Correlation between Market-to-Book Value and Financial Ratios of South African Companies

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ABSTRACT

This research study examines the relationship between JSE main board listed companies accounting financial ratios and the level of shareholder wealth created by these companies at their financial year end, with the aim of identifying whether this relationship is consistent across industry sectors.

The Market-to-Book (MTB) ratio is used to measure shareholder wealth, as this measure incorporates the funds that shareholders' have had to invest in the company in obtaining current market value level of their shareholding in the company. The accounting financial ratios studied include Profitability, Performance, Asset Efficiency, Capital Structure, and Liquidity ratios.

Standardised financial statements and daily equity prices for JSE main board listed companies across nine industry sectors were collected for the 2001-2010 period, from which MTB ratios and accounting financial ratios were calculated.

To measure the relationship between companies accounting financial ratios and the level of shareholder wealth created by these companies, the relationship between the MTB ratio and accounting financial ratios for each industry sector were tested through: multiple correlation analysis, testing the strength of the relationship between the MTB ratio and the combined effect of each facet of a company's financial; and bivariate correlation analysis testing the strength of the relationship between individual accounting financial ratio and the MTB ratio.

This study demonstrated that, with the exception of the Cyclical Consumer Goods industry sector, a company's accounting financial ratios are related to its MTB ratio. The strength of this relationship, as well as the individual accounting financial ratios that displayed the greatest substantive significant relationship to the MTB ratio were found to differ across industry sectors, confirming that financial structural differences are present across industry sectors.

A company's management team should therefore focus on consistently driving improved performance of those financial ratios most related to the MTB ratio in an effort to ensure that wealth for shareholders' is constantly be created.

DECLARATION

I, Riaan Shewdin, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Riaan Shewdin

Signed at *Mtunzini*

On the *30th* day of *March* 2016

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 Purpose of the study

The purpose of this research study is to identify the drivers of shareholder wealth creation for South African Johannesburg Securities Exchange (JSE) listed companies through identifying the relationship between the level of a company's accounting financial ratios (Profitability, Performance, Asset Efficiency, Capital Structure, and Liquidity) and the level of shareholder wealth created by the company at its financial year end. This report will establish how a company's management team can influence and drive the creation of wealth for the company's shareholders' by identifying how value is created and destroyed within the company.

1.2 Context of the study

It is a widely accepted fact that the primary objective of the management team of any profit seeking company is to maximise the wealth of the company's shareholders' (Madhavi & Prasad, 2015; Gentry & Shen, 2010; Danielson, Heck & Shaffer, 2008; Petravičius & Tamošiūnienė, 2008; Santos, Vega & Barkoulas, 2007). However, in order to increase shareholder wealth, a company's management team first needs to understand the intricacies of how their management activities relate to shareholder wealth creation (Monea, 2009). As management activities are governed by the strategy of the company, and shareholder wealth is influenced by the total value of the company owing to shareholders, the relationship between management activities and shareholder wealth creation can be conceptually defined through relating the strategic management process of a company to the company's equity valuation; thereby identifying the drivers of shareholder wealth creation (Laux, 2010a).

1.2.1 *The Strategic Management Process*

Strategic management involves crafting and executing strategies to positively influence a company's performance, thereby enabling the creation of wealth for the company's shareholders. As illustrated in Figure 1.1, Thompson, Strickland and Gamble (2008) posit that strategic management consists of five interrelated and integrated phases.

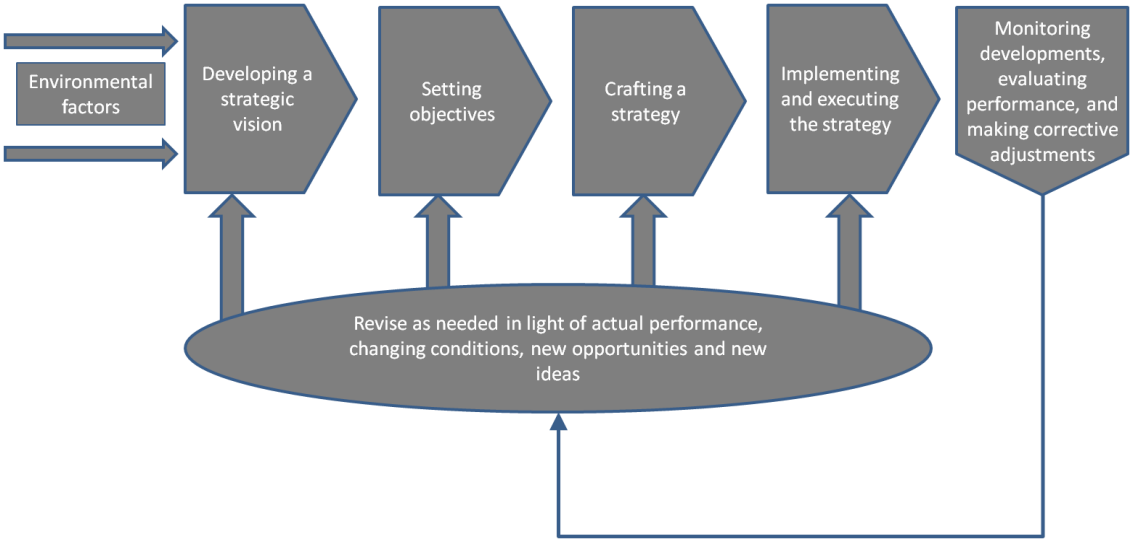

Figure 1.1: The Process of Strategy Development and Strategy Execution (Thompson et al., 2008)

According to Thompson et al. (2008) and Falshaw, Glaister and Tatoglu (2006), the first step in the strategic management process is to conduct an environmental analysis, which includes performing an external analysis of the company (examination of macro-environmental and micro-environmental factors acting upon the company) to identify opportunities that could be available to the company and threats that could affect the company; and an internal analysis of the company to determine the company's strengths and weaknesses, thus enabling the company's managers to develop a strategic vision of where the company needs to head and what its future product, market, customer and

technological focus should be. The second step in strategic management involves setting objectives for the company that would enable the company to measure its performance and progress toward achieving its strategic vision. The third step in strategic management involves crafting a strategy that would enable the company to achieve its objectives. Once a company's strategy has been defined, the company's management team then implements and executes this strategy. The fifth step of the strategic management process involves evaluating the company's performance and initiating corrective adjustments in the company's vision, objectives, strategy, or execution of strategy in light of actual experience, changing conditions, new ideas, or new opportunities (Thompson et al., 2008; Falshaw et al., 2006).

Both Thompson et al. (2008) and Falshaw et al. (2006) agree that a significant part of the internal analysis of a company includes evaluating the company's financial performance to determine the company's asset management efficiency and effectiveness, profitability and overall financial health. This evaluation can be achieved through an analysis of the company's current and past accounting financial ratios, with the results of this analysis being used as inputs into identifying the company's strengths and weaknesses, the company's ability to take advantage of market opportunities and the company's exposure to market threats; thereby guiding the company's strategic vision, strategic objectives, and strategy.

According to both Thompson et al. (2008) and Falshaw et al. (2006), the use of accounting financial ratio analysis does not end once a company's strategy has been crafted. Accounting financial ratios can be seen as effective tools for monitoring the implementation of a company's strategy, as they can be used evaluate a company's performance in relation to its vision, objectives, strategy, and execution of its strategy as both quantitative and abstract measures that are of true importance to the company can be incorporated into measures and targets for the company that can be quantified through the company's financial results. These targets can therefore be translated into accounting financial ratios; and thus, accounting financial ratios can be used to monitor the

effectiveness of the company's strategic vision, strategic objectives, strategy, and the effectiveness of the implementation of the company's strategy; and can thereby guide the company's management team in identifying where corrective adjustments to the company's strategic vision, strategic objectives and strategy are required (Burja & Burja, 2009).

1.2.2 *The Company Valuation Process*

Nissim and Penman (2001) state that various approaches can be applied in determining the value of a company, however, Fernández (2007) states that company valuation methods based on cash flow discounting methods are the only conceptually correct models for calculating the enterprise value of a company, and that these methods of valuing a company are becoming increasingly popular. These valuation methods view the company as a cash flow generator and, therefore, assessable as a financial asset. The value of a company is thus considered a function of its future cash flows and its cost of capital (Ratnatunga & Montali, 2008; Nissim &Penman, 2001). In calculating the intrinsic value of a company, cash flow discounting methods involve the generation of detailed forecasts of the financial items related to the generation of the cash flows corresponding to the company's operations for each forecast period; and discounting these cash flows at the cost that the company pays for the use of the capital invested in it (Nissim & Penman, 2001; Abarbanell & Bushee, 1997; Penman, 1996a; Bernard, 1995).

A common technique employed to guide the generation of a company's cash flow forecasts is Fundamental Analysis (Nissim & Penman, 2001), a technique that focuses on evaluating the underlying factors that affect a company's actual business and its future prospects to generate cash flows, and thereby calculate the intrinsic value of the company (Bernard, 1995). The central task of fundamental analysis is therefore the analysis of current and past financial performance with the aim of predicting future earnings of a company (Abarbