

Optimal share selection: A study of the South African construction industry

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ABSTRACT

Investment selection difficulties for novice or inexperienced investors has long been a hurdle for investors, the main concern being that invested capital may be lost due to poor investment decisions. The identification of a good quality share that has its origins in companies that are profitable and sustainable can become a maze of numbers and data that does not add value to the investor and does not answer the fundamental question of whether to invest or seek alternative investment opportunities. This research study attempted to uncover financial multiples and or variables that will be indicative of share price fluctuations in the construction industry and to construct a framework that investors can use in assisting to make investments decisions. Furthermore, a share portfolio using this framework was constructed by applying the framework developed.

The approach of the research study was to firstly conduct a literature review on the construction industry, share selection theory and financial multiples and variables. This was done in context of the South African construction industry locally and abroad. Following this a sample population of companies listed on the Johannesburg Stock Exchange that are categorised under the construction segment was chosen for research purposes. The financial data from these companies was gathered and multiple linear regression analysis used to analyse data and develop regression equations. Out of these equations the most prominent variables were identified. Following identification, these variables were presented in a framework that was indicative of the construction industries share price volatility. Finally, a share portfolio of construction companies was constructed. The portfolios objective was to have an adequate balance between the volatility of the portfolio and the level / rate of returns that it could earn.

Although the construction industry in South Africa is severely under pressure with high levels of competition the framework and the portfolio constructed did demonstrate that the new potential and existing investors could enjoy adequate returns on investment in the construction industry in South Africa.

KEYWORDS

Share selection, construction industry, share selection framework, share portfolio, financial multiples

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CHAPTER 1: INVESTMENT IN THE CONSTRUCTION INDUSTRY

1.1 Introduction

The objective of chapter 1 is to introduce the background and direction of the research study and provide a framework against which the research will be based on.

The identification of a good quality share that has its origins in companies that are profitable and sustainable can become a maze of numbers and data that does not add value to the investor and does not answer the fundamental question of whether to invest or seek alternative investment opportunities. For the novice or inexperienced investor, the use of financial multiples is an adequate source for investigating the wellbeing of companies of interest (IAC Publishing 2016).

This research study seeks to uncover financial multiples that will be indicative of share price fluctuations in the construction industry. Each industry has its own unique qualities and characteristics and react differently although they operate in the same market. This can be attributed to competitors entering and exit the market and as macro-economic circumstances change (Marx, Mpofu & Van de Venter 2003:82).

Because an industries reaction to the market trends and climate differ, so could their indicative financial multiples. The problem exists that not all financial multiples supplied are universally indicative of companies share price fluctuations. The financial multiples that this research study will seek to uncover will theoretically have to correlate with the fluctuations of the market share price.

The identification of these multiples is not limited to investors seeking new companies to invest in. These multiples could also potentially indicate to existing investors whether to hold or sell their shares given the current market situation

1.2 Problem Statement

Financial multiples can be used by investors to valuate a share and ultimately guide the investor to the appropriate decision whether to buy, hold or sell the asset. The

problem exists that not all financial multiples available are indicative of share price movement.

There are numerous factors that influence to what degree different financial multiples are indicative. Factors such as operating markets or industry, local market conditions and timeliness of valuation influence how strong financial multiples movements correlate to the fluctuations of a company's share price.

In knowing that there is numerous known and unknown factors that influence this, investors are challenged into making informed decision regarding their choice of investment when looking at financial multiples as a guideline. Investors could thus benefit from applying a framework, using financial multiples and some criteria, to assist in making the correct investment decisions.

Such a framework for share selection, in the heavy construction segment of the Johannesburg Stock Exchange, seems not to be readily available for use by investors.

1.3 Objectives of study

1.3.1 Primary objective

The primary objective is to develop a framework to assist investors to select profitable shares from the construction industry and ultimately combine the shares in an investment portfolio that will generate acceptable returns for a given level of risk.

1.3.2 Secondary research objectives

1. Determine whether variables exist and to what degree do they correlate with market share price fluctuations
2. Based on the findings under sub-objective 1 above, if possible, to develop a framework for selection of a portfolio of shares from the construction sector.
3. If it is possible to develop a selection framework test the ability of the framework to compile construction share portfolio that will return optimal returns

1.4 Expected contribution of the study

The expected contribution of the study will be to make available a framework that can assist investors to select shares in the construction industry that could potentially produce acceptable returns given their individual tolerance for risk.

Furthermore, the most prominent financial multiples identified in the framework, could give some indication to existing investors whether to hold or sell their shares in companies in the construction sector.

1.5 Field of study

The research will deal with aspects designated to the field of financial and asset management. Financial management primarily deals with the efficient management of funds to reach individual or organisational goals (Megginson, Smart & Graham 2009:6). This research study will deal with company analysis and valuation. Furthermore, the risk valuation theories will also be used to assist in the development of the framework and the portfolio.

1.6 Industry focus of the study

The focus of the study will be on companies that are listed on the Johannesburg Stock Exchange and categorised under the heavy construction segment. The companies in question will be large to mid-market capitalization companies. The focus will be on all companies that have long track records and are well established in the industry and listed on the Johannesburg Stock Exchange.

1.7 Research methodology

1.7.1 Statistical instruments

To assist in the development of the framework multiple linear regression analysis will be applied to the data.

1.7.2 Study population

The data to be used are the audited financial results from construction companies that are listed on the Johannesburg Stock Exchange. The period under consideration is the financial data timeline from 2008 to 2014.

These companies core activities are large infrastructure developments such as roads, railways, and other large constructions projects. A typical example of projects that these companies undertake would be the FNB Stadium (Soccer City) that was built by the Aveng Group (Aveng Group 2016).

1.7.3 Gathering of data

The financial data that is required for the development of the anticipated framework will be sourced from www.inetbfa.com. InetBfa is a South African financial database that can supply current and historical data and information of listed companies in South Africa.

1.8 Limitations of study

The limitations of the study are:

1. The companies in question are well diversified and have smaller operating subsidiaries that do not operate directly in the construction industry. These operating subsidiaries will be disregarded as far possible.
2. The companies in questions have cross border interest. The to be developed frameworks results might be skewed somewhat because of cross border interests.
3. Market and industry abnormalities have a negative impact on the data and could affect some companies more than others. These anomalies would typically be the September 2008 market crash in United States of America and the 2010 FIFA World Cup. These abnormal market and industry influence are

difficult to quantify and could influence data and the proposed framework. Awareness of their impact is thus important.

4. All financial models and frameworks that could potentially predict future market and share returns are based on historical data. The framework potentially being developed in this study will thus only be indicative of current and recent past industry and market conditions. If market and industry trends retain its status quo then the financial multiples identified in the study could be relevant in the long term.

1.9 Layout of the study

A layout of the study and a chapter description will provide clarity and direction for what can be expected.

1.9.1 CHAPTER 1: INVESTMENT IN THE CONSTRUCTION INDUSTRY

Chapter 1 provides an orientation of the study. It explains at a strategic level what the problem is with regards to the subject matter and how the study plans to solve the problem by using theories and instruments found in literature.

1.9.2 CHAPTER 2: THEORY FOR SHARE SELECTION

Chapter 2 will provide the necessary knowledge and understanding with regards to theoretical knowledge in the field of financial multiples and share selection. Furthermore, this chapter will also provide the background information that could have influence on the results of the study.

1.9.3 CHAPTER 3: EMPIRICAL STUDY AND RESULTS

Chapter 3 will address the empirical research of the study. In this chapter the research sample data will be analysed and statistical methods applied to assist in developing a framework and possible share portfolio. The results and findings will be presented.

1.9.4 CHAPTER 4: CONCLUSION AND RECOMMENDATIONS

Chapter 4 will conclude the research study and addresses the results obtained in chapter 3. The results will also be measured against the research objectives. Finally, a conclusion will be made regarding the findings of the research study.

CHAPTER 2 THEORY FOR SHARE SELECTION

2.1 Introduction

In this chapter a literature review will be presented. The purpose of the literature study is to establish an understanding of factors involved when developing the framework in question.

When considering share selection in a specific industry there are specific dominant market and economical characteristics that have an impact on how companies, and subsequently their share price performs (Chen, Roll & Ross 1986:383). In noting that there are specific characteristics in external influences in the different industries, share selection in the construction industry may have unique attributes and significant financial multiples stemming from these characteristics and influences which need to be considered.

Firstly, an analysis will be done on the industry involved in the study. This will serve to establish what characteristics could play a role in the identification of possible significant financial multiples. Secondly financial multiples and valuation theories, sourced from literature, will be presented.

2.2 Industry overview of the construction industry in South Africa

According to PricewaterhouseCoopers (2015:7) there are two main factors that determine performance of companies in the construction industry. These factors are namely public and private sector spending.

The largest contributors to public sector spending are the large parastatal transport and power generation companies. These companies are namely Eskom, Transnet and South African National Roads Agency Limited. *Figure 2.1* illustrates the public

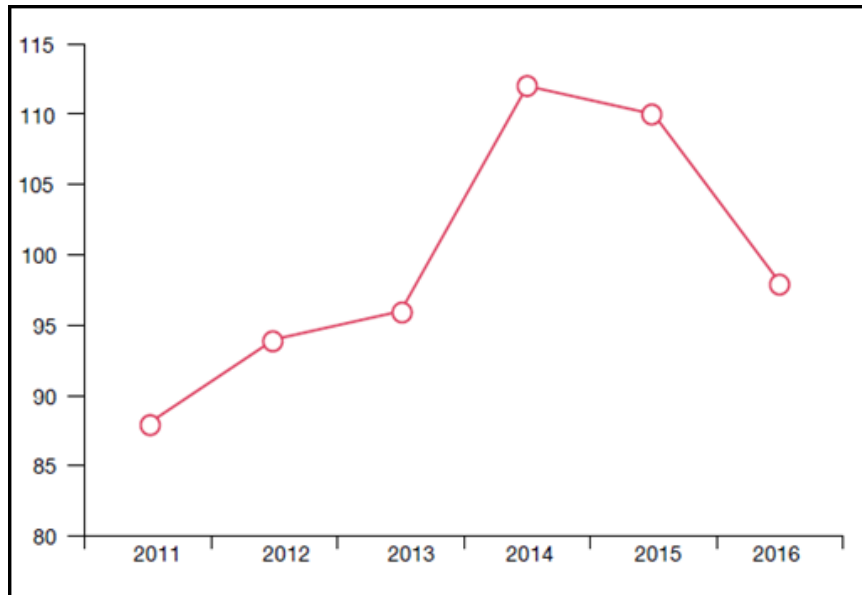


Figure 2.1 : Capital expenditure of Eskom, Transnet and SANRAL for 2016 (PricewaterhouseCoopers 2015:8)

spending by these parastatal companies. These parastatals' have traditionally always been a consistent source of income for the industry but it's spending on projects seems to have declined somewhat over the last few years. Taking into consideration the suppressed South African economy and the decline in public spending, one may conclude that construction companies also cannot expect spectacular growth in spending from these income sources (PricewaterhouseCoopers 2015:7).

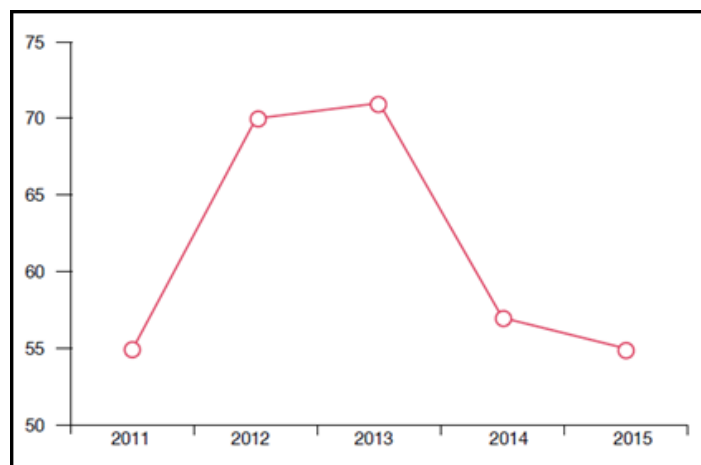


Figure 2.2: Capital expenditure for mining sector (Price Waterhouse

The other contributor to the construction industry business activity is the private sector. The private sectors main contributor being the mining industry. The mining industry has seen its lowest production and profit margins in many years. This is mainly due to labour unrest and the falling price of commodities such as steel and gold (Price waterhouseCoopers 2015:9).

Figure 2.2 (see page 8) shows the sharp decline in capital expenditure in the mining industry. This sharp decline will most possibly have a profound impact on the construction industry and in more particular the large corporations. It could therefore be argued that if this trend is continued the construction industry could remain under pressure for the foreseeable future.

2.2.1 Heavy construction industry value

Table 2.1 exhibits the historical total industry value of the construction industry for South Africa for the period 2011 to 2015. Although the global and South African economy was under pressure the compound annual growth rate of the construction industry in the period 2011–2015 was 9.5% (Marketline Industry Profile 2013:8).

Table 2.1: South African heavy construction industry value (Marketline Industry Profile 2013: 8)

Year	Industry value (ZAR Billions)
2011	239.7
2012	257.7
2013	276.1
2014	309.0
2015	345.1

2.2.2 Construction industry segmentation

The heavy construction industry segments is divided into two distinct categories namely non-residential building and civil engineering. Non-residential building has a 22% percentage share with civil engineering having the largest and dominant 78% activity share (Marketline Industry Profile 2013:9)

2.2.3 Industry rivalry and competition

According to Marketline Industry Profile (2013) the rivalry in the South African construction industry was assessed to be overall very strong. In *Figure 2.3* the drivers for rivalry and relative strengths in the South African construction market is displayed.

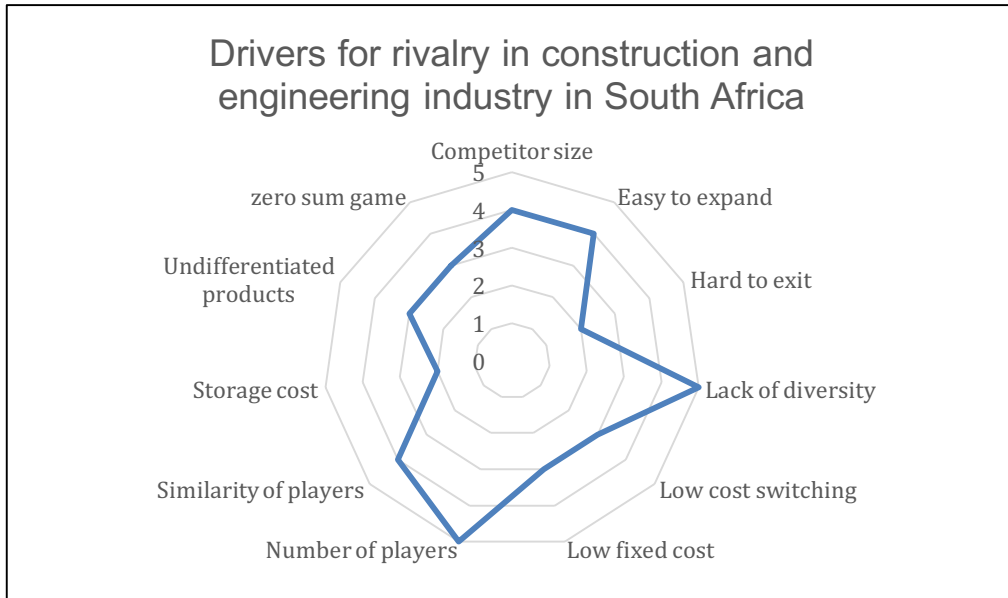


Figure 2.3: Drivers for rivalry in the construction & engineering industry in South Africa (Marketline Industry Profile 2013:17)

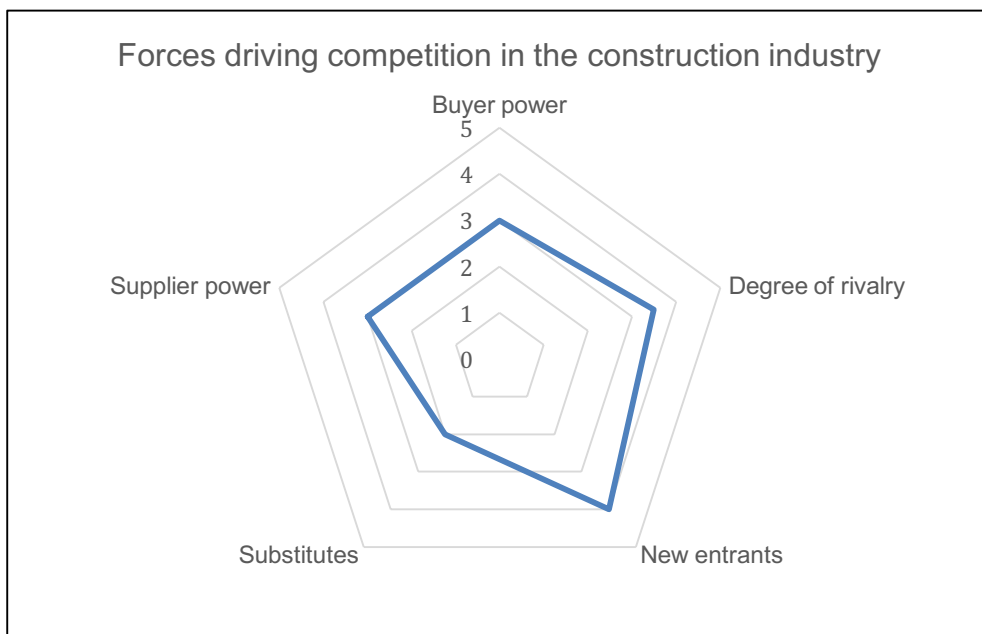


Figure 2.4: Forces driving competition in the construction industry (Marketline Industry Profile 2013:12)

Ffurthermore, industry competition can be illustrated by Porters Five Force's model. *Figure 2.4* (see page 10) presents the strength of the forces driving competition in the construction industry.

The degree of rivalry and new entrants were the strongest forces in this competition five-force model. This is to be expected because of the relatively weak impact of substitution and the number of players in the industry. It would be reasonable to reason if there is low substitution in the construction industry, barriers of entry would be low with capital investment only to be matched with the size of the project (Marketline Industry Profile 2013:15).

The threats of new entrants entering the market has a significant impact on current and established companies. *Figure 2.5* exhibits the factors that play a role for new entrant into the market. The level of regulation is usually highly complex and serves as a significant entry barrier for new entrants. In contrast to this a new entrant does not necessarily require large amount of capital to enter the industry as small sub-contractors are used for their specific expertise and projects they undertake (Marketline Industry Profile, 2013:15).

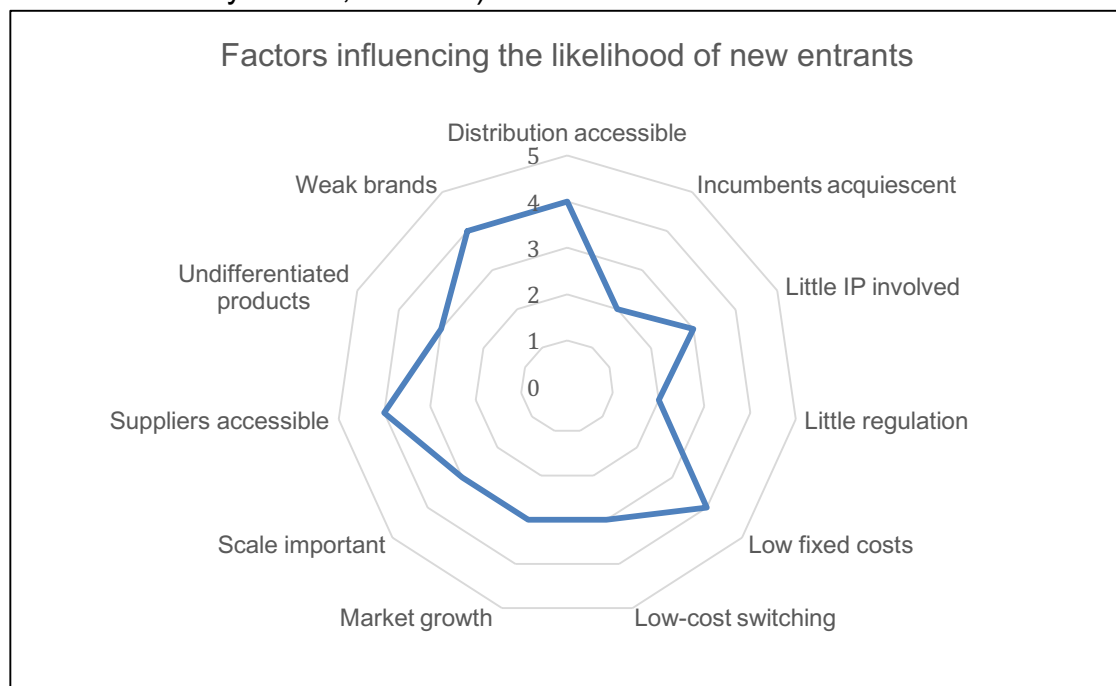


Figure 2.5: Factors influencing the likelihood of new entrants (Marketline Industry Profile 2013:15)

It is noteworthy to mention that large companies that have diversified operations, have a competitive advantage over some of their competitors. Diversification enables these companies not to be bound to one sector of the construction market. Due to this diversification, it has alleviated the rivalry somewhat in a down turning market (Marketline Industry Profile 2013:17).

In conclusion, considering the lack of diversity in the industry the relative lack of entry barriers and the number of competitors currently operating and new competitors entering, the South African construction market is an extremely competitive space for companies to operate in.

2.3 Share valuation theory

Share valuation theory deals with assessing a desired company's value and subsequently estimate whether the current stock-trading price is higher or lower than the underlying value. It is important to note that historical movements in share prices are value-relevant to investors it does not necessarily give indication of actual performance of the company (Balatbat et al. 2010:924). The distinction between valuation and evaluation (performance) needs to be considered. For the purposes of this research the emphasis will be on valuation of construction companies not necessarily performance measurement.

In this section an overview of share valuation theory will be given since it is considered significant in developing a share selection framework. Firstly, an overview will be presented of general share valuation characteristics, share valuation in the South African context and finally share valuation in the construction industry.

Secondly financial multiples that could be significant for framework development will be presented and discussed. Lastly asset pricing theory and general portfolio theory will be discussed and presented.

2.3.1 Share valuation overview

Common stock valuation models that evaluate a company and its performance can be divided into three distinct categories (Demirakos, Strong & Walker 2004:224). These approaches are namely single period comparative models, hybrid valuation models and multi-period valuation models. Below follows a breakdown of each of these approaches.

Single period comparison valuations are the following:

- Earnings multiples
 - Price earnings ratio
 - Enterprise value to EBITDA ratio
 - Enterprise value to EBIT ratio
- Sales Multiples
 - Enterprise value to sales
 - Price to sales valuation
- Price to Book/Assets valuation
- Price to cash flow valuation

Hybrid valuations are the following:

- Economic value added
- Accounting rate of return
 - Return on invested capital (ROI)
 - Return on common equity (ROE)

Multi period valuation is as follows:

- Free cash flow approach
- Dividend discount valuation

Share valuation can also be carried out by comparing the required rate of return as determined by the Capital asset pricing model with a “benchmark” expected and/or

realised rate of return. The latter specifically to establish if an asset or share is under or overvalued.

2.3.1.1 Share valuation in South African context

Preferred valuation approaches and methods differ from sector to sector and region to region. In a valuation methodology survey PricewaterhouseCoopers (2015:38) attempted to establish what valuation methods are most commonly used by industry professionals. The primary preferred valuation approach that the PricewaterhouseCoopers survey identified was the discounted cash flow approach categorized as the income approach. The second most commonly preferred approach identified was the market approach, using financial multiples. The results indicated that 69% of the respondents preferred to use the income approach as primary valuation method. Financial multiples were the primary choice for valuation 29% of the time. Finally, the survey found that although the income approach was the preferred method of valuation it was seldom that practitioners used only one approach for valuation (PricewaterhouseCoopers 2015:39).

When considering the financial multiples commonly preferred by industry professionals, price to earnings ratio and enterprise value to EBITDA were favoured. The results from the survey can be seen in *Figure 2.6*.

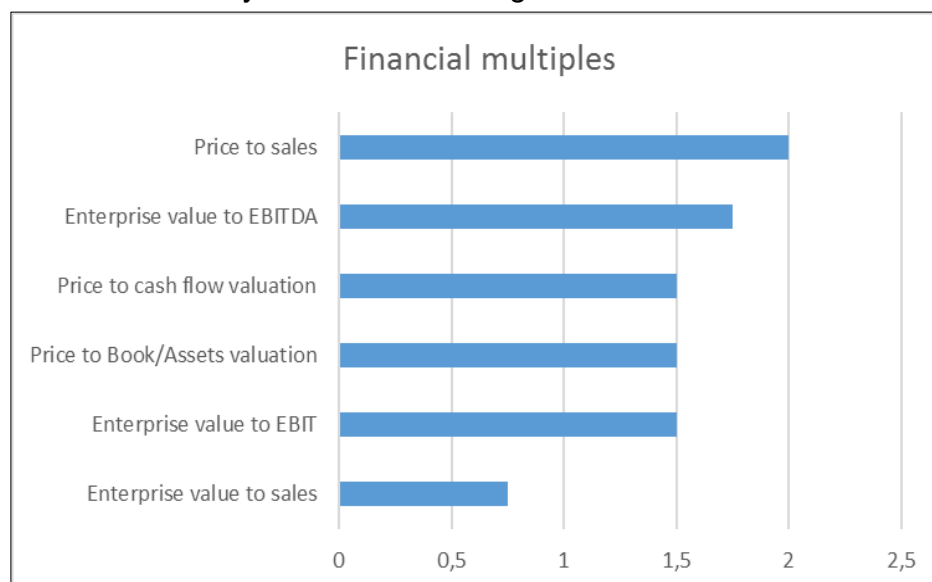


Figure 2.6: industry preferred financial multiples (PricewaterhouseCoopers 2015:69)

The research done by Nel (2009:111) showed that enterprise value to EBIT ratio was the most commonly used financial multiple in the South African construction and material industry and was preferred to the traditional price to earnings ratio.

Nel (2009:115) concluded in his research that different financial multiples should be used when performing valuations of companies and multiples should be chosen based on their individual ability to accurately predict future performance. The financial multiples most commonly preferred by investors according to Nell's (2009:111) research are the following:

- Price earnings ratio.
- Enterprise value to EBITDA ratio.
- Enterprise value to EBIT ratio.
- Enterprise value to sales.
- Price to Book/Assets valuation.
- Price to profit before tax.

2.3.1.2 Share valuation in the construction industry

When considering the financial multiples used in the valuation of the construction industry the research done by Balatbat, Carmichael and Lin (2010:922) will be considered. Although their primary research was a comparative research study on the performance of construction companies in the Australian market, it could be reasonable to assume that the same multiples applied by Balatbat et al. could be applied in the valuation of the share price value.

Their research on publicly listed construction companies in Australia used the following financial multiples evaluation of performance:

- Market performance.
 - Annual share returns.
 - Change in market value over the 10-year period.
- Equity valuation and performance ratios.

- Earnings per share (EPS).
- Dividend per share (DPS).
- Dividend yield.
- Price to earnings ratio.
- Enterprise value multiples.
- Market capitalization to trading revenue ratio.
- Price to book (P/B) value.
- Profitability ratios.
 - Return on equity (ROE).
 - Return on assets (ROA).
 - Return on invested capital (ROIC).
 - Earnings before interest and taxes (EBIT).
 - Earnings before interest, taxes, depreciation and amortization (EBITDA) margin.

The results from the study found that construction companies in Australia did not perform well comparatively to other blue chip companies when the analysis was based purely on earnings per share or dividends per share. They did however conclude that construction companies had high return on assets and they exhibited resilience with regards to profitability of a 10-year period irrespective of economic conditions (Balatbat et al. 2010:927).

2.3.1.3 Share valuation overview conclusion

When considering the financial multiples proposed by Demirakos et al. (2004), Balatbat et al. (2010), PricewaterhouseCoopers (2015) and Nel (2009) it can be concluded that there are similarities and parallels between the preferred and used financial multiples applied in the valuation of companies, local and abroad. The findings and recommendation from the different authors will thus be considered in the presentation of financial multiples and share valuation theory.

2.3.2 Fundamental share valuation

The value of any asset equals the present value of all its future benefits. The investor thus needs to gather information and knowledge of current and historical trends to establish the possible future benefits and returns of the assets (Megginson et al. 2009:112). As the perceived risk of the asset increases, so must the expected benefit (return) increase proportionately. The valuation process for any asset should thus include the determination of an appropriate balance between risk and return (Megginson et al. 2009:112)

Because asset information and knowledge is based on historical data there is an element of risk that is associated with predicting future benefits. Although the expected economic situation can be forecasted and the impact on assets estimated it remains a prediction that is extrapolated from historical data and information.

In *Equation 1* the fundamental equation for asset valuation is presented. This equation uses a discounted rate (asset's risk) and cash flows (CF_n) to produce the present value (P_0) of the asset given a period (n) (Megginson et al., 2009:113).

$$P_0 = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_n}{(1+r)^n} \quad \dots \text{Equation 1}$$

P_0 = Present value

CF = Cash flow

n = period

r = return

2.3.3 Single period comparative models

The single period comparative models use financial data in a single period. This could typically be a financial year or financial year quarters. These financial multiples are thus specific to the timeframe that the data originates from. These financial multiples

can be compared from one period to another and then to compare companies with each other.

2.3.3.1 Earnings Multiples

Earnings multiples remain the sum of the most commonly used measures of relative value (PricewaterhouseCoopers 2015). In this section a detailed examination of the price earnings ratio and enterprise value ratios will be explored.

2.3.3.1.1 Price-earnings ratio

The price to earnings ratio primarily illustrates what investors are willing to pay of the expected earnings of a share produced. The price to earnings ratio is not currency bound, although the denominator and numerator of the share needs to be of the same currency.

As stated by the study by Werner and Thaler's (1985:804) on whether stock markets overreact, they concluded that high price to earnings ratio shares are generally overvalued and shares with a low price-earnings value are undervalued. They also concluded that there is a positive relation between the price-earnings ratio and a shares dividend yield. When considering the conclusions from Werner and Thaler's it must be noted that dividend yield must not be confused with earnings yield which is in actual fact the inverse of the price to earnings ratio. Dividend yield stems from dividing the annual dividend per share payout by the price per share.

To calculate the price-earnings ratio of a company *Equation 2* is applied. The numerator of the price-earnings ratio is the current market share price, with denominator (earnings per share) calculated with the use of *Equation 3*. Earnings per share, *Equation 3*, is calculated by dividing profit or loss attributable to ordinary equity holders by the weighted average number of ordinary shares outstanding during the period (Deloitte Global Services Limited 2016)

$$\frac{P}{E} = \frac{\text{Market share price}}{\text{Earnings per share}} \dots \text{Equation 2}$$

Earnings per Share

$$= \frac{\text{Net income} - \text{Dividends on preferred shares}}{\text{Average outstanding shares}} \quad \dots \text{Equation 3}$$

The price-earnings ratio cannot be used in isolation. For example, if a company's earnings are close to zero or has made a loss, the price-earnings ratio does not provide a true reflection on the current state of the company in question. Analyst use alternative valuation methods when earnings are close to zero or negative, these are normally the cash flow per share and book value of shares (Megginson et al. 2009:144). Furthermore, the true underlying value or price of the share is not necessarily in line with the market price. Because of this the actual or potential rate of return calculated for the price to earnings ratio can be negatively influenced.

When considering the price-earnings ratio of Australian construction companies, it was found that their price-earnings ratio was more stable and not overvalued when compared to other companies listed on the Australian Stock Exchange (Balatbat et al. 2010:924). The reasoning for this favourable characteristic was mainly attributed to low market capitalisation while still sustaining profits for long period, namely 10 years. If this trend is similar in a South African context, then the price-earnings ratio could also be significant in a share selection framework.

2.3.3.1.2 Enterprise value

Enterprise value is a historical view of a company's worth as a whole. Although enterprise value is backward looking and is, according to Liu, Nissan and Thomas (2002:163), not as optimal as forward looking multiples in predicting the performance of equity shares, it is still relevant in that the information is absolute.

Enterprise value is calculated by using the current market capitalization of the company's current share price times the number of outstanding shares in the market. Furthermore, it takes into consideration the companies interest bearing debt and investments. In *Equation 4* it is shown how enterprise value is calculated.

$$EV = \text{market value of common stock} + \\ \text{market value of preferred equity} + \text{market value of debt} + \\ \text{minority interest} - \text{cash and investments} \dots \text{Equation 4}$$

2.3.3.1.3 Enterprise value to EBITDA ratio

EBITDA indicates the ability of a company to service debt and is a good multiple to evaluate profitability. EBITDA is also typically applied to projections of current year or the following financial year forecasts (Jensen investment management 2013). The main disadvantage of using price EBITDA ratio is that it does not consider cash and cash flow required to fund working capital and replace old equipment (IAC Publishing 2016). In Equation 5 it is shown how enterprise value to EBITDA is calculated.

$$\frac{EV}{EBITDA} = \frac{\text{Enterprise value}}{\text{Revenue} - \text{Expenses (excluding tax, interest, depreciation, amortization)}}$$

... Equation 5

Enterprise value divided by Earnings before Interest, Taxes, Depreciation and Amortization is currently the second most used valuation indicator in South African (Nel 2009:110). The research done Balatbat et al. (2010:925) suggested that much of construction companies on the Australian Stock Exchange had higher enterprise values relative to the earnings they can produce. This indicated that in general these construction companies were more stable and that the net income was in line with the enterprise value. If the same trend is followed in a South African context then enterprise value to EBITDA ratio could be, as in the case of price-earnings ratio, be a significant indicator of share price performance.

2.3.3.1.4 Enterprise value to EBIT ratio

Enterprise value to EBIT ratio is an important indicator to establish a company's potential earnings power when compared to competitors. Enterprise value to EBIT

ratio is a much more accurate valuation measure than the price-earnings ratio. This is because it considers the elements of the balance sheet and income statement that provides a more accurate valuation of a company's earnings potential (IAC Publishing 2016). Enterprise value to EBIT ratio is given by *Equation 6*.

$$\frac{EV}{EBIT} = \frac{\text{Enterprise value}}{\text{Revenue} - \text{Expenses(excluding tax, interest)}} \dots \text{Equation 6}$$

As stated by Nel (2009:111), enterprise value to EBIT ratio was the best performing indicative multiple in the South African construction industry. Along with enterprise value to EBITDA, enterprise value to EBIT could be a significant indicative multiple for a possible framework development.

2.3.3.2 Price to Book/Assets valuation

Book value is also known as net book value or net asset value (Megginson et al. 2009:143). Book value reflects the historical cost of a company's depreciation adjusted assets net of its liabilities, divided by the number of outstanding shares (*Equation 7*).

$$\text{Book value} = \frac{\text{Assets (depreciation adjusted)} - \text{Liabilities}}{\text{Number of outstanding shares}} \dots \text{Equation 7}$$

Book value is normally most prevalent in valuation when a company is in financial distress because it is backwards looking. Generally, the book value of a company is less than the market value of the shares (Megginson et al. 2009:143). In evaluating the book value of a company, it is important to establish if a company's earnings are in line with their net invested assets (Ohlson 1995:681). In addition to this, companies must apply section 16 of the International accounting standards. Under section 16, revaluation of company assets should be carried out regularly so that the carried amount of the asset, on the balance sheet, does not differ from assets fair value. Factors such as depreciation, initial measurement and recognition models are applied to all assets (Deloitte Global Services Limited 2016).

Price to book value is a ratio used to compare a shares market value to its book value (*Equation 8*). This ratio provides indication if assets of the company is valued by investors. If the ratio is low, when compared to competition and or previous years then it might indicate that the share is over or undervalued. Furthermore, it can be argued that if the ratio is under one the perception could be that the investment is unfavourable but the possibility exists that it is undervalued and could be a reasonable investment.

$$\text{Price to Book value} = \frac{\text{Current share price}}{\text{Book value}} \dots \text{Equation 8}$$

2.3.3.3 Price to cash flow valuation

Price to cash flow is calculated by dividing the 30 to 60-day current share price of a company by the free cash flow of the company for the last 12 months. Price to cash flow ratio is not as commonly used as a valuation multiple, but it does however indicate if a company is trading at a low market share price when compared to its cash flow (IAC Publishing 2016). *Equation 9* formulates the price to cash flow ratio.

$$\text{Price to Cash Flow} = \frac{\text{Current share price}}{\text{12 month Cash flow}} \dots \text{Equation 9}$$

2.3.3.4 Sales multiples

Sales multiples are single period valuations that calculate different ratios considering sales. The period that is applied when considering sales in financial multiples are normally the sales realised for the last 12 months.

2.3.3.4.1 Enterprise value to sales

Enterprise value to sales ratio, *Equation 10*, indicated how much capital is needed to purchase the company's current sales. Furthermore, because enterprise value takes into consideration the interest-bearing debt of the company it is more accurate than only using market capitalization (IAC Publishing 2016).

$$\frac{EV}{\text{Sales}} = \frac{\text{Enterprise value}}{\text{Annual sales}} \dots \text{Equation 10}$$

As per the research findings of Kim and Ritter (1999:436), enterprise value to sales ratio has a reasonable ability to forecast the performance of established and new companies. Considering that much of the potential research population are relatively mature and established, this multiple could not be significant in framework.

2.3.3.4.2 Price to sales valuation

Price to sales is calculated by dividing the current share price by the sales per share price. An alternative equation would be market capitalization divided by sales. This valuation is important because it directly effects all stakeholders i.e. shareholders, creditors and the holding company (Fernandez 2001:3). *Equation 11* formulates the price to sales valuation.

$$\text{Price to Sales} = \frac{\text{Current share price}}{\text{sales per share price}} \dots \text{Equation 11}$$

2.3.4 Hybrid valuation models

Hybrid valuation models are predominately applied when different equity classes need to be compared to each other. This assumes a future payoff when liquidation becomes a factor (Demirakos et al. 2004:223).

2.3.4.1 Economic value added

Economic value added (EVA) is a measure of a company's financial performance. It is based on the residual wealth calculated by deducting cost of capital from its operating profit after tax (Fernandez 2001:4). *Equation 12* illustrates how economic value added is calculated.

$$\begin{aligned} \text{EVA} = & \text{Net Operating Profit After Taxes (NOPAT)} \\ & - (\text{Capital} * \text{Cost of Capital}) \dots \text{Equation 12} \end{aligned}$$

There are a number of advantages for using the economic value add (EVA) valuation instead of traditional accounting profit ratios like return on equity (ROE) and return on assets (ROA) (Bursaitiene 2009:709). An example of the advantages of using

economic value add would be when two companies with the same return on equity is compared. If two companies are to be considered equally successful and economic value add method is applied, the perceived success of the companies might be very different. Because the two firms, in question, have different cost of capital structures the company's economic profit and residual income will differ significantly (Burksaitiene , 2009:709).

Another advantage of using economic value add is that it can be applied to individual investments or to an entire company. Its primary use is in financial planning that focuses on the company in its entirety (Megginson et al. 2009:697).

It is unknown if economic value add has a positive correlation with share performance, although it has been studied in financial literature extensively (Megginson et al. 2009:697). The biggest drawback when using economic value add is the complexity of calculating it. This is predominately because of accrual factors in the net operating profit after tax and other investments. Theoretically the positive correlation with a share price would be valid but because of the implementation difficulties it is not commonly used (Megginson et al. 2009:697).

2.3.4.2 Accounting rate on return

The accounting ratios used for evaluation of performance are return on investment and return on common equity. These ratios are also commonly referred to as profitability ratios. Their biggest influence is generally on a company's market share price. This occurs when these ratios change or fluctuate without warning signs or prior indication (Megginson et al. 2009:45). Because of this influence, these accounting ratios might be indicative of share price fluctuations, notwithstanding that they are performance measures and not valuation instruments.

2.3.4.2.1 Return on invested capital (ROIC)

Return on invested capital is also known as return on total assets. The evaluation of performance and measures how efficiently a company uses its assets to generate returns for common shareholders (*Equation 13*) (Megginson et al. 2009:46).

$$\text{Return on invested capital} = \frac{\text{Net income} - \text{Dividends}}{\text{Total capital}} \dots \text{Equation 13}$$

Heavy construction companies generally have large capital investments. These investments would typically be used for plant and machinery. Because plant and machinery could be used for more than one project and has multiyear usage the return on invested capital should be above average. This is confirmed by Balatbat et al. (2010:926) research. In their research, Australian construction companies had average returns on invested capital of 10% higher than then companies of similar size.

2.3.4.2.2 Return on common equity (ROE)

Return on common equity is closely related to the profitability measure. Return on common equity provides an indication on the return that the company produced with the invested capital from shareholders. *Equation 14* presents the equation for return on common equity (Megginson et al. 2009:46).

Return on common equity

$$= \frac{\text{Earnings available for common shareholders}}{\text{Common stock equity}} \dots \text{Equation 14}$$

An alternative method of calculating return on common equity is to use the DuPont system of analysis. This approach uses both income statement and balance sheet information to calculate the desired ratios. For the DuPont system, the return on total assets is calculated by using *Equation 15*.

Return on assets

$$= \frac{\text{Earnings available for common shareholders}}{\text{Total assest}} \\ * \frac{\text{Sales}}{\text{Total assets}} \dots \text{Eqaution 15}$$

Subsequently return on common equity can be calculated by multiplying asset-to-equity ratio. The product of the two ratios is thus equal to the company's return on equity (*Equation 16*) (Megginson et al. 2009:47).

$$ROE = ROA * \frac{Assets}{Equity} \dots Equation 16$$

According to Balatbat et al. (2010:925) research, when comparing the average return on equity of the construction companies against companies in the same trading market, the result of construction companies was encouraging. The indication was that construction company's return on common equity was only slightly lower than that of the more well know "blue chip" counterparts. Furthermore, a high return on equity ratio would indicate that construction companies can be sustainably profitable, in a South African context, and thus potentially increasing the value of the share.

2.3.5 Multi-period valuation model

Multi-period valuations calculate the present value of a firm's cash flows over multiple future periods. The multi-period valuation model that will be presented is the free cash flow model and the dividend discount model.

The dividend discount model is a multi-period valuation in that there is a discounted rate applied to calculate the present value of the share and that the growth estimates of the dividend pay-out is projected over multiple periods.

2.3.5.1 Free cash flow approach

Free cash flow is an alternative method of valuating a company collectively and not just using the value of the market share price. The benefit of this is that it assumes that the free cash that the company has at its disposal can be used to for distribution to its shareholders namely, bond holders, preferred stock holders and common stock holder (Megginson et al. 2009:140).

Calculating free cash flow *Equation 17* is applied (Megginson et al. 2009:140).

$$FCF = OCF - \Delta FA - (\Delta CA - \Delta AP - \Delta Accruals) \dots Equation 17$$

FCF = Free Cash Flow

OCF = Operating Cash Flow

FA = Fixed Assets

CA = Current Assets

AP = Accounts Payable

Because of different requirements with regards to a firm's securities there is a need for a single discount rate that can be applied to the free cash flow valuation. This discount rate is known as weighted average cost of capital (WACC).

Weighted average cost of capital is the weighted average cost of a company's financing requirements (Megginson et al. 2009:141). The weighting is determined by the different sources of capital. These sources of capital are typically short term creditors, long-term creditors, interest bearing debt, preferred shareholders, and common shareholders. Stated differently WACC is the average return expected by all investors, with these investors being the source of a company's capital (Pagano & Stout 2004:13)

The ultimate purpose of free cash flow calculation is to determine what the company's common shares are worth. By using *Equation 18* the fair value of a company's common share value can be calculated (Megginson et al. 2009:142).

$$V_s = V_F - V_D - V_P \dots \text{Equation 18}$$

V_s = Value of common shares

V_F = Total company value (Discounted FCF)

V_D = Value of Debt

V_P = Value of preferred shares

The share value is then calculated by dividing the value of common shares by the number of outstanding shares of the company (*Equation 19*).

$$\text{Per Share value} = \frac{V_s}{\text{Number of outstanding shares}} \dots \text{Equation 19}$$

2.3.5.2 Dividend discount valuation

The main advantage of the dividend discount valuation is its simplicity (Marx et al. 2003:122). In *Equation 19* the present value of the share price is equal to the dividend pay-out streams divided by the required return (discount rate) (Megginson et al. 2009:132).

$$P_0 = \frac{D_1}{(1+r)^1} + \dots + \frac{D_n}{(1+r)^n} \dots \text{Equation 20}$$

D_n = Dividend in required year n

r = required return

P_0 = Current share value

P_1 = Share selling price

There are some assumptions when calculating the share price using the dividend discount model. The main assumption is the behaviour of the projected growth rate in the future. The growth assumptions are zero growth, constant growth and variable growth.

2.3.5.2.1 Growth estimation

Growth estimation is difficult to determine with very little evidence indicating that a company's future growth rates can be based on historical growth trends (Chan, Karceski & Lakonishok 2003:683). The simplest growth rate estimation can be calculated by using *Equation 21*. By using the retention rate (RR) and return on equity (ROE) a growth rate can be estimated. The assumption is that the company will use its retained earnings to expand its operations and subsequently grow (Megginson et al. 2009:137).

$$g = RR * ROE \text{ ... Equation 21}$$

g = growth rate

RR = Retention rate

ROE = Return on equity

2.3.5.2.2 Zero growth

The application of zero growth in the dividend discount model assumes that the dividends paid out stays constant.

$$D_1 = D_2 = \dots = D \text{ ... Equation 21}$$

Equation 19 can be simplified to Equation 22. This produces a valuation of the share with the application of zero growth.

$$P_0 = \frac{D}{r} \text{ ... Equation 22}$$

2.3.5.2.3 Constant growth

Equation 23 provides the dividend discount models assumption of constant growth.

$$P_0 = \frac{D_1}{r - g} \text{ ... Equation 23}$$

P_0 = Current share price

g = growth rate

r = required return

D_1 = Dividend year one

The disadvantage of the dividend discount model, using constant growth, is that a company can only grow faster than the market for short periods of time. If the company

had to grow indefinitely faster than the economy, it would theoretically become the market (Marx et al. 2003:124).

Another limitation of the dividend discount model is that the cost equity capital cannot exceed the growth of the dividend growth rate. This limitation on the dividend discount model, with constant growth, lends itself to be used for mature companies and for assets that have proven dividend pay-out policies (Marx et al. 2003:124). As stated earlier the population in this research could be considered as mature. Considering the above mentioned the dividend pay-out could be significant in the selection framework.

2.3.5.2.4 Variable growth

Variable growth rate is applied when there is a change in the projected growth rate of the company. This will typically be applied when companies experience abnormal fast growth followed by a period of more sustainable constant growth (Megginson et al. 2009:135). *Equation 24* presents the equation used when variable growth is applied. The equation is split in two parts namely the initial growth period and then the end of the initial growth period when constant growth patterns continue.

$$P_0 = \frac{D_0(1 + g_1)^1}{(1 + r)^1} + \frac{D_0(1 + g_1)^1}{(1 + r)^1} + \dots + \frac{D_0(1 + g_1)^1}{(1 + r)^1} + \left(\frac{1}{(1 + r)^N} * \frac{D_{n+1}}{r - g_2} \right) \dots \text{Equation 24}$$

2.3.5.2.5 Non dividend pay-out situation

The dividend discount valuation cannot be applied to valuate a company's share price performance if the company in question has a non-dividend pay-out dividend policy. This can be due to a variety of reasons but the most common reason is that companies chose to reinvest free cash flow back into the company's operations instead of using external financing. Another prominent reason for non-dividend pay-out is a share buyback by a company (Megginson et al. 2009:138).

Companies cannot sustain a non-dividend pay-out situation indefinitely. Investors ultimately seek some form of return on their investments (Megginson et al. 2009:138). In the South African context dividend pay-out is heavily taxed. The current rate of dividends tax is 15% (SARS 2016). Investors are thus more interested in capital growth for long-term wealth creation rather than short-term dividend pay-out. It is thus reasonable to assume that if dividend tax is high and investors are more interested in capital gains so that companies would not pay-out dividends but rather use it for reinvestment into the company.

2.3.6 Asset pricing theory

2.3.6.1 Beta

Beta (β) is defined as the degree of the volatility of an asset or a portfolio in relation to the market. The comparison of beta to the market provides an indication of the systemic risk of the asset (IAC Publishing 2016),

Beta is estimated by using linear regression statistics. Regression analysis identifies a best fitted line through a series of data points by minimizing the sum of the square errors between the data point and the line. The regression output line is the beta of the share/asset. The output line of the regression indicates how the share price of the asset changes in comparison to the market (Megginson et al. 2009:210).

In addition to the beta value there is other information that is also presented by the regression that is useful. R^2 provides an indication of how the variability of one variable, the share price in this case, can be explained by the movement of another variable. Thus, R^2 indicates how much variability of a share can be explained by the variability of the market (Megginson et al. 2009:210).

The problem exists with estimating a beta is that the data used for the regression is subjective and that if there are too little data points the results will be sensitive to outliers. In constructing a regression model for financial purposes, it could necessitate using large amount historical data (Megginson et al. 2009:212).

2.3.6.2 Capital asset pricing model

According to Connor (1984:13) the capital asset pricing model (CAPM) provides an intuitive understanding of portfolio choices and asset pricing in large, diverse economies. The capital asset pricing model is widely used because of its simple implementation and is also the main factor for its wide spread use (Megginson et al. 2009: 208).

The basic principal of the model is that it generates a specific prediction about the risk-return characteristics of individual assets and how these assets co-varies with the market it operates in.

The reasoning behind the capital asset pricing model is as follows (Megginson et al. 2009:208):

1. Investor are risk averse and expect high returns for high risk.
2. Investor's main concern lies with systemic risk because of portfolio diversity.
3. Unsystematic risk in the market is not recognised because diversity can be changed.
4. A portfolio's main objective is to be efficient and maximise return for a level of risk.
5. In an equilibrium market the optimal portfolio would be the market. Investors needs are not homogeneous thus their composition of their optimal portfolios are not the same
6. With the use of the capital asset pricing model the investor is concerned with the systemic risk of an asset and how it co-varies with the rest of the market. The specific beta for the asset provides a quantitative measure of the risk. The CAPM presents a linear relationship between the return and risk of the asset.

Capital asset pricing model is classified as a single factor model because in the equation it is only the beta that changes for each security. The equilibrium expected return of an asset must be plotted on the securities market line. The expected return of an asset is calculated by applying *Equation 25*.

$$E(R_i) = R_f + \beta_i(R_m - R_f) \dots \text{Equation 25}$$

$E(R_i)$ = Expected return of asset

R_f = Risk free return

R_m = Market return

β_i = Beta of asset

In *Figure 2.7* a CAPM graph is presented with the individual assets or company shares being plotted above and under the securities market line. When the individual asset is plotted on the securities market line it is in equilibrium. When using *Equation 25* to calculate the placement of an individual asset it will be either above or under the securities market line. If an asset is above the securities market line it is undervalued. The inverse exists for an overvalued asset or share.

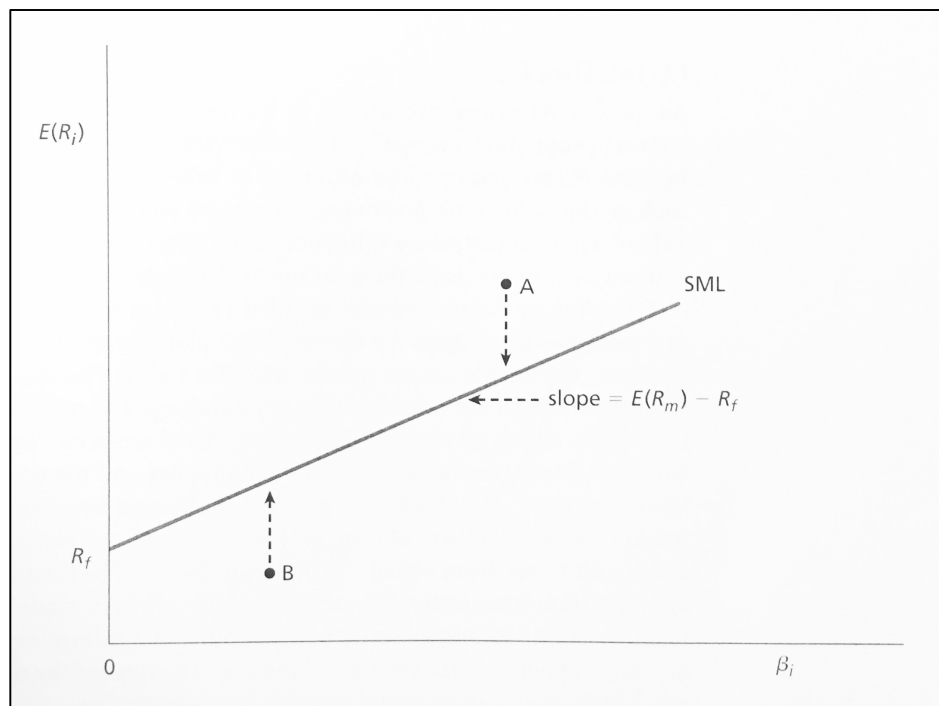


Figure 2.7: Security market line (Megginson et al. 2009:209)

2.4 Efficient portfolios theory

Markowitz (1952:77) proposed the following observations regarding portfolio selection. There are two stages of portfolio selection. The first stage deals with the observation and ends with the belief of possible future benefit of the desired security. The second stage starts with the belief and ends with the actual portfolio selection.

When selecting a portfolio, the investor must consider the expected return as desirable and variance (risk) as undesirable. This statement, although inherently logical, is important because it poses the hypothesis, regarding assets selection, to the investor. The relationship between return and risk is thus the critical theme in asset portfolio creation and maintenance (Markowitz 1952: 77)

An investor holding a portfolio consisting of a one-company asset could improve the performance of the portfolio by adding additional shares to the portfolio. By adding additional shares to the portfolio, the expected return can be improved and the standard deviation (risk) of the portfolio will be decreased.

As researched by Neu-Ner and Firer (1997), when investing on the Johannesburg Stock Exchange a well-diversified portfolio must include at least 30 shares. They also demonstrated that significant benefits of portfolio diversification could be achieved by holding a smaller portfolio. Their results indicated that a portfolio of 10 shares would reduce the associated risk with a single share by 60%. By increasing the number of shares in the portfolio from 10 to 30 decreased the risk by additional 12%.

2.4.1 Portfolio returns

When assets are combined in a portfolio their individual expected returns would produce a portfolio expected return. This will depend on the weighting that will be assigned to each individual asset.

Equation 26 demonstrates the expected return of a multi asset portfolio. The equation is linear with the expected return of the portfolio increasing or decreasing as the invested proportions of the assets is altered (Megginson et al. 2009:172).

$$E(R_p) = w_1E(R_1) + w_2E(R_2) + \dots + w_NE(R_N) \dots \text{Equation 26}$$

2.4.2 Portfolio variance

The variance of an asset is the indication of the risk of the individual asset. The same applies to the variance when assets are grouped together in a portfolio. The goal of portfolio creation is to minimise the risk. The risk of a portfolio is reduced when the fluctuations of the assets offset each other. This inverse fluctuation is critical when developing a portfolio. To determine this the covariance of assets provides a statistical measure the co-movement. *Equation 27* demonstrates how the co-variance would be calculated. As in the case of valuation models co-variance is based on historical data because the probability distributions of the assets are unknown (Megginson et al. 2009:173).

$$Cov(R_1, R_2) = \sigma_{12} = \frac{\sum_{t=1}^N (R_{1t} - R_1) * (R_{2t} - R_2)}{N - 1} \dots \text{Equation 27}$$

The correlation coefficient, *Equation 28*, is a unit free measure to indicate the co-movement of two assets. The output of the correlation coefficient is either 1 or -1. When the correlation coefficient is 1 then the assets are perfectly positively correlated, the inverse applies to -1, this indicated a negative correlation. The closer the coefficient moves to 0 the less correlation the two assets poses (Megginson et al. 2009:174).

$$\text{Correlation coefficient} = \rho_{12} = \frac{\sigma_{12}}{\sigma_1\sigma_2} \dots \text{Equation 28}$$

The portfolio variance can be calculated after the correlation coefficient has been calculated. The portfolio variance is depended of the variance of the assets, the weighting assigned to each one and the covariance's of the assets. *Equation 29* demonstrates the portfolio variance of a 2-asset portfolio (Megginson et al. 2009 :174). Calculating a weighted portfolio with N assets then a variance-covariance matrix is used.

$$\text{Portfolio variance} = \sigma_p^2 = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\rho_{12}\sigma_1\sigma_2 \dots \text{Equation 29}$$

2.4.3 Efficient frontier

Figure 2.8 demonstrates an example of a two-asset portfolio with the graph representing the expected return against the standard deviation of the portfolio. When the weighting of the two assets are varied the expected return and the standard deviation changes proportionally. The minimum variance portfolio point indicates the lowest standard deviation the portfolio can obtain. Beyond this point the standard deviation increases with a lower expected return. This would be considered as an inefficient portfolio. The combination of portfolio weighting depends on the tolerance for risk of the investor (Megginson et al. 2009:196).

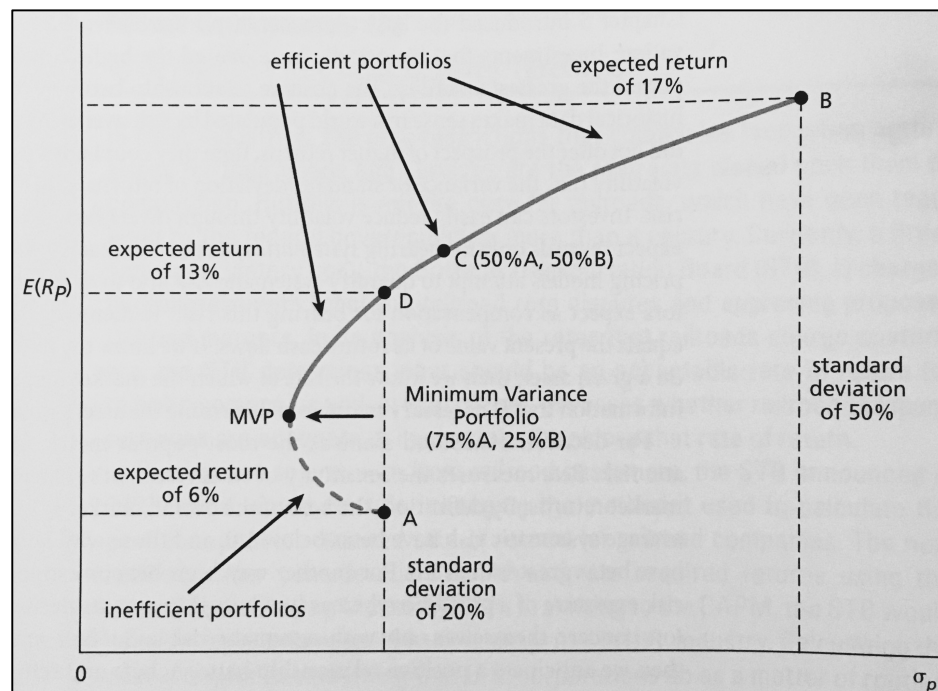


Figure 2.8: Expected return and standard deviation, two asset portfolio (Megginson et al. 2009:196)

Figure 2.9 demonstrates a multi asset efficient frontier. The data points for each numbered portfolio represents a portfolio with different weightings and share combinations. Data point 9 reveals that it is inferior to point 3 and 4 because of the lower expected return and the higher standard deviation. Point 5 and 6 have similar expected return but there is a significant difference in the standard deviation. The question is then if the marginally higher return warrant the increase in risk?

In deciding what combination and weighting to apply in the investment decisions the same risk to return decision criteria is applied to the a multi asset portfolio. The investor's tolerance for risk is thus ultimately the deciding factor (Megginson et al. 2009:200).

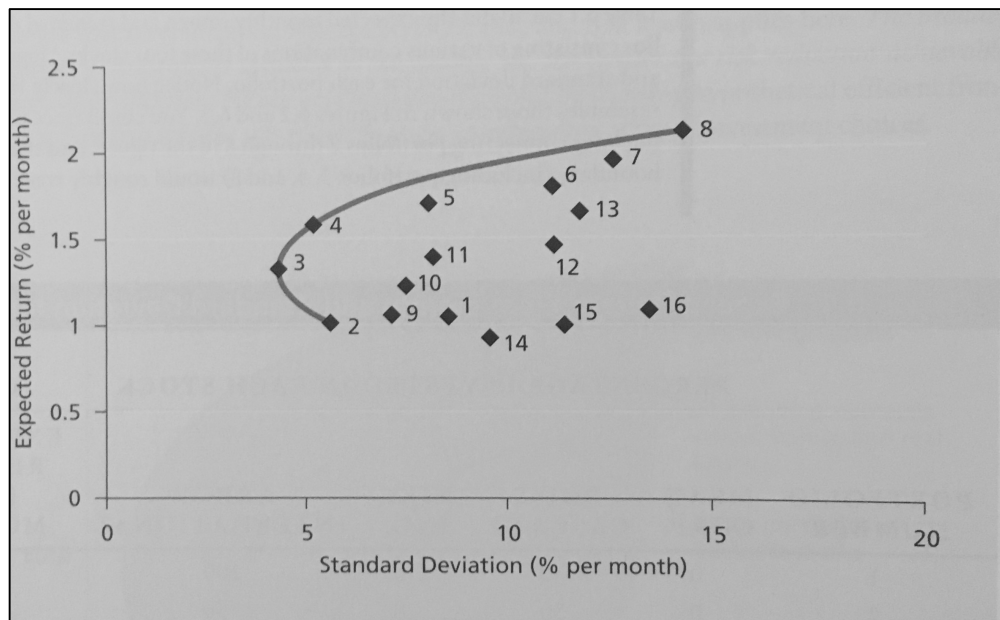


Figure 2.9: Expected return and standard deviation for various portfolios (Megginson et al. 2009:200)

CHAPTER 3: EMPIRICAL STUDY AND RESULTS

3.1 Introduction

In chapter 3 the empirical research that was performed and results gathered will be presented. The following aspects will be discussed in this chapter.

Firstly, the research sample will be presented and briefly discussed. Secondly the research methods and rational will be discussed along with the methods of data gathering and data construction. Lastly the results from the statistical analysis will be presented.

3.2 Research sample

The research population is companies that are listed in the Johannesburg Stock Exchange and whose primary activities are construction. There is a total number of nine companies that are classified in the heavy construction segment of the Johannesburg Stock Exchange.

Because of the relatively small number of companies in the sample there was no future selection criteria set for the research sample other than the segment they operate in and that these companies had to be listed and their listed financial data should be available from 2008 to end of the 2015 financial year. It is noteworthy to mention that because the research sample will encompass the entire population. The sample data is relatively small and statistically not ideal but the fact that the entire population is considered could assist in mitigating the data size limitations.

3.2.1 Company profiles

Here follows a brief description of the companies that partook in the research study. The information gathered was from their respective annual reports and from the INET BFA website.

3.2.1.1 Aveng Limited

Aveng Limited is a South African registered and listed company. Aveng is categorized in the heavy construction sector of the Johannesburg Stock Exchange. Main activities are construction, contract mining and steel processing. Primary subsidiaries are Aveng (Africa) Proprietary Limited and Aveng Australia Holdings Proprietary Limited. Aveng had an annual turnover of R16.9 billion in 2015. Aveng was first listed in 1999 (INET BFA 2016).

3.2.1.2 Basil Read Limited

Basil Read is a construction company with its subsidiary companies being active in the areas of civil engineering, road construction, general building, mixed integrated housing developments, property development, bitumen distribution, opencast mining and project management solutions. The subsidiaries operate throughout Africa and internationally. Basil Read had a turnover of R6.5 billion in 2015. Basil Read was first listed on the JSE in 1987 (INET BFA 2016).

3.2.1.3 Calgro M3 Holdings Limited

Calgro M3 Holding Limited is a South African register company established in 1995. Calgro M3 Holding primary activities are mainly BNG housing, CRU units, GAP and FLISP housing, social housing, open market affordable housing, mid-to-high income units and retirement & lifestyle estates. Calgro M3 Holdings had a turnover of R932 million in 2015. Calgro M3 was first listed in 2007 (INET BFA 2016).

3.2.1.4 Esorfranki Limited

Esorfranki Limited (Escor) is a South African register company established in 1946. Escor primary activities are in housing developments, general infrastructure, pipelines, pipe servicing and sanitation. Escor had a turnover of R1.44 billion in 2015. Escor was first listed in 2006 on the JSE (INET BFA 2016).

3.2.1.5 Group Five Limited

Group Five Limited is a South African register company established in 1974 and was the amalgamation of 5 companies. Group Five was listed on the JSE in the same year. Group Fives primary activities are mining, industrial, power, oil and gas, water and real estate. Group Five had a turnover of R13.9 billion in 2015 (INET BFA 2016).

3.2.1.6 Murray and Roberts Holding Limited

Murray and Roberts Holding Limited is a South African register company established in 1902 and was first listed on the JSE in 1960. Murray and Roberts primary activities are in the oil and gas, underground mining, power and water as well as the civil infrastructure and building markets. Murray and Roberts had a turnover of R30.6 billion in 2015 (INET BFA 2016).

3.2.1.7 Raubex Group Limited

Raubex Group Limited is a South African register company established in 1974 and was listed on the JSE for the first time in 2006. Raubex group's primary activities are road and building rehabilitation, railway construction, concrete structures, property development and mining development. Raubex also has some construction material activities such as asphalt production and crusher aggregates. The Raubex Group had a turnover of approximately R7.25 billion in 2015 (INET BFA, 2016).

3.2.1.8 Stefanutti Stock Holding Limited

Stefanutti Stock Holding Limited is a South African register company established in 1902. Stefanutti Stock's primary activities are in the civil engineering, pipeline construction, oil and gas, road earthworks and geotechnical. Stefanutti Stocks Holdings Limited had a turnover of R10.6 billion in 2015 and was first listed on the JSE in 2007 (INET BFA 2016).

3.2.1.9 WBHO Limited

Wilson Bayly Holmes-Ovcon Limited is a South African register company. Wilson Bayly Holmes Limited was established in 1983 and changed to WBHO Construction in 1994. WBHO's main operating divisions and operational activities are building construction, civil engineering, roads and earthworks. WBHO had a turnover of R29.5 billion in 2015 and was first listed on the JSE in 1991 (INET BFA 2016).

3.2.1.10 Research sample conclusion

As presented in the summary the selected companies are all involved in the same industry and their activities correlate. Their reported revenues vary between 1 billion to 30 billion South African Rand. Although these revenue figures are only indicative of the size differences it is worth noting that the smaller companies can be adequately profitable and have good potential for growth. Empirical findings by Becchetti and Trovato (2002:13) concluded that that smaller firms have higher than average growth potential when compared to larger and more established companies.

In *Figure 3.1* (see page 42) the share stock performance of the companies in the research can be seen. The companies all exhibited the same trend with regards to their share price performance. All the companies, except for WBHO Limited that could be treated as an outlier, had their peak share price in 2007 or 2008. The peak and the gradual decline can most lightly be associated with two major events.

