)

During a sample period of 31 years, Francis and Ibbotson (2009:152) also found that in the US the average returns of REITs far surpassed the returns of direct real estate. This comparative information about South Africa's performance is very limited.

3.3 Volatility

In an assessment of several studies on real estate, Boshoff and Cloete (2012:77) state that real estate shares are less volatile than other shares but more volatile than direct real estate. Chin *et al.* (2007:12) also found REITs more volatile if compared to direct real estate and bonds.

3.4 Risks

If the risk of REITs is compared to direct real estate companies, it is lower because of lower levels of debt and higher dividend yields (Hobbs, 2007:2; Chin *et al.*, 2007:2; Cohen & Steers, 2013:4).

Real estate values are sensitive to economic factors such as market recessions and interest rate changes. The value may also change in response to factors such as tax, legal, technological or political developments that may lead to increasing vacancies and declining rents and therefore a lowered income stream. Lack of liquidity and limited diversification may also contribute to lowered valuation. Investing in foreign securities has additional risk factors, such as political and economic uncertainties, currency fluctuations and differences in accounting standards (Cohen & Steers, 2013:14). The above-mentioned economic factors affect both direct real estate and REITs in the same manner (Cohen & Steers, 2013:14).

3.5 Diversification

Real estate securities have low correlation with most other major asset classes and diversification differences also exist between direct real estate investment and REITs (Chin *et al.*, 2007:13). In a study where data from share, bond, commodity, hedge fund and real estate indices in the US, as well as risk-free Treasury Bills and inflation

data from 1990 until 2001 were used, Georgiev *et al.* (2003:13) compared the performance of direct real estate investment with REITs. It was found that some diversification benefits could be obtained from direct real estate investment. However, if other asset classes, such as commodities or hedge funds, were added to the portfolio the diversification disappeared. Keng (2004:11), on the other hand, obtained significant diversification gains with the addition of international REITs to mixed asset Australian portfolios. If direct property was added to the portfolio the diversification gain was even more. With the allocation of direct property and REITs at only 20% and 10% respectively, portfolios consisting of shares, bonds, direct property and international REITs outperformed other mixed-asset portfolios.

The length of the real estate holding period bears some association with the returns on the investment. According to Pirounakis (2013:138) the strong performance of a property is unlikely to be sustained in the longer term. After a period of five years of outperformance, divesting should be considered.

Pirounakis (2013:139) is also of opinion that there is also a strong indication that the correlation of returns on real estate across different countries varies between zero and perfect correlation. This poses yet another fact to consider in portfolio management.

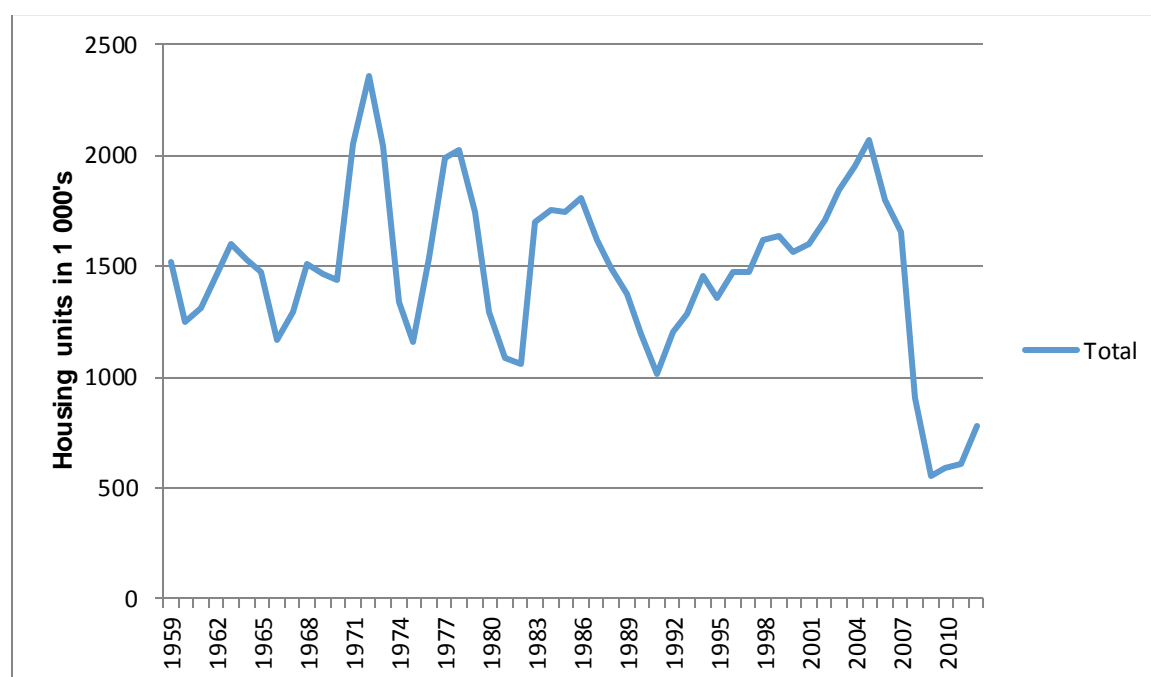
3.6 Cyclicality

The quest of supply and demand is applicable in the real estate market. The relative balance between supply and demand can be disrupted if market conditions shift from over- to undersupply for reasons such as periods of overbuilding when the market is saturated with oversupply to recessions, which put downward pressure on demand. Hence there is interdependence between the real estate market and the macro-economy; the macro-economy contributes to forming cycles within the real estate market.

According to Cunningham and Kolet (2007:2), the average housing cycle in the US has a mean five-year expansion and four-year contraction period, which compares with business cycles that comprise an average of seven to 10 years of expansion,

followed by an average of one year of contraction. There is also a fairly high correlation between the Canadian and US housing cycles (Cunningham and Kolet, 2007). In figure 3.2 the cyclical nature of new privately owned housing units started in the US from 1959 to 2010 is displayed.

Figure 3.2: New privately owned housing units started in the US (1959-2010)



Source: <http://www.census.gov/construction/nrc/pdf/startsan.pdf>

Cycles in real estate are recurrent manifestations with definite and characteristic periodicity. Property cycles differ in terms of their periodicity, amplitude and the impact they have on the wider economy (Dehesh & Pugh, 2000:2581). In a study that stretched from 1978 to 2008 and covered four recessions, Francis and Ibbotson (2009:142) found that business, residential and farm real estate are significantly correlated but in their cycles the peaks and troughs are not formed concurrently.

Clayton and Peng (2011:190) found that mortgage supply is affected by past real estate capital appreciation, which is a key factor of a positive feedback loop between mortgage supply and real estate values. Quarterly US data property capital appreciation, mortgage interest rates and mortgage fund flows, as well as loan-to-value ratios from 1978 to 2008 were used in the study. It is postulated that this feedback loop may be a potentially important driving force of real estate cycles.

According to Liow (2007:303), moderate to strong long-run cyclical co-movements exist in international real estate, which may lead to small or no diversification benefits in the long term. However some differences in the patterns of the common cycles in Asia and the United Kingdom (UK) and their lead-lag linkages are apparent. Investors would therefore benefit from diversifying real-estate shares in Asia and the UK in the short and medium term (Liow, 2007:303).

Drivers of demand and supply differ significantly across different property sectors. REITs within a certain property sector tend to perform alike in a particular economic environment, because of the distinct features of each property type. These include specific economic drivers that affect property tenants, barriers to supply and lease duration. Depending on a sector's valuation, property and economic cycles, these economic factors will lead some property sectors to perform better than others at a certain time (Cohen & Steers, 2013:8). With data from 1990 until 2001 from the US, Georgiev *et al.* (2003:12) found that different sectors within the real estate market do not perform equally. The apartment and hotel sectors outperformed the office, retail and industrial sectors. Over a 31-year sample period, Francis and Ibbotson (2009:145) found the annual compound returns of residential, farm and business real estate to be 5,68%, 8,76% and 9,99% respectively.

Early signals of property market activity may also be helpful for the investment decision-making process. With the usage of data of 16 years in the UK, many possible leading indicators of real estate market contraction or expansion were tested by Krystalogianni *et al.* (2004:17). Industrial production was found to be significant for the office and industrial sectors and car registration series for retail capital values, while gilt yield and broad money supply were significant leading indicators of retail, industrial and office properties capital value. Therefore, if the relationships between individual property sectors and economic forces are understood, investors can identify leading indicators. These leading indicators may predict the direction of commercial property capital values and the real estate market in the short run.

By examining and understanding all the impact forces and foreseeing the cyclicity of real estate market movements, investors and portfolio managers may discern any

contrasting or co-moving cyclical patterns and exploit them, which may help with portfolio management.

3.7 Real estate financial metrics

By comparing the underlying real estate fundamentals to the current share price, the relative value offered by real estate security and the real estate company's on-going financial performance can be measured by analysts. Commonly used terms for real estate valuation according to Cohen and Steers (2013:11) are:

Net asset value (NAV)

NAV is basically the marked-to-market book value of a company's real estate investments.

$$\text{NAV} = \text{net property value} - \text{liabilities} \quad (3.1)$$

Funds from operations (FFO)

FFO measure a real estate company's operating performance and are similar to earnings.

$$\text{FFO} = \text{IFRS net income} - \text{gains from asset sales} + \text{real estate depreciation/amortisation} \quad (3.2)$$

Net operating income (NOI)

NOI measures the cash flow real estate generated by subtracting property-level expenses (including real estate taxes) from the real estate's rental income. It is therefore similar to the corporate measure of EBITDA.

$$\text{NOI} = \text{rental income} - \text{property expenses} \quad (3.3)$$

Capitalisation rate (CAP rate)

CAP rate is an expression of real estate value in terms of yield. Usually, the lower the cap rate, the better the property or portfolio of assets (i.e., better cash flow growth and good tenants).

Property CAP Rate = property income/acquisition cost (or current value)

(3.4)

**Company CAP Rate = Total NOI/gross asset value of the company's property
portfolio**

(3.5)

3.8 Conclusion

Although the South African real estate sector dates back to 1969, SA REITs became a reality on 1 May 2013. SA REITs consolidate the historical two forms of listed property investment entities in South Africa, namely property unit trusts and property loan shares companies. According to the SA REIT Association (2013:1), the listed property market of South Africa has a market capitalisation of R250 billion and it foresees that in 2014 SA REITs may become the eighth largest REIT market globally. Over the past 10 years the South African real estate sector has outperformed REITs of developed countries as well as local equities, bonds and cash (SA REIT Association, 2013:1).

Before making investments in the South African real estate securities sector, emerging market risk premiums and relatively high interest rates should be taken into consideration in addition to all the other factors mentioned previously. The quality of information available about a company, as well as the information required, will determine the valuation method chosen.

Chapter 4

Empirical research of financial indicators in the real estate and development sector of the JSE

4.1 Introduction

Investing in direct real estate differs from investment in other asset classes because of the unique characteristics of real estate, which include immobility, continuous management, costly and uncertain price discovery, usually low liquidity, high transaction costs, high capital requirements, potential improvement and subjectivity to planning, zoning and building restrictions, as well as special taxation (Pirounakis, 2013:131).

Real estate returns would thus most likely perform differently from other asset classes listed on the JSE. Investing in REITs offers the investor the unique qualities of investing in real estate, as well as shares and bonds. The financial indicators of value of real estate would thus most likely be unique to this class of asset.

The aim of this analysis is to determine the underlying financial indicators of value in the South African real estate market.

4.2 Sample selection

All the companies listed in the Real Estate Holding and Development sector of the JSE were used in the analysis. The number of listed companies in this sector varied from 12 in 2000 to 26 in 2010. Ten of the companies listed in 2000 were still listed in 2010.

4.3 Sample period

The sample period is from 2000 to 2010. This period includes two years prior to and two years after an expansion period in the South African business cycle.

4.4 Research method

The empirical study of this analysis was achieved by developing a multiple regression model, which is based on a simple linear regression.

In a simple linear regression a value (dependent variable) is predicted on the basis of another (independent variable) value.

The simple linear regression equation, according to Levine *et al.* (2011:500), is as follows:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \quad (4.1)$$

where:

- Y_i = dependent variable
- β_0 = Y intercept for the population
- β_1 = slope for the population
- X_i = independent variable
- ε_i = random error in Y for observation i.

If, however, several independent variables are used to predict the value of the dependent variable, a multiple regression model is used. The multiple regression equation with k independent variables is, according to Levine *et al.* (2011:556), as follows:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki} + \varepsilon_i \quad (4.2)$$

where:

- β_0 = Y intercept
- β_1 = slope of Y with variable X_1 , holding variables X_2, X_3, \dots, X_k constant
- β_2 = slope of Y with variable X_2 , holding variables X_1, X_3, \dots, X_k constant
- β_3 = slope of Y with variable X_3 , holding variables X_1, X_2, \dots, X_k constant
- β_k = slope of Y with variable X_k , holding variables X_2, X_3, \dots, X_{k-1} constant
- ε_i = random error in Y for observation i.

4.4.1 Preparation of data

Preparation of data for multiple regression includes correlation analysis and a residual analysis to test if the prerequisite assumptions for regression are being met.

A phenomenon of a multiple regression model may be collinearity, which should be addressed. Collinearity exists if two or more independent variables are decidedly correlated. The effect of each independent variable becomes difficult to distinguish from that of other variables. It is thus impossible to extricate unique information pertaining to each variable subjected to collinearity (Levine *et al.* 2011:612).

Assumptions necessary for regression, according to Levine *et al.* (2011:516), include:

- *linearity* – requires linear relationship between variables;
- *independence of errors* – requires errors to be independent of one another;
- *normality of error* – requires errors to be normally distributed at each value of X; and
- *homoscedasticity* – requires constant variances of errors for all values of X.

To test if data adheres to these assumptions (and thus qualifies for regression), residual analysis is done.

After data preparation has been done, multiple regression models will be built using the best-subsets approach to model building. Methods to be used for the evaluation of the multiple regression models (Levine, 2011:561) include:

- Coefficient of multiple determination (r^2) – measures the fraction of the variation in the dependent variable Y that is described by the set of independent variables;
- Adjusted coefficient of multiple determination (adjusted r^2) – the same as r^2 , but takes both the sample size and the number of independent variables into

consideration. It is therefore more appropriate to use the adjusted r^2 in a multiple regression; it was used in this study;

- Overall F test – determines if a significant relationship exists between all the independent variables and the dependent variable in the regression; and
- Observed level of significance (p value)

4.5 Financial indicators

The financial indicators that were used in this analysis are discussed in chapter 2. A significant number (47) of these financial indicators were used as independent variables in this analysis.

Most of the dependent and independent variables were obtained from historical data on the McGregor BFA database, which is composed from standard financial statements, ratios and JSE share information.

Independent variables used in this study, in addition to those in the database, include ATO and CAP, as specified in chapter 2.

4.5.1 Dependent variables

The dependent variables used in this study as proxy for corporate value are:

- average share price (ASP): - the average share price for the duration of the last month of trade before the financial year end; and
- change in average share price (CASP): - change in average share price between two consecutive years.

4.5.2 Independent variables

The independent variables used are tabulated in table 4.1.

Table 4.1: Independent variables

No	Indicator	Description
1	AARMB	Absolute average real market beta
2	AAWACC	Absolute average real required WACC
3	AHCB	Absolute Hamada calculated beta
4	AHWACC	Absolute Hamada real required WACC
5	ARMB	Average real market beta
6	ARMB1	Absolute real market beta
7	ARTO	Accounts receivable turnover ratio
8	ARWACC	Absolute real required WACC
9	ATO	Asset turn over
10	C1S	Annual change in sales 1 year
11	C2S	Annual change in sales 2 years
12	C3S	Annual change in sales 3 years
13	C5S	Annual change in sales 5 years
14	C8S	Annual change in sales 8 years
15	C10S	Annual change in sales 10 years
16	CAP	Cap rate
17	CNOWC	Change in net operating working capital
18	CR	Current ratio
19	CROIC	Company return on invested capital
20	DPR	Dividend pay-out ratio
21	DTA	Debt to assets ratio
22	DTE	Debt to equity ratio
23	DY	Dividend yield
24	EM	Equity multiplier
25	EPS	Earnings per share ratio
26	EVA1	Operating economic value added
27	EVA2	Company economic value added
28	EY	Earnings yield
29	FCFC	Company free cash flow
30	FCFO	Operating free cash flow

31	HCB	Hamada calculated beta
32	MEBIT	Company EBIT
33	NOPATC	Company NOPAT
34	NOPATO	Operating NOPAT
35	NPM	Net profit margin
36	OP	Operating profit
37	OPCR	Operating capital required
38	OPM	Operating profit margin
39	OROIC	Operating return on invested capital
40	PTBV	Price-to-book value ratio
41	PTE	Price-to-earnings ratio
42	QR	Quick ratio
43	RMB	Real market beta
44	ROA	Return on assets
45	ROE	Return on equity
46	ROEI	Return on external investment
47	TATO	Total asset turnover

4.6 Outliers

It was decided to keep all the outliers within the existing data to get a realistic image of how the real estate holding and development market as a whole actually performs. Outliers might, however, have affected JSE market role-players.

4.7 Correlation analysis

An independent correlation matrix was used for each year and all correlation values ≥ 0.7 or ≤ -0.7 were identified.

One of the two independent variables with correlation ≥ 0.7 or ≤ -0.7 was removed. The decision on which variable to remove was made on the basis of highest occurrence.

The same correlation matrix for each year was used to select only the independent variables that had a correlation ≥ 0.4 or ≤ -0.4 with the various dependent variables. This was done to identify only those variables that had a distinctive impact on the dependent variable.

The number of independent variables had to be reduced to adhere to the norm of at least one independent variable fewer than observations of the dependent variable.

Table 4.2 depicts the independent variables selected that had a correlation ≥ 0.4 or ≤ -0.4 with the ASP for each year. These independent variables were then subjected to the best-subset approach to model building.

Table 4.2: Independent variables for ASP after correlation analysis

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
EPS	0.811	0.940	0.596						0.523			3
FCFC	0.434		0.596		0.767	0.687						4
EVA2	0.427				-0.535			-0.725	-0.818	-0.516	-0.489	6
CNOWC		0.434										1
PTE		0.462	0.427									2
ROA		0.527										1
C1S		0.688										1
CAP		0.434										1
ROEI			0.467	-0.588	-0.711							3
OROIC			0.576		0.547	0.501						3
ATO			0.400						-0.441			2
OP				0.721			0.495					2
NOPATC					0.735							1
NPM					0.465							1
ROE						0.569						1
EY						0.612						1
ARWACC							-0.715					1
OPM							0.432	0.463		0.635	0.542	4
QR									-0.549	-0.464	-0.442	3
AAWACC									0.515	0.503		2
C10S											0.486	1
FCFO											-0.442	1

Table 4.3 depicts the independent variables selected that had a correlation ≥ 0.4 or ≤ -0.4 with CASP for each year. These independent variables were subsequently subjected to the best-subset approach to model building.

Table 4.3: Independent variables for CASP after correlation analysis

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
EPS	0.790	0.895							-0.565			2
OPM	0.538											1
CNOWC		0.629			0.513	0.456						3
ROA		0.517										1
C1S		0.620			0.604			0.426				3
DPR						-0.609						1
PTE			-0.666									1
FCFC			-0.644									1
ARTO				-0.439								1
TATO				-0.606								1
ATO					-0.534	-0.438						2
EVA1					-0.487							1
ARWACC						-0.661	-0.802					2
EVA2						-0.574		-0.584			-0.468	2
OP							0.467					1
CR							-0.434					1
C5S							0.580					1
AHWACC								0.400				1
ROEI								-0.455				1
EM									0.420			1
C3S									0.409			1
FCFO										-0.534		1
PTBV										0.540		1
OPM										0.435		1
C10S											0.532	1

4.8 Residual analysis

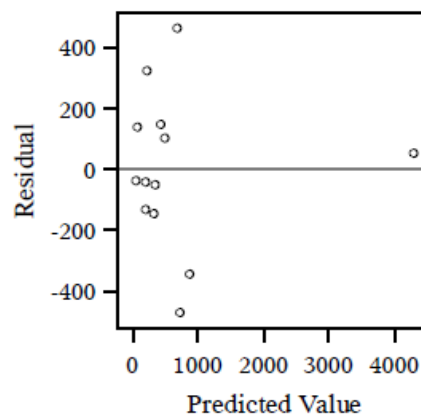
Residual analysis is used to evaluate the assumptions necessary for regressions. A residual is the difference between the observed and predicted value of Y of a regression model. The variables that remained in the correlation matrix after correlation analysis had been done were subjected to the SAS system (for Windows Release 9.3 TS Level 1M0). The program calculated the residuals and drew various scatter plots and histograms for each year independently.

Residual scatter plots were visually inspected to determine the linearity and homoscedasticity for the fitness of regression. Histograms were visually inspected to

determine the normality of error for the fitness of regression. Visuals obtained from the SAS system for 2001 were used to demonstrate how the plots and histograms were scrutinised for fitness for regression according to Levine (2011:516-519):

Linearity is met if the residuals are evenly spread below and above 0 for all the values of X as in a residual vs. predicted value of Y plot, shown in figure 4.1

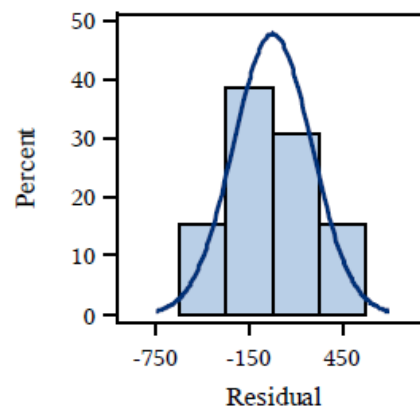
Figure 4.1: Test for linearity



Independence of errors may be violated if data is collected over serial periods of time. If residuals plotted in time order form a distinctive repeated pattern, the data has autocorrelation and is not fit for regression. However, it is not applicable to this set of data, as each year was analysed independently.

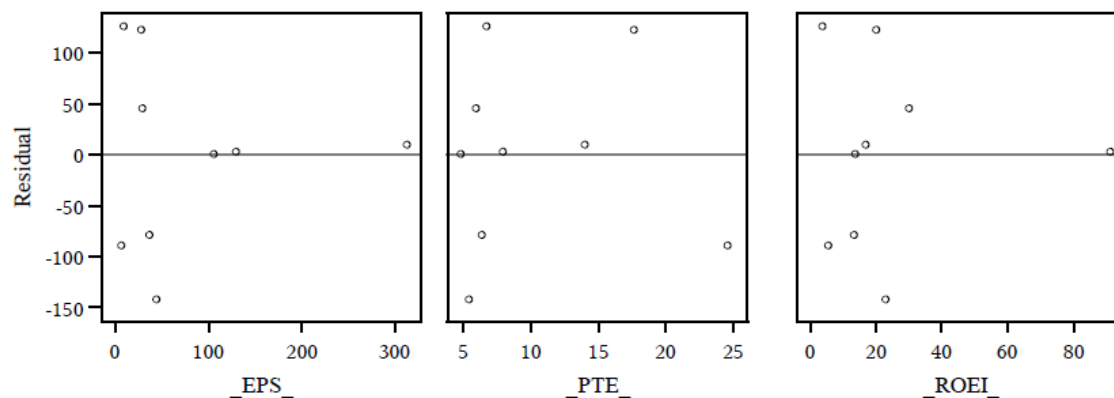
Normality of error can be assumed if residuals follow a normal distribution curve. Robustness of regression analysis allows modest departures from normality, as shown in figure 4.2.

Figure 4.2: Test for normality



Homoscedasticity is met if the variability of the residuals does not differentiate much for the different values of X of the independent variables, as shown in figure 4.3.

Figure 4.3: Test for homoscedasticity



All the independent variables tested with dependent variable ASP met the requirements for fitness for regression. All the independent variables with dependent variable CASP met the requirements for fitness for regression.

4.9 Best subsets for model building

The SAS system was used to determine all the possible regression models for a given set of independent variables with ASP and with CASP for each year independently. All the possible subsets for 2000, with the subset chosen in green, are reflected in table 4.4. The principle of parsimony in the selection of the best

subset was applied in concurrence with the highest adjusted coefficient of multiple determination. The selection was somewhat subjective, as a slightly higher value of adjusted coefficient of multiple determination in three years for ASP and two years for CASP was foregone in favour of less independent variables.

Table 4.4: All possible subsets of independent variables with ASP for 2000

Number of variables	r^2	Adjusted r^2	Variables in model
1	0.9803	0.9784	FCFC
1	0.9772	0.9749	EVA2
1	0.7929	0.7722	EPS
2	0.9959	0.9950	EPS, FCFC
2	0.9949	0.9938	EPS, EVA2
2	0.9804	0.9760	FCFC, EVA2
3	0.9961	0.9946	EPS, FCF, EVA2

4.10 Average share price regression models

Table 4.5 reflects the most appropriate subset chosen with ASP for each year from the list of all possible subsets, as was presented by the SAS system. These subsets were subsequently subjected to the F test and p value.

To test if the slope of the regression model is statistically significant, the F test and subsequent p value (observed level of confidence) were inspected. A level of significance of 0.05 was used. An F value < than the critical value or a p value > 0.05 states that the regression can be rejected.

Therefore it can be concluded that a significant relation exists between the dependent and independent variables in all of the sample years, save for 2006 and 2009. Because of these two exceptions, the data relating to the 2006 and 2009 sample years were omitted from further regression model building.

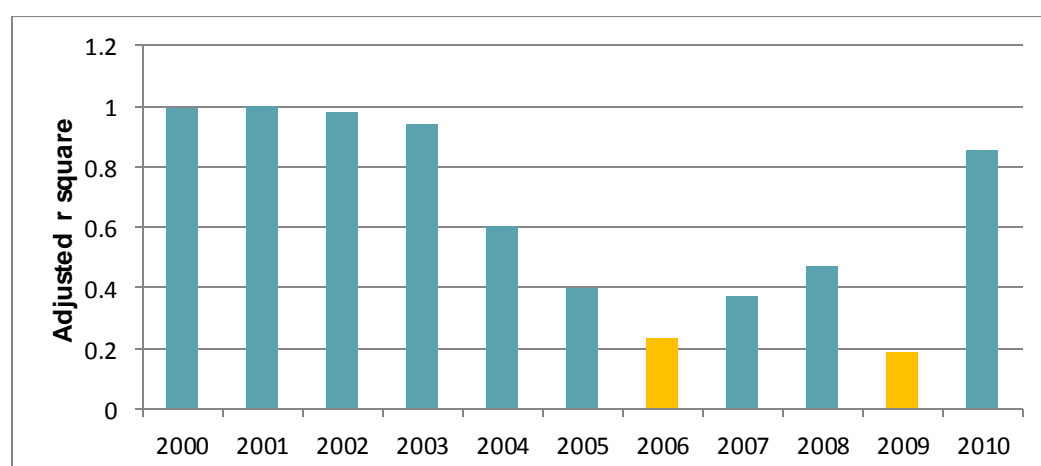
The independent variables of years 2000, 2001, 2002, 2003, 2004, 2005, 2007, 2008 and 2010 were subsequently subjected to multiple regression model building.

Table 4.5: Best subsets chosen for ASP

Year	Independent variables	r^2	Adj r^2	F value		Critical value	P value
2000	EPS, FCFC	0.9959	0.9950	1088,34	>	5.71	<0.001
2001	EPS, C1S, CNOWC, ROA	0.9988	0.9979	1077.99	>	7.39	<0.001
2002	EPS, PTE, FCFC	0.9881	0.9809	89.51	>	4.83	<0.001
2003	OP	0.9485	0.9438	191.22	>	6.12	<.0001
2004	NPM, ROEI, FCFC	0.6879	0.6028	8.08	>	4.63	0.0040
2005	EY, FCFC	0.4642	0.4011	7.36	>	6.65	0.005
2006	ARWACC	0.2823	0.2375	6.29	>	6.12	0.0233
2007	EVA2	0.3992	0.3742	15.95	>	5.72	0.0005
2008	EPS, EVA2	0.5482	0.4729	11.34	>	4.69	0.0009
2009	AAWACC, EVA2	0.2800	0.1900	1.98	<	4.62	0.1692
2010	OPM, EVA2	0.8859	0.8574	8.15	>	4.69	0.0036

Figure 4.4 shows the adjusted coefficient of multiple determination values for the regressions for ASP for each of the years in the sample. For 2000 it means that 99,50 % of the variation in ASP is explained by EPS and FCFC, but for 2005 only 40.11% of the variation in ASP is explained by EY and FCFC.

Figure 4.4: Adjusted coefficient of multiple determination values for regressions for ASP



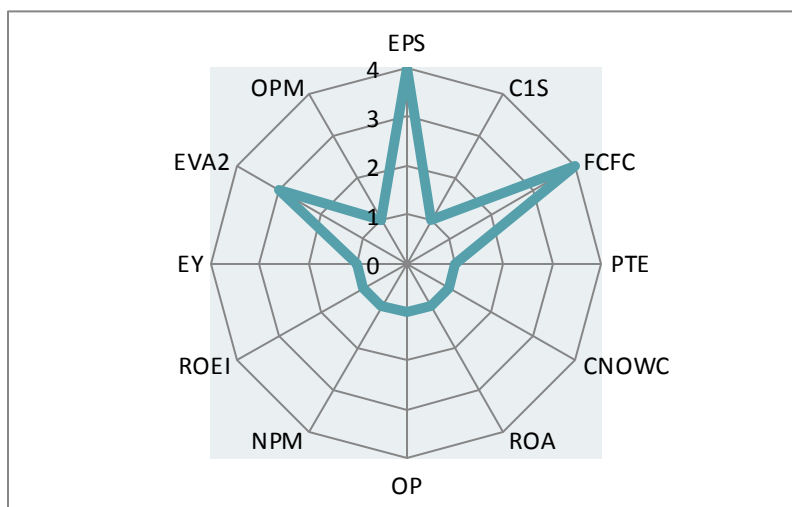
The multiple linear regressions developed for the ASP for 2000, 2001, 2002, 2004, 2005, 2008 and 2010, as well as simple linear regressions for 2003 and 2007, are presented in table 4.6. All the coefficients of the independent variables, as they occur in each chosen subset for ASP, are listed in the corresponding row for that variable. The number of times each independent variable occurred over the sample period was recorded in the most right column.

Table 4.6: Regression models for ASP

	Independent variables coefficients									
	2000	2001	2002	2003	2004	2005	2007	2008	2010	Number recorded
Y intercept	19.824	-0.4146	-9.9888	160.55	350.59	478.71	533.13	406.66	388.8	
EPS	5.013	1.500	5.277					4.456		4
FCFC	0.001		0003		454E-7	0.0001				4
C1S		26.28								1
PTE			-1.332							1
CNOWC		0.003								1
ROA		-2.071								1
OP				.003						1
NPM					3.493					1
ROEI					-.122					1
EY						23.776				1
EVA2							-.003	-.002	-.005	3
OPM									1.526	1

Figure 4.5 displays the content of table 3.6 graphically

Figure 4.5: Frequency of occurrence of independent variables of regressions with ASP



From table 4.6 it is evident that EPS and FCFC had the highest occurrence of the independent variables, namely four times out of eight. EVA2 occurred three times, followed by PTE, CNOWC, ROA, OP, NPM, ROEI, EY and OPM, which all occurred once.

4.11 Change in average share price regression models

Table 4.7 displays the best subset chosen with CASP for each year from the list of possible subsets presented by statistics.

On a level of 0.05 of significance, the F value and p value were considered.

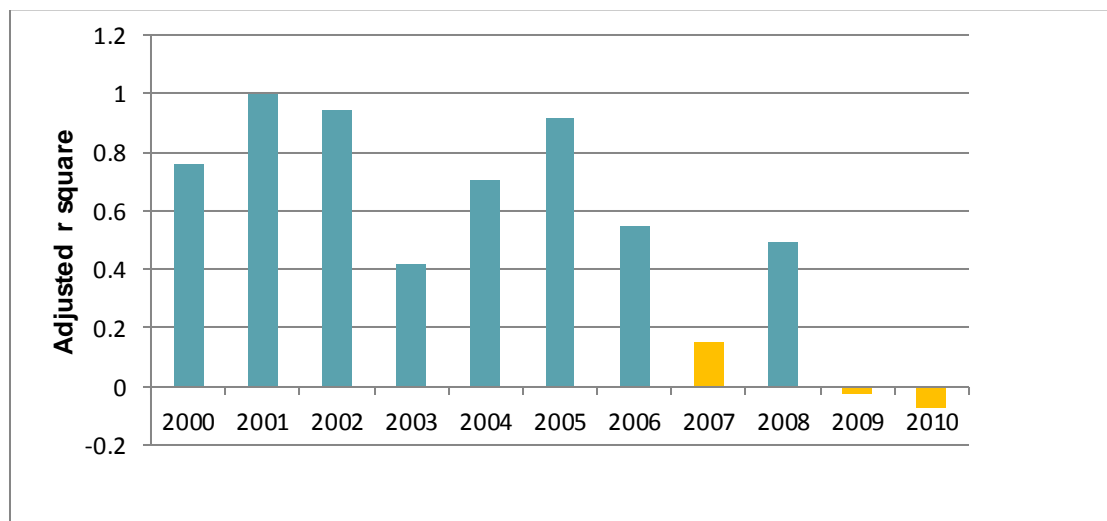
Inspection of table 4.7 reveals that no significant linear relationship exists between CASP and the independent variables for 2007, 2009 and 2010. The data relating to these three years was subsequently excluded from further model building.

For all the sample years 2000 2001, 2002, 2003, 2004, 2005, 2006 and 2008, a significant relation between the dependent and independent variables existed and these were subjected to multiple regression model building.

Table 4.7: Best subsets chosen for CASP

Year	Independent variables	r^2	Adj r^2	F value		Critical value	P value
2000	EPS	0.7818	0.7600	35.83	>	6.94	0.0001
2001	CNOWC, EPS	0.9986	0.9982	24.13	>	5.71	0.0001
2002	FCFC	0.9490	0.9448	223.42	>	6.55	<.0001
2003	TATO	0.4510	0.4167	13.14	>	6.12	0.0023
2004	CNOWC, ATO	0.7403	0.7032	21.61	>	4.77	<.0001
2005	EVA2, ATO	0.9430	0.9145	9.03	>	4.62	0.002
2006	CR	0.5913	0.5459	9.45	>	5.72	0.0052
2007	EVA2, ROEI	0.2435	0.1747	3.54	<	4.38	0.0465
2008	EPS	0.5268	0.4952	15.38	>	5.98	0.0010
2009	PTBV	0.0313	-0.0257	0.48	<	5.98	0.4952
2010	EVA2	0.0359	-0.0713	1.07	<	5.98	0.3146

The adjusted coefficient of multiple determination values for the regressions for each of the years in the sample is shown in figure 4.6.

Figure 4.6: Adjusted coefficient of multiple determination r^2 values for regressions for CASP

The multiple linear regressions developed for CASP for 2001, 2004 and 2005, as well as simple linear regressions for 2000, 2002, 2003, 2006 and 2008, are presented in table 4.8. All the coefficients of the independent variables, as they occur

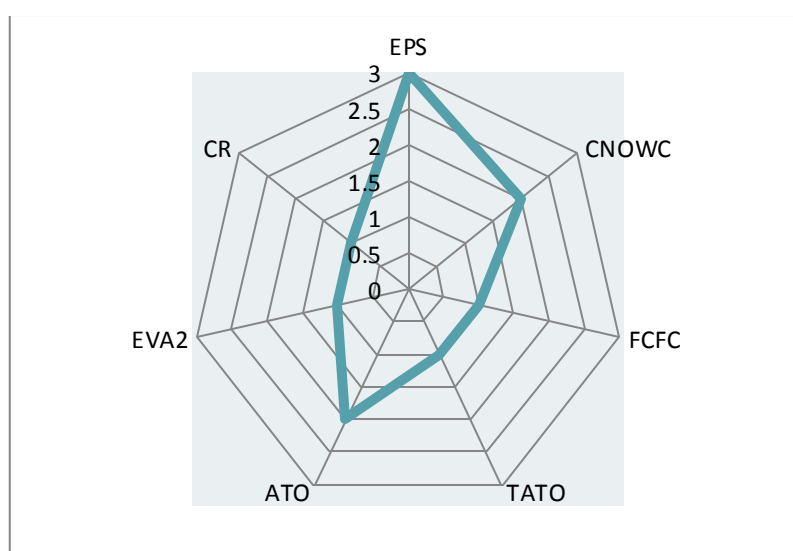
in each subset chosen for CASP, are listed in the corresponding row for that variable. The number of times each independent variable occurred over the sample period was recorded in the most right column.

Table 4.8: Regression models for CASP

	Independent variables coefficients								
	2000	2001	2002	2003	2004	2005	2006	2008	Total
Y intercept	-187.26	89.99	119.65	275.99	378.34	78.244	391.67	138.22	
EPS	7.6997	3.8738						- 1.7552	3
CNOWC		0.0017			0.0037				2
FCFC			- 0.003						1
TATO				- 671.51					1
ATO					- 1434.1	82.383			2
EVA2						-0.0014			1
CR							44.955		1

Figure 4.7 displays the content of table 4.6 graphically

Figure 4.7: Frequency of occurrence of independent variables of regressions with CASP



From table 3.8 it is evident that EPS occurred most often in the regressions of CASP, namely three times out of eight, ATO and CNOWC occurred twice and EVA2, FCFC, TATO and CR once.

The variable that occurred most frequently in the CASP regression models, namely EPS, was also prominent in the regression models of ASP.

4.12 Test results of ASP regression models

The results of the regressions of ASP were tested with the available historical data. The purpose of the testing was to determine to what extent each of the independent variables was an indicator for the following year's ASP. In the event that the variables had an indicative value to ASP, it might be useful for investors for future decision-making.

In the test the percentage growth of EPS, FCFC and EVA2 was compared to the percentage growth of ASP. EPS, FCFC and EVA2 were the independent variables that most frequently occurred in the regressions of ASP over the sample period. If a company's EPS, FCFC or EVA2 grew 20% or more in one year, the change in ASP growth of the following year was compared to that. The analysis of change in ASP growth was also done on different combinations of EPS, FCFC and EVA2.

A percentage increase of 20% was randomly selected as benchmark threshold because this value is substantially higher than the average return on real estate equity. According to Francis and Ibbotson (2009:146), the average return on real estate equity varies between 6% and 14%, depending on the type of real estate.

4.12.1 Testing method

The following steps were followed to test the impact of the growth of EPS, FCFC and EVA2 on the growth of ASP:

- The percentage growth of EPS, FCFC, EVA2 and ASP of all the listed companies in the real estate and development sector of the JSE was calculated.

- The annual growth of EPS, FCFC, EVA2 and ASP was calculated independently.
- Companies' financial information was extracted and tabulated in seven different tables for further analysis, based on each of the following relevant variables:
 - Growth of EPS $\geq 20\%$
 - Growth of FCFC $\geq 20\%$
 - Growth of EVA2 $\geq 20\%$
 - Growth of EPS and FCFC $\geq 20\%$
 - Growth of EPS and EVA2 $\geq 20\%$
 - Growth of FCFC and EVA2 $\geq 20\%$
 - Growth of EPS, FCFC and EVA2 $\geq 20\%$.
- Companies' growth in each of the seven different combinations of variables in a year was compared to the subsequent year's growth of ASP in those companies (e.g. percentage growth $EPS_{year\ X}$ compared to percentage growth $ASP_{year\ X + 1}$).
- The times when the change in ASP growth was $\geq 20\%$ were then counted.
- A summary of all the observations over the sample period is presented in table 4.9.

Table 4.9: Summary of number of times ASP growth $\geq 20\%$, given growth of EPS, FCFC and/or EVA2 $\geq 20\%$

	Number of observations	Number of times growth ASP $\geq 20\%$	Percentage
Growth EPS $\geq 20\%$	55	37	67
Growth FCFC $\geq 20\%$	81	43	53
Growth EVA2 $\geq 20\%$	37	23	62
Growth EPS $\geq 20\%$ and growth FCFC $\geq 20\%$	20	10	50
Growth EPS $\geq 20\%$ and growth EVA2 $\geq 20\%$	7	4	57
Growth FCFC $\geq 20\%$ and growth EVA2 $\geq 20\%$	13	9	69
Growth EPS, FCFC and EVA2 $\geq 20\%$	9	7	78

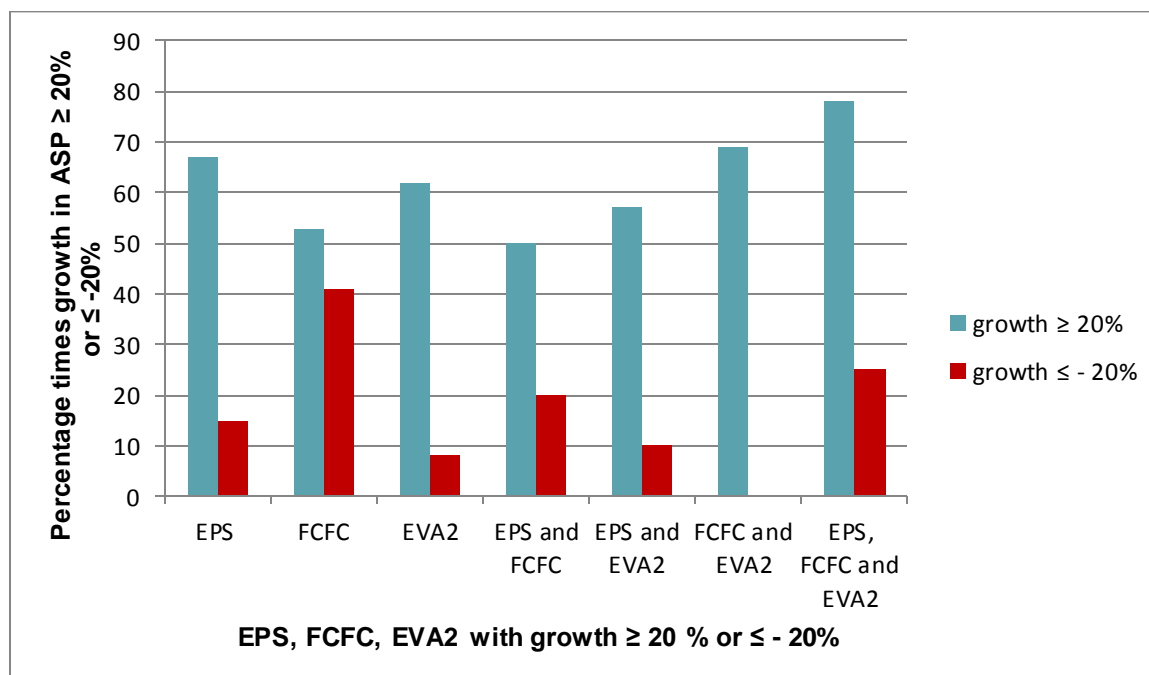
- The same procedure was followed for growth of $\leq -20\%$.
- A summary of all the relevant observations of growth of $\leq -20\%$ over the sample period is presented in table 4.10.

Table 4.10: Summary of number of times ASP growth $\leq -20\%$, given growth of EPS, FCFC and/or EVA2 $\leq -20\%$

	Number of observations	Number of times growth ASP $\leq -20\%$	Percentage
Growth EPS $\leq -20\%$	48	7	15
Growth FCFC $\leq -20\%$	17	7	41
Growth EVA2 $\leq -20\%$	74	6	8
Growth EPS $\leq -20\%$ and growth FCFC $\leq -20\%$	5	1	20
Growth EPS $\leq -20\%$ and growth EVA2 $\leq -20\%$	21	2	10
Growth FCFC $\leq -20\%$ and growth EVA2 $\leq -20\%$	3	0	0
Growth EPS, FCFC and EVA2 $\leq -20\%$	4	1	25

- Figure 4.8 displays the information of tables 4.9 and -4.10 graphically.

Figure 4.8: Percentage of number of times growth of ASP $\geq 20\%$ or $\leq -20\%$, given growth of EPS, FCFC and/or EVA2 $\geq 20\%$ or $\leq -20\%$



From figure 4.8 it is evident that there is a much higher correlation between positive growth rate of the tested variables than the negative growth rate of the tested variables and the successive year's ASP growth rate.

For the positive growth rate, the best result was achieved if EPS, FCFC and EVA2 all had a growth rate $\geq 20\%$ in the same year. In 78% of those events the subsequent year's ASP growth rate was $\geq 20\%$. The weakest correlation was for the combination of EPS and FCFC growth rate $\geq 20\%$; in 50% of those cases the ASP had a growth rate $\geq 20\%$ the subsequent year.

For negative growth rate, given that FCFC had a growth rate $\leq -20\%$, in 41% of those events the subsequent year's ASP growth rate was $\leq -20\%$. This was the highest number of correlations with negative growth rates. The correlation between the EVA2- and ASP growth rates $\leq -20\%$ was 8%. Not once did the growth rate of both EVA2 and FCFC $\leq -20\%$ have a growth rate $\leq -20\%$ of ASP in the subsequent year.

- Companies' financial information was once again tabulated in seven different tables for further analysis, based on each of the following variables:

- Growth of EPS $\geq 20\%$
 - Growth of FCFC $\geq 20\%$
 - Growth of EVA2 $\geq 20\%$
 - Growth of EPS and FCFC $\geq 20\%$
 - Growth of EPS and EVA2 $\geq 20\%$
 - Growth of FCFC and EVA2 $\geq 20\%$
 - Growth of EPS, FCFC and EVA2 $\geq 20\%$.
- Given growth of EPS, FCFC and/or EVA2 $\geq 20\%$, the times the change in ASP growth was $20\% > \text{ASP}_{(\text{year } x+1)} \geq 10\%$ and also $10\% > \text{ASP}_{(\text{year } x+1)} \geq 0\%$ were then counted.
 - A summary of all the observations over the sample period is presented in table 4.11.

Table 4.11: Summary of number of times ASP growth was $20\% > \text{ASP}_{(\text{year } x+1)} \geq 10\%$ and also $10\% > \text{ASP}_{(\text{year } x+1)} \geq 0\%$, given growth of EPS, FCFC and/or EVA2 $\geq 20\%$

	Number of observations	Number of times growth $20\% > \text{ASP} \geq 10\%$	Percentage growth $20\% > \text{ASP} \geq 10\%$	Number of times growth $10\% > \text{ASP} \geq 0\%$	Percentage growth $10\% > \text{ASP} \geq 0\%$
Growth EPS $\geq 20\%$	55	1	2	2	4
Growth FCFC $\geq 20\%$	81	10	11	5	6
Growth EVA2 $\geq 20\%$	37	4	11	4	5
Growth EPS $\geq 20\%$ and growth FCFC $\geq 20\%$	20	3	15	2	11
Growth EPS $\geq 20\%$ and growth EVA2 $\geq 20\%$	7	0	0	0	0
Growth FCFC $\geq 20\%$ and growth EVA2 $\geq 20\%$	13	0	0	1	8
Growth EPS, FCFC and EVA2 $\geq 20\%$	9	0	0	0	0

- Given growth of EPS, FCFC and/or EVA2 $\leq -20\%$, the times the change in ASP growth was $-20\% < \text{ASP}_{(\text{year } x+1)} \leq -10\%$ and also $-10\% < \text{ASP}_{(\text{year } x+1)} \leq 0$ were counted.

- A summary of all the relevant observations of growth of $ASP_{(year\ x+1)}$ over the sample period is presented in table 4.12.

Table 4.12: Given growth of EPS, FCFC and/or EVA2 $\leq -20\%$, the number of times the change in ASP growth was $-20\% < ASP_{(year\ x+1)} \leq -10\%$ and also $-10\% < ASP_{(year\ x+1)} \leq 0$

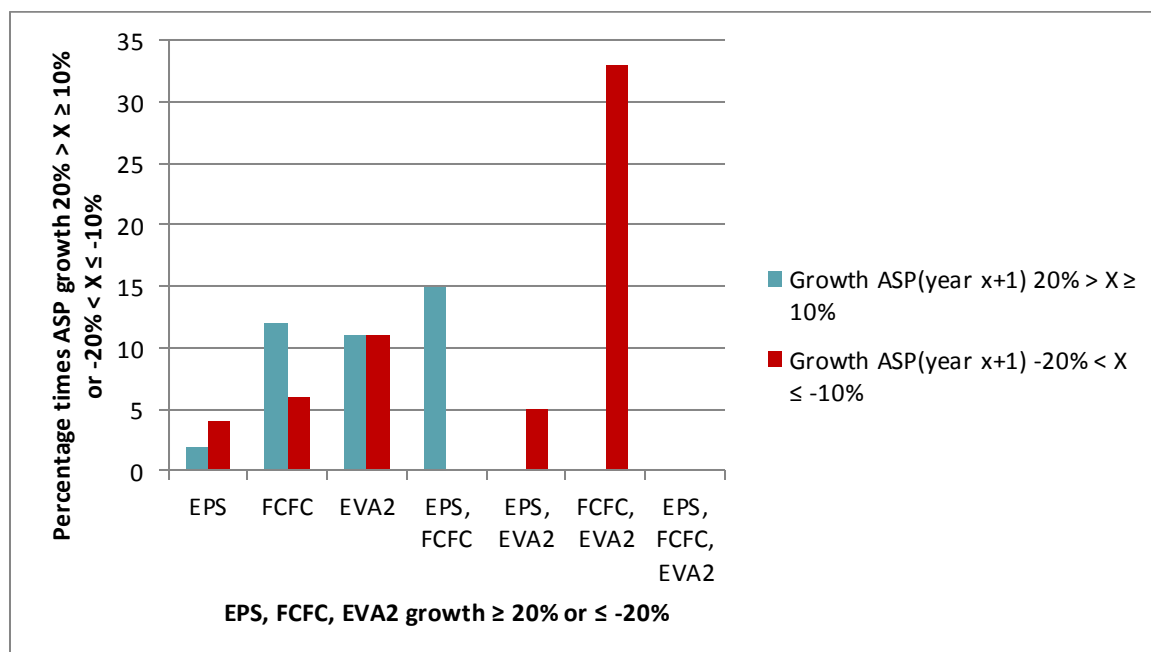
	Number of observations	Number of times growth $-20\% < ASP_{(year\ x+1)} \leq -10\%$	Percentage growth $-20\% < ASP_{(year\ x+1)} \leq -10\%$	Number of times growth $-10\% < ASP_{(year\ x+1)} \leq 0$	Percentage growth $-10\% < ASP_{(year\ x+1)} \leq 0$
Growth EPS $\leq -20\%$	48	2	4	3	6
Growth FCFC $\leq -20\%$	17	1	6	1	6
Growth EVA2 $\leq -20\%$	74	8	11	7	15
Growth EPS $\leq -20\%$ and growth FCFC $\leq -20\%$	5	0	0	0	0
Growth EPS $\leq -20\%$ and growth EVA2 $\leq -20\%$	21	1	5	2	10
Growth FCFC $\leq -20\%$ and growth EVA2 $\leq -20\%$	3	1	33	0	0
Growth EPS, FCFC and EVA2 $\leq -20\%$	4	0	0	1	25

The percentages indicating the number of times the subsequent year's ASP growth was:

- $20\% > ASP_{(year\ x+1)} \geq 10\%$, given growth of EPS, FCFC and/or EVA2 $\geq 20\%$; and
- $-20\% < ASP_{(year\ x+1)} \leq -10\%$, given growth of EPS, FCFC and/or EVA2 $\leq -20\%$

are displayed in figure 4.9.

Figure 4.9: Percentage of number of times growth of ASP were 20% > $ASP_{(year\ x+1)} \geq 10\%$ or $-20\% < ASP_{(year\ x+1)} \leq -10\%$, given growth of EPS, FCFC and/or EVA2 $\geq 20\%$ or $\leq -20\%$



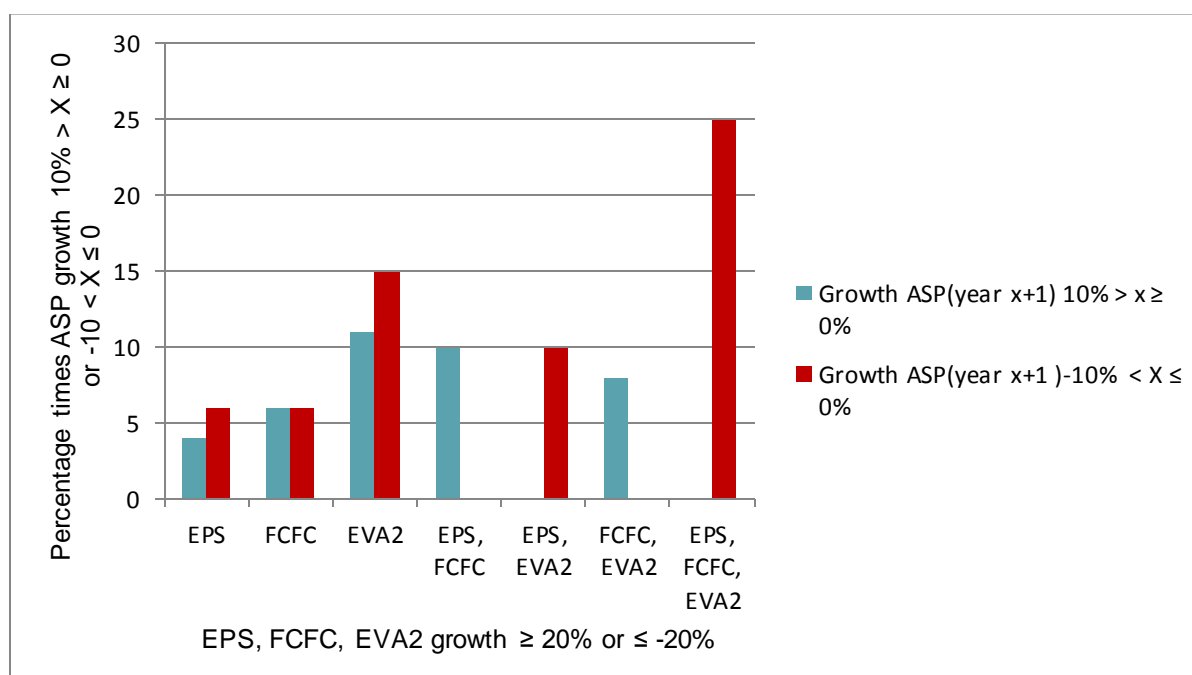
The negative growth percentage for the combination of FCFC and EVA2 is skewed, since there was only one occurrence out of three observations. All other correlations of EPS, FCFC and/or EVA2 growth $\geq 20\%$ or $\leq -20\%$ and ASP growth of 20% > $ASP_{(year\ x+1)} \geq 10\%$ or $-20\% < ASP_{(year\ x+1)} \leq -10\%$ were $\leq 15\%$.

The percentages indicating the number of times the subsequent year's ASP growth was:

- $10\% > ASP_{(year\ x+1)} \geq 0\%$, given growth of EPS, FCFC and/or EVA2 $\geq 20\%$; and
- $-10\% < ASP_{(year\ x+1)} \leq 0\%$, given growth of EPS, FCFC and/or EVA2 $\leq -20\%$

are displayed in figure 4.10.

Figure 4.10: Percentage of number of times growth of ASP were 10% > $ASP_{(year\ x+1)} \geq 0\%$ or $-10\% < ASP_{(year\ x+1)} \leq 0\%$, given growth of EPS, FCFC and/or EVA2 $\geq 20\%$ or $\leq -20\%$



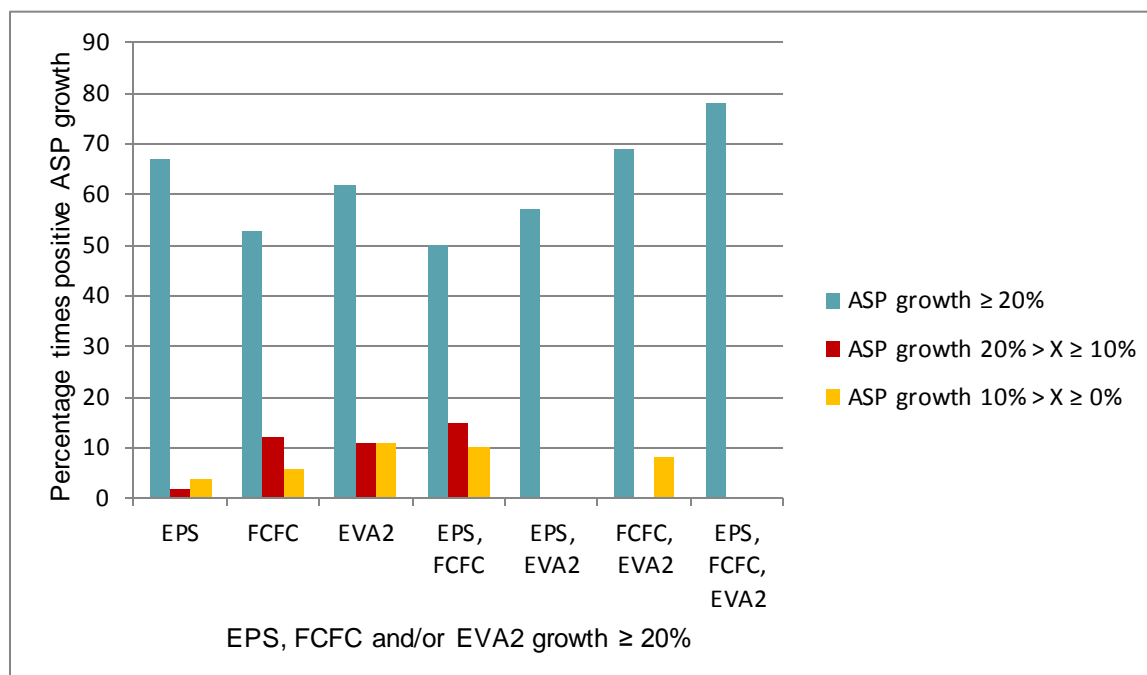
The negative growth percentage for the combination of EPS, FCFC and EVA2 is skewed, since there was only one occurrence out of a possible four observations. All other correlations of EPS, FCFC and/or EVA2 growth $\geq 20\%$ or $\leq -20\%$ and ASP growth of $10\% > ASP_{(year\ x+1)} \geq 0\%$ or $-10\% < ASP_{(year\ x+1)} \leq 0\%$, were $\leq 15\%$.

Given a growth of $\geq 20\%$ for EPS, FCFC and/or EVA2, the percentage indicating the number of times the growth of ASP in the subsequent year between the following parameters:

- ASP growth $\geq 20\%$;
- $20\% > ASP_{(year\ x+1)} \geq 10\%$; and
- $10\% > ASP_{(year\ x+1)} \geq 0\%$

is displayed in figure 4.11.

Figure 4.11: Given EPS, FCFC and/or EVA2 growth rates are $\geq 20\%$, the percentage indicating the number of times the subsequent year's ASP was between given parameters



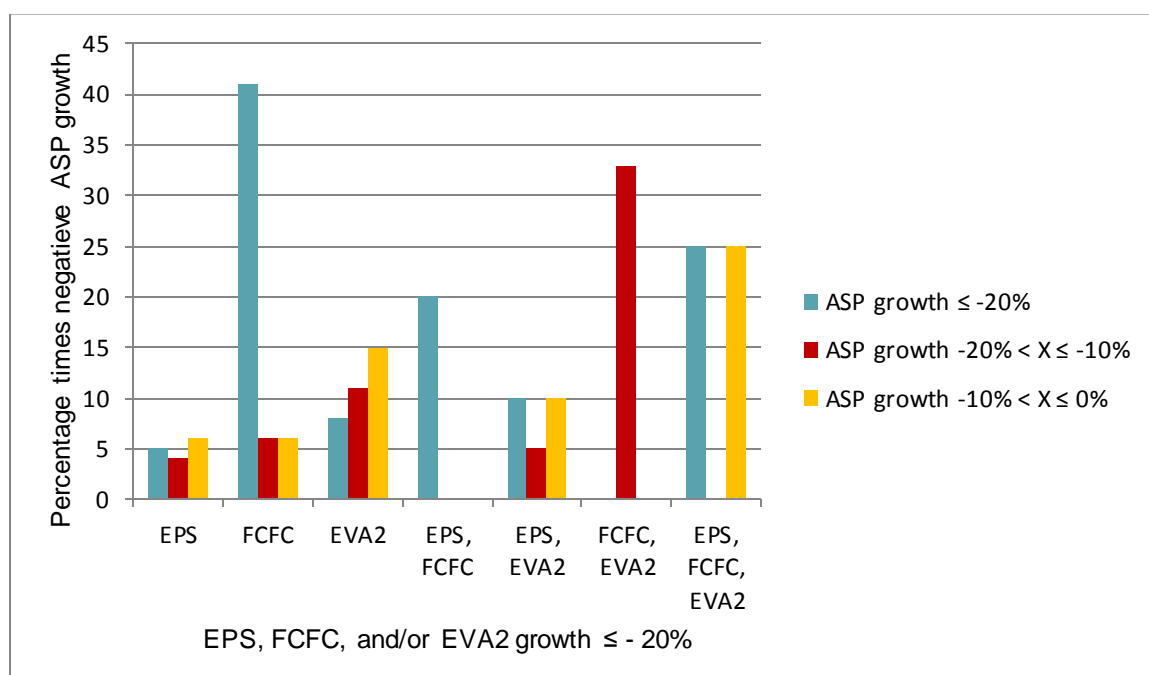
From figure 4.11 it is evident that if EPS, FCFC and/or EVA2 growth rates were $\geq 20\%$, the probability that the subsequent year's ASP growth rate would also be $\geq 20\%$ was much higher than the probability that the subsequent year's ASP growth rate $< 20\%$.

Given growth of $\leq -20\%$ for EPS, FCFC and/or EVA2, the percentage indicating the number of times the growth of ASP in the subsequent year between the following parameters:

- ASP growth $\leq -20\%$;
- $-20\% < \text{ASP}_{(\text{year } x+1)} \leq -10\%$; and
- $-10\% < \text{ASP}_{(\text{year } x+1)} \leq 0\%$

is displayed in figure 4.12.

Figure 4.12: Given EPS, FCFC and/or EVA2 growth rates are $\leq -20\%$, the percentage indicating the number of times the subsequent year's ASP was between given parameters



The negative growth percentage for the combinations of EPS and FCF, FCFC and EVA2 and also EPS, FCFC and EVA2 are skewed, since there were respectively only five, three and four observations, with one occurrence in all four instances. Apart from those skewed readings, the highest reading was if the FCFC growth rate was $\leq -20\%$; in 41% of those instances the ASP growth rates were $\leq -20\%$. In all other instances of negative ASP growth rate, the percentage of times of occurrence was $\leq 15\%$.

Investors could apply these empirical results in the following manner: if real estate companies listed on the JSE had a growth of $\geq 20\%$ in all of EPS, FCFC and EVA2, according to the model, they have the highest probability (78%) of a growth in ASP $\geq 20\%$ the following year. Figure 4.11 depicts the growth of ASP $\geq 20\%$ with the various combinations of EPS, FCFC and EVA2 growth $\geq 20\%$ the previous year. The probability that ASP growth will be less than 20% is substantially lower than growth of $\geq 20\%$ in any of the combinations of growth of EPS, FCFC and EVA2 $\geq 20\%$. The negative growth rates of these variables (see figure 4.12) is not nearly as indicative as the positive growth rates of the same variables.

Chapter 5

Conclusion on financial performance indicators of the real estate and development sector of the JSE for the period 2000 - 2010

5.1 Introduction

Since investors' wealth growth is measured in terms of the return on their investments, which includes capital gains or revenue profits on the disposal of the investments, or dividend payouts or both, the financial factors that could influence such investments were considered in the literature study.

In the quantitative study the correlation between identified financial indicators and share prices in the real estate and development sector of the JSE were tested.

The methodology of the quantitative study included in particular the following:

- Multiple regressions were developed for each year in the sample period, which covered 11 years.
- ASP and CASP, proxies of company value, were used as dependent variables.
- Forty-seven financial indicators were identified as independent variables.
- Visual inspection, the adjusted coefficient of multiple determinations, the overall F test and the observed level of significance were used for the evaluation of the regression models.

Based on the evaluations, two of the regression models for ASP (2006, 2009) and three of the regression models for CASP (2007, 2009, 2010) were disqualified from further analyses.

5.2 Conclusions

The results of the above valuations indicated that the following variables occurred most frequently in all of the models developed for ASP over the sample period: EPS, FCFC and EVA2. EPS and FCFC occurred four times, and EVA2 three times out of nine, indicating their significance to ASP. Variables that were submitted for regression, but had no significance in relation to ASP regressions, were FCFO, EY, C1S, C10S, CAP, ROE, ROEI, OROIC, NOPATC, QR, ATO, AAWACC and ARWACC.

It is noteworthy to mention that none of the metrics that relate specifically to real estate, namely CAP and ATO, had any significance in relation to ASP.

Of all the regression models developed for CASP, EPS (three times out of eight) and CNOWC and ATO (two times out of eight) were the variables that occurred most frequently over the sample period, indicating their significance to CASP. Variables that were submitted for regression, but had no significance in relation to CASP regressions, were DPR, OPM, ROA, C1S, C3S, C5S, C10S, OPR, PTE, FCFO, ARTO, QR, ROEI, EM, PTBV, EVA1, ARWACC and AHWACC.

EPS was prominent in both sets of ASP and CASP regression models.

In the analysis of the real estate data over the sample period, consideration was given to global events that significantly influenced the real estate market. During 2006 the US experienced a housing market bubble, which burst in 2007 – 2008 and resulted in a world-wide financial crisis (Pirounakis, 2013:349). This is evident from the increase (during the bubble formation) and decrease (during the burst) in the number of new housing units approved in the US, as portrayed in figure 3.2. This bubble, the burst and the drastic recession that followed had a spill-over effect into most other countries (Pirounakis, 2013:349).

The South African real estate market was no exception, as it did not go unaffected by the recession. This is evident from the adjusted coefficient of multiple

determination of ASP, displayed in figure 5.1, and the South African business cycle, displayed in figure 5.2. From a comparison between the two figures, it seems as if they mirror each other.

A more detailed analysis of the adjusted coefficient of multiple determination in relation to the business cycle showed that:

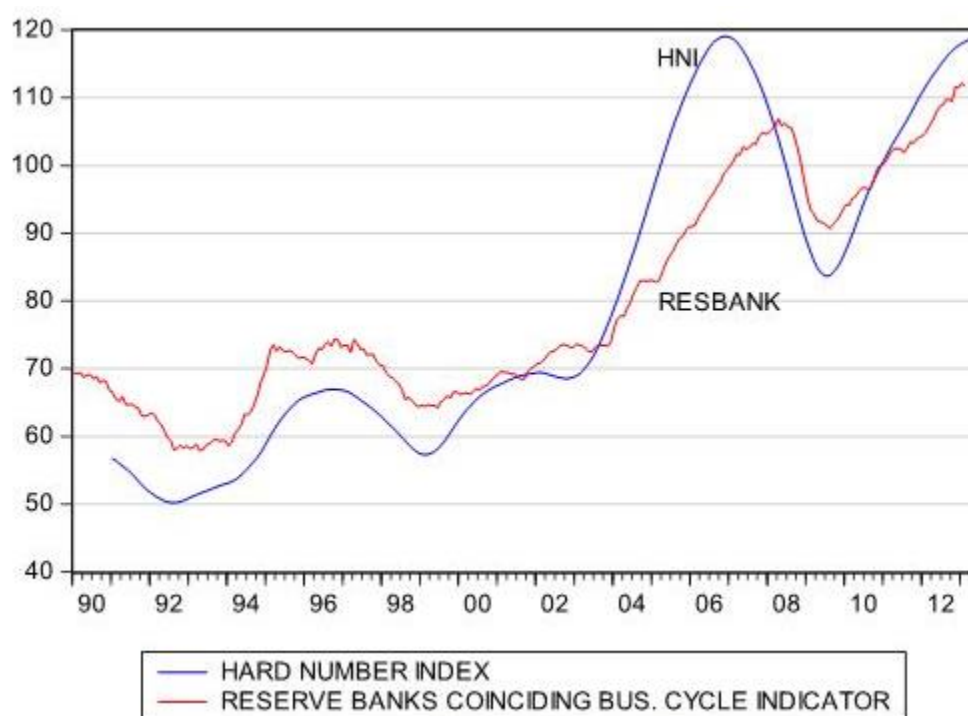
- During the sample years of moderate growth (2000 - 2003) the adjusted coefficient of multiple determination was substantially high. Therefore, the variation of ASP was appropriately described by the set of independent variables.
- During the years of fast expansion and successive recession in the South African business cycle, the adjusted coefficients of multiple determination changes mirrored the business cycle movement.
- From 2003 to 2006 there were annual successive declines in the adjusted coefficient of multiple determinations. This means that viewer variation in the ASP was described by the set of independent variables.
- From 2007 to 2010 the adjusted coefficient of multiple determination increased gradually again, except for a setback in 2009. This means that, once again, the variance in ASP was progressively better explained by the set of independent variables. In other words, if the business cycle movement is steep, the variation of ASP is not appropriately explained by the different sets of independent variables.
- The fact that the regression models for ASP for 2006 and 2009 and CASP for 2007, 2009 and 2010 were not even done is another indicator of the volatility in this market just prior to and just after the recession. It might be an indication that investors trade cautiously in times of moderate business growth, but more erratically during times of steeper economic expansion and contraction.

The CASP adjusted coefficient of multiple determinations showed no discernible pattern in relation to the business cycle.

Figure 5.1: Adjusted coefficient of multiple determination of ASP and CASP



Figure 5.2: SARB business cycle indicator



Source: SARB, Naamsa, Investec Wealth and Investment (quoted by Kantor, 2013)

Historical data was used to test the relevance of the independent variables that had the highest occurrence in the total set of regression models with ASP. The methodology and results are summarised below:

- The number of times that ASP had a growth rate of $\geq 20\%$, given that the previous year's growth of EPS, FCFC and/or EVA2 $\geq 20\%$ was determined.
- ASP had a growth rate of $\geq 20\%$ in 67% of cases in which EPS had a growth rate $\geq 20\%$ in the preceding year, the highest of the three single independent variables that were tested.
- ASP had a growth rate of $\geq 20\%$ in 78% of the instances where all of EPS, FCFC and EVA2 had a growth rate of $\geq 20\%$ in the preceding year, the highest in the case of a combination of variables.
- Given EPS, FCFC and/or EVA2 had a growth rate of $\geq 20\%$, in between 50% and 78% of those cases, the ASP growth rate the subsequent year was $\geq 20\%$.
- All correlations between events of growth of EPS, FCFC and/or EVA2 $\geq 20\%$ and events of growth of $20\% > \text{ASP}_{(\text{year } x + 1)} \geq 0\%$ were $\leq 15\%$.

An analysis of the negative growth rates indicated that if:

- ASP growth rate was $\leq -20\%$, in 41% of the cases the FCFC with a growth rate $\leq -20\%$ in the preceding year, was the highest correlation.
- ASP did not have a growth rate of $\leq -20\%$ in the observations when both EVA2 and FCFC had a growth rate $\leq -20\%$ in the preceding year.
- Given EPS, FCFC and/or EVA2 had a growth rate of $\leq -20\%$, in between 0% and 41% of those cases, the ASP growth rate the subsequent year was $\leq -20\%$.
- Except negligible observations, all correlations between growth of EPS, FCFC and/or EVA2 $\leq -20\%$ and growth of $-20\% < \text{ASP}_{(\text{year } x + 1)} \leq 0\%$ were $\leq 15\%$.

The most outstanding observations were therefore:

- In a comparison between the positive growth rate correlations and the negative growth rate correlations, it is accepted that the positive growth rate correlations are better indications of the subsequent year's change in ASP than the negative growth rate correlations.
- If EPS, FCFC and/or EVA2 growth rates were $\geq 20\%$, the probability that the subsequent year's ASP growth rate would also be $\geq 20\%$ was much higher than the probability that the subsequent year's ASP growth rate would be $< 20\%$.
- For negative growth rates, only one correlation was outstanding namely growth of $FCFC \leq -20\%$ and growth of $ASP_{(year\ x + 1)} \leq -20\%$.

The application of this model is bound to the real estate sector of the JSE. Investors might look out for growth of EPS, FCFC and/or EVA2 of $\geq 20\%$. The probability of growth in $ASP \geq 20\%$ in the subsequent year, according to the model, is between 50% - 78%, depending on the different combinations of financial indicators. The growth rates of EPS, FCFC and EVA2 of $\leq -20\%$ is not much of indicators of the subsequent year's ASP.

5.3 Recommendations

According to Pirounakis (2013:349), there have been three asset-price bubbles and consequent bursts globally to date, in 1873, 1929 and 2007-2008. Deep and prolonged recessions followed after all three of these asset-price bursts. The sample period spanned two years prior to and two years after an excessive growth phase that culminated in the bubble and burst in the real estate market, one of the three global asset-price bubbles and bursts mentioned. It is therefore recommended that the sample period be extended to include a few full cycles in the real estate market. A bigger sample size will also increase the credibility of the outcomes.

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