The peaks, or high-points, of the share prices could be associated with the hosting of the FIFA World Cup. Most of the companies in this research sample took part in the infrastructure development that was needed to host the event (Cottle 2007). The anticipation of increased revenue the years following tender and project adjudication probably contributed to the share prices increase across the board. The subsequent decline of the share prices in the following this period was mainly attributed to the financial crises of September 2008, in the United States of America and the United Kingdom (Kroukamp 2011:803)

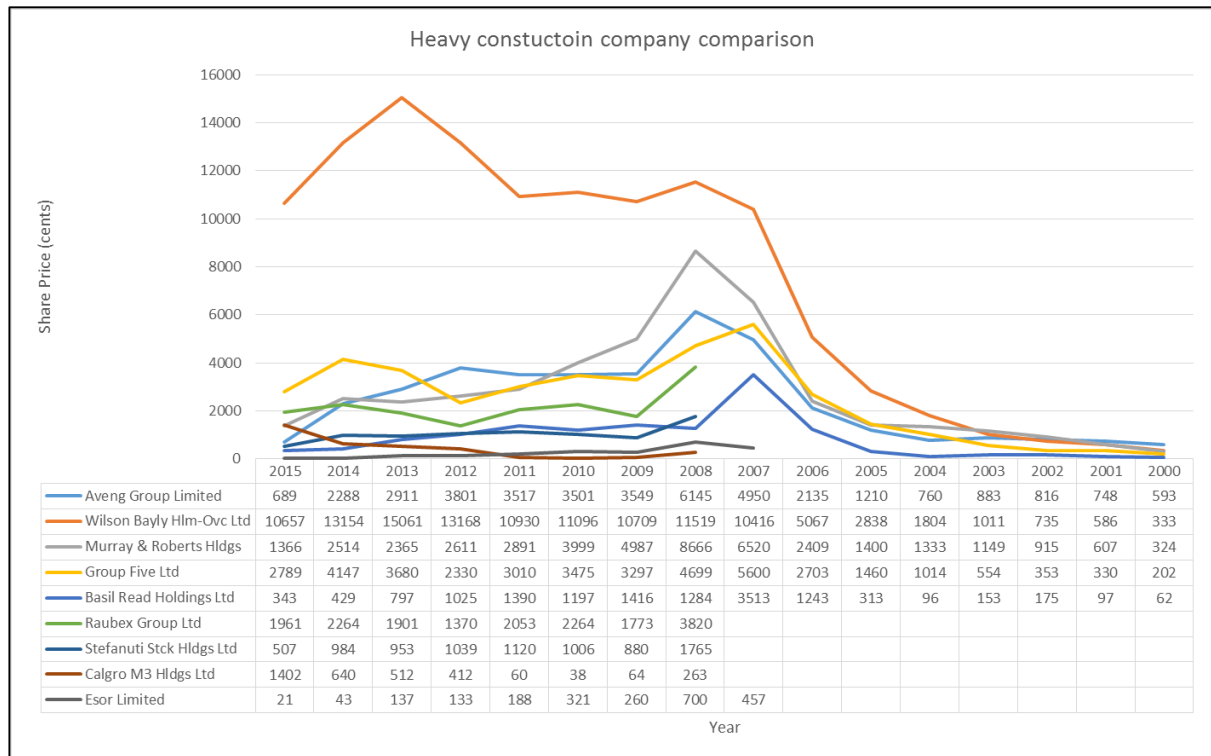


Figure 3.1: Research sample historical share price movement

Taking cognises of these anomalies the statistical analysis was performed on the historical data from 2008 to 2014. Although the analysis is done from 2008 to 2014 the results that will be considered in the framework will only be from 2011 to 2014. Because of the above-mentioned anomalies the possibility exists that the results can be skewed and not produce a true reflection of the most indicative financial multiples.

3.3 Research procedures

As stated in Chapter 1, the primary objective of the research studies primary objective is to develop a framework that will assist investors to select the correct shares by identifying the most prominent financial multiples that are most indicative of share fluctuation and performance.

From the literature study, possible multiples of valuation indicators were identified that could possibly assist investor to invest in construction companies. The indicators that were chosen to be part of the statistical analysis were:

1. Dividend / Share (c)

2. Earnings / Share (c)
3. Price / Book Value
4. Price / Cash Flow
5. Price / Earnings
6. Price / Sales
7. Return on Average Equity %
8. Return on Capital Employed %
9. Price / Share to Cash Flow / Share
10. Enterprise Value / EBIT
11. Enterprise Value / EBITDA

3.4 Statistical processes

The financial and annual results concerning to the companies in the heavy construction segment was obtained from INET BFA Ltd. The data was gathered and prepared for statistical analysis.

IBM SPSS Statistics Version 23 was used for the statistical analysis of the data. Multi linear regression model were constructed with the data gathered. The data was firstly tested for the following aspects namely linearity, independence, normality and equal variance (Levine, Stephan & Szabat 2014:518). To conform to the multiple linear regression assumptions, scatterplots, normal probability plots and co-linearity between multiples was drawn and assessed.

Multiple linear regression equations were constructed for each year. A significance level of 10% was applied thus contributing to a 90% confidence level for each model. Furthermore, an F-test was determined for each equation to determine the significance relationship between the dependent and the entire set of independent variables. Lastly the R^2 for each model was calculated to explain the variations between the dependent and independent variables.

3.4.1 Data presentation

Table 3.1 presents the coding identifier used for the different variables namely dependent and independent variables and the companies in the research sample. This coding was used in the statistical analysis.

Table 3.1: Statistical data presentation

Identifier Variable		Company Identifier	Company
X1	Dividend / Share (c)	1	Aveng
X2	Earnings / Share (c)	2	WBHO
X3	Price / Book Value	3	Murray and Roberts
X4	Price / Cash Flow	4	Group Five
X5	Price / Earnings	5	Basil Read Holdings
X6	Return On Average Equity %	6	Raubex Group
X7	Return On Capital Employed %	7	Stefanuti Stocks
X8	Price / Share to Cash Flow / Share	8	Clagro M3
X9	Enterprise Value / EBIT	9	Esor Limited
X10	Enterprise Value / EBITDA		
X11	Enterprise Value/Sales		
X12	Price/Sales		
Y1	Price / Share (c)		

3.5 Statistical analysis results

Table 3.2 represents the multiple linear regression resulted equation that was constructed for each year. The equation constructed represent the variables and valuation multiples, that can best explain the share price, when compared to the following years share price. Thus, the independent variables from 2012 were applied to the depended variable of 2013.

Table 3.2: Multiple linear regression models

Year	Model
2008	$Y_1 = -18.997 + 3.889X_1$

2009	$Y_1 = -162.116 + 1.457X_2 + 38.770X_5 - 1.662X_{11}$
2010	$Y_1 = -155.762 + 2.064X_2 + 36.509X_4$
2011	$Y_1 = -20.520 + 1.244X_1 + 1.804X_3 + 4.527X_5 + 0.567X_{10}$
2012	$Y_1 = -184.521 + 3.546X_3 + 24.788X_9 - 4.400X_{11}$
2013	$Y_1 = 5.066 + 3.306X_3 - 3.362X_{11}$
2014	$Y_1 = 11.579 + 0.825X_1 + 1.037X_2 - 3.701X_5 + 0.276X_{12}$

Table 3.3 represents the statistical results from the multiple linear regression models. Aspects such as adjusted R^2 , degrees of freedom and the significance of the equation. On analysis of the results the adjusted R^2 can be assumed to be satisfactory. On average, only 9.75 % in the variation in the share price can be explained by other factors not included in the regression models.

Table 3.3: Statistical variable analysis

Model	R Square	Adjusted R square	Std. Error of estimate	Sig.	Sum of Squares	df	F
2008	0,802	0,763	0,84057	0,006	17,876	6	20,299
2009	0,908	0,862	0,67925	0,002	30,151	9	19,313
2010	0,86	0,82	0,77936	0,001	30,436	9	21,554
2011	0,928	0,87	0,57225	0,005	22,737	9	16,108
2012	0,96	0,939	0,40313	0	24,157	9	47,549
2013	0,871	0,829	0,67366	0,002	21,187	8	20,343
2014	0,988	0,976	0,26598	0	23,806	8	83,129

3.5.1 Statistical analysis validation

In constructing the multiple linear regression equations, the data was subjected to mathematical manipulation. Manipulation techniques such as log linear transformation was performed on the data. A validation on the statistical procedure was performed to illustrate the statistical validity. The 2012 model was chosen to test if the statistical procedures applied is valid. In *Figure 3.2* the results of the 2012 equation validation can be seen. The predicted share prices, for the research sample, corresponds accurately to the actual share price for the year in question.

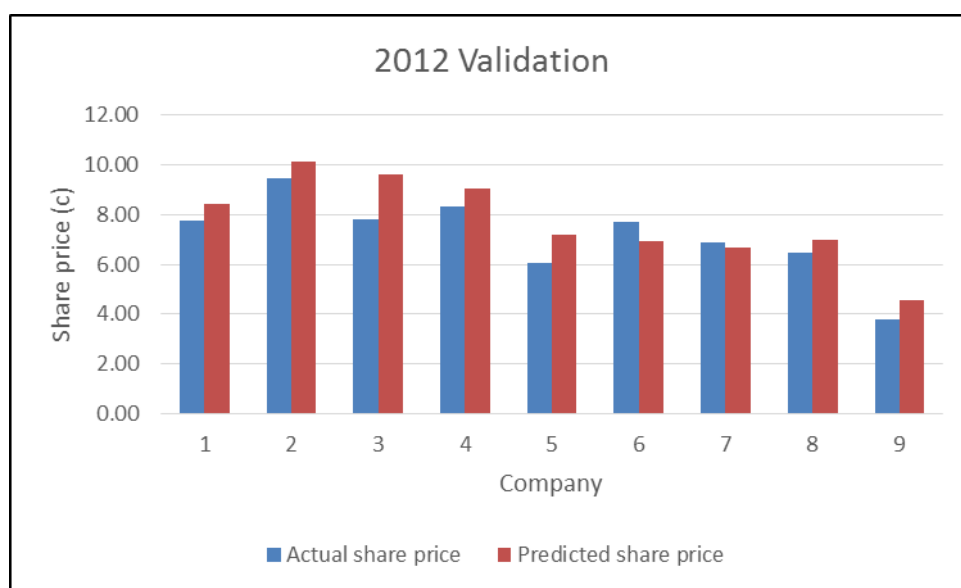


Figure 3.2: 2012 Statistical model validation

3.6 Statistical analysis results interpretation

Following the application of the statistical methods, the results was tabulated. In *Table 3.4* (see page 47) the significant variable count as per the multiple linear regression equations can be seen. The table demonstrates the number of times a specific significant variable was present in a year.

Table 3.4: Variable results 2008-2014

Multiples	Nr.	2014	2013	2012	2011	2010	2009	2008
Dividend / Share (c)	2	1			1			
Earnings / Share (c)	4	1				1	1	1
Price / Book Value	3		1	1	1			
Price / Cash Flow	0							
Price / Earnings	3	1			1		1	
Return On Average Equity %	0							
Return On Capital Employed %	0							
Price / Share to Cash Flow / Share	1					1		
Enterprise Value / EBIT	1			1				
Enterprise Value / EBITDA	1				1			
Enterprise Value/Sales	3		1	1			1	
Price/Sales	1	1						

Note: 1 Indicates significance in the year

On analysis of the results from 2008 to 2010 the only multiples that have any significance in explaining the movement, or volatility, of the companies share prices are earnings per share, price to earnings, price to cash flow and enterprise value to sales. During the financial climate at the time, investors were most likely not interested in the actual value of the companies in question but only short-term gains and loss mitigation.

When only examining *Table 3.5* (see page 48), the results from 2011 onwards can be seen. The most significant multiples during this period included earnings per share, dividends per share, price to book value, enterprise value to EBIT, Enterprise value to EBITDA and Enterprise value to sales. As per the literature presented in Chapter 2.3.3 (Earnings multiples), the multiples identified from 2011 to 2014 could be considered more reasonable when compared to 2008 to 2010, as they give indication of relative value.

Metrics, present in the identified multiples, such as enterprise value, EBIT, EBITDA, book value and sales are business and operational related characteristics and could assist investors to reach more holistic investment decisions. The above-mentioned metrics are furthermore not directly influenced by market perceptions and trends and

produces information that should assist investors to invest in companies that are sustainably profitable for long term wealth creation.

Table 3.5: Variable results 2011-2014

Multiples	No.	2014	2013	2012	2011
Dividend / Share (c)	2	1			1
Earnings / Share (c)	2	1			
Price / Book Value	3		1	1	1
Price / Cash Flow	0				
Price / Earnings	2	1			1
Return On Average Equity %	0				
Return On Capital Employed %	0				
Price / Share to Cash Flow / Share	0				
Enterprise Value / EBIT	1			1	
Enterprise Value / EBITDA	1				1
Enterprise Value / Sales	2		1	1	
Price / Sales	1	1			

In conclusion, the most significant multiples that can explain the variation in the movement of the share price of companies in the heavy construction industry are the following:

1. Dividend per share
2. Earnings per share
3. Price to Book value
4. Price to Earnings
5. Enterprise value to EBIT
6. Enterprise value to EBITDA
7. Enterprise value to Sales

3.7 Framework for selection criteria

Each of the multiple identified by the multiple linear regression equations have distinct characteristics that needs to be considered when selecting shares. Here follow some guidelines when analysing the multiples.

As the multiples identified in the analysis are all ratios analysis and the results of different companies can thus be compared to each other. *Table 3.6* (see page 49) exhibits the resultant medians of the multiples. The median results are used because of the presence of outliers and extreme values (Levine et al. 2014:138). This would give the investor a relatively good indication and guideline for possible investment.

If a potential share is identified, in the heavy construction segment, the multiples should be greater than or equal to 90% of to that indicated value in *Table 3.6*. It is important to note that the multiples must be considered as a collective and not individually.

To verify the validity of the guideline the price to earnings ratio was tested. The guideline proposed resulted in a price to earnings ratio of 9,512. When the price to earnings is converted, it produces a 10.51% earnings yield. Considering that South Africa's overall consumer price index was 5,2% in December 2015 earnings yield of 10,51% would give the investor a real gain of 5,31% (Statistics South Africa, 2016).

Table 3.6: Multiple median results

Multiples	Median
Dividend / Share (c)	3,145
Earnings / Share (c)	126,350
Price / Book Value	1,283
Price / Earnings	9,512
Enterprise Value / EBIT	9,917
Enterprise Value / EBITDA	8,852
Enterprise Value / Sales	0,589

3.8 Portfolio selection

As per the sub objectives 3 in the research proposal the framework prescribed in the above sections will be applied to selecting a heavy construction share portfolio that will return optimal results for the investor.

3.8.1 Portfolio selection

The financial multiples identified in the analysis along with the framework guidelines was applied to the financial data of all the companies for the financial year of 2013 and 2014. Four companies passed the selection criteria as prescribed by the framework and selection criteria. In *Table 3.7* the results can be seen. The green illustrates that the companies passed the criteria for that multiple, yellow indicates that the multiple was 90% of the criteria and red indicates that it failed the criteria. If a multiple was 90% of the criteria it was considered as a pass.

Table 3.7: Portfolio selection 2013-2014

Year	Comp	X1	X2	X3	X5	X9	X10	X11	% Passed
2014	WHBO	312.80	1172.60	1.59	11.22	12.59	9.44	0.48	86%
2013	WHBO	312.80	1150.90	1.88	13.09	13.88	10.54	0.53	100%
2014	M&R	42.50	221.00	1.73	11.38	11.85	8.10	0.48	86%
2013	M&R	0.00	188.00	1.37	12.58	9.70	6.76	0.47	57%
2014	GF	85.00	407.00	1.60	10.19	12.62	8.93	0.53	100%
2013	GF	56.95	298.00	1.70	12.35	12.62	8.77	0.63	100%
2014	RG	2.87	187.10	1.32	12.10	9.50	6.24	0.81	71%
2013	RG	3.42	158.70	1.20	11.98	9.09	5.93	0.76	86%

The company's that passed the framework screening identified for a possible portfolio are:

1. Wilson Bayly Holmes-Ovcon Limited
2. Murray and Roberts Holding Limited
3. Group Five Limited
4. Raubex Group Limited

3.8.2 Portfolio selection results

Following the selection criteria process a Markowitz portfolio minimum variance calculations was performed. As discussed in the literature study the balance between risk and return is the ultimate purpose of optimisation of a portfolio. The variance of

the portfolio needs to minimise by adjusting the weighting of the individual shares in the portfolio. In *Table 3.8* the results of different portfolio combinations can be seen.

From the analysis, portfolio 2 could be considered optimal. Portfolio 2's standard deviation of 31.33% is relatively low when compared to the other portfolio weightings. Additionally, the expected return of 13.49% is adequate when you consider that the portfolio encompasses shares from all the companies selected by the framework. In *Table 3.9* (see page 52) the detail calculated results from portfolio 2 can be seen. As stated portfolio 2 has a combination of all the shares identified in the framework. A portfolio combination could have been chosen that only has one or two of nominated shares but this defeats the object of creating, and managing, a multi asset portfolio.

In conclusion depending on the investor's appetite for risk they could potentially achieve higher rate of returns but the risk associated with this will also proportionally increase.

Table 3.8: Portfolio results applying different weightings

	% Invested in share				Portfolio characteristics	
Port number	WBHO	M&R	GF	RG	Expected return	Standard deviation
1	50%	0%	0%	50%	12.58%	25.48%
2	30%	15%	15%	40%	13.49%	31.33%
3	0%	10%	10%	80%	2.67%	31.60%
4	20%	10%	30%	40%	13.37%	32.75%
5	30%	20%	20%	30%	15.71%	34.30%
6	0%	25%	25%	50%	9.32%	34.47%
7	0%	0%	50%	50%	10.64%	34.99%
8	25%	0%	50%	25%	17.81%	35.49%
9	0%	50%	0%	50%	8.01%	36.35%
10	25%	25%	25%	25%	16.50%	36.75%
11	14%	39%	12%	35%	12.77%	36.81%
12	100%	0%	0%	0%	26.93%	37.83%
13	20%	20%	40%	20%	17.81%	38.33%
14	50%	0%	50%	0%	24.99%	40.08%
15	10%	10%	70%	10%	20.42%	41.78%
16	40%	40%	10%	10%	20.01%	42.18%

17	5%	5%	85%	5%	21.73%	43.63%
18	0%	0%	100%	0%	23.04%	45.55%
19	50%	50%	0%	0%	22.36%	47.04%
20	0%	50%	50%	0%	20.42%	49.70%
21	0%	100%	0%	0%	17.79%	59.54%

Table 3.9: Portfolio 2 calculations and results

	WBHO	M&R	GF	RG	Total	
Portfolio %	30.0%	15.0%	15.0%	40.0%	100%	
Expected Return	26.9%	17.8%	23.0%	-1.8%		
Variance/Covariance Matrix						
	WBHO	M&R	GF	RG		
WBHO	14.3%	19.4%	14.6%	0.3%		
M&R	19.4%	35.4%	21.3%	3.1%		
GF	14.6%	21.3%	20.7%	8.6%		
RG	0.3%	3.1%	8.6%	11.1%		
Variance Terms	2.8%	2.3%	2.1%	2.5%	Variance	9.8%
					Std. Dev.	31.3%
Return Terms	8.1%	2.7%	3.5%	-0.7%	Return	13.5%

CHAPTER 4: CONCLUSION AND RECOMMENDATIONS

4.1 Introduction

In chapter 4 a conclusions and recommendations will be given with regards to the research study that was performed. Firstly, a conclusion will be presented with regards to the individual objectives.

Secondly a recommendation will be given with regards of how future research study could be performed and how the more detail verification could be done to guide investors when investing in this chosen population. Finally, a conclusion on the research study will be discussed.

4.2 Conclusion of results and objectives

The results of the research study will be measured against the research objectives set out in chapter 1.

4.2.1 Primary objective conclusion

The primary objective was to develop a framework that will assist investors to select the correct shares by identifying the most prominent financial multiples that could possibly be indicative of share price fluctuations and volatility.

The literature study conducted gave some guidelines to what multiples might be indicative for share price fluctuations. Multiple were chosen based on the literature study. This data from the sample population was gathered and multiples regression equation constructed for the different financial years namely 2008 to 2014. It was decided to exclude some years from the analysis because of external factors that could have influenced company's share price performance and the subsequent desired framework.

The results from the multiple regression equation indicated significant multiples that explained 90.25% of the share price fluctuations. In conjunction with the secondary objectives, the primary objective was successful in identifying financial multiples and

subsequently developing framework that investors could apply in share selection and portfolio creation activities.

4.2.2 Secondary objectives

Secondary objective one was to determine if these multiples identified exists and whether they are indeed correlating to the market share price. As discussed in the primary objective conclusions these multiples do exists and that there is statistically a strong positive correlation between the multiples and the market share price.

Secondary objective two was to develop a framework for selection of shares based on the findings of the primary objectives. A framework was developed using the historical data of the multiples. As discussed in the results section the median values of the identified multiples were used to provide an indication at what value the multiples must be for potential investment. As the sample encompassed the entire population it was reasonable to assume that the framework presented is realistic.

The final secondary objective was to construct a construction share portfolio applying the framework proposed. The framework was applied to the shares and four companies were identified that could potentially provide positive return on investment. Differently weighted portfolios were presented and using the Markowitz minimum variance approach, a portfolio was identified that could potentially produce 13,5% return on investment.

4.3 Recommendations for future studies

The recommendations for future studies in the construction industry could come from in-depth analysis and quantification on non-financial indicators. The indicators that would be applicable would be aspects such as the state of the company's order book for future guaranteed income. Similar to this research study there should potentially be a correlation between the findings and the relevant share price.

Furthermore, a meta-analysis could be performed by combining related qualitative and quantitative data from similar industries such as construction material companies. If

this type of research is performed a more definitive and objective conclusion could be drawn as to why and how share prices in the construction industry fluctuates positively or negatively.

4.4 Concluding summary

In closing, the research was performed and could be considered as being successful if measured against the objective set out. If a potential investor wished to invest in companies under the construction segment of the Johannesburg Stock Exchange, the guidelines set out in this research could give adequate indication as to what financial multiples to focus on and at what levels these financial multiples should be for sustainable long term wealth creation. Finally, if the investor chose to invest in different construction companies in a weighted portfolio it was shown that acceptable returns can be produced while still mitigating the level of risk the associated with share investment.

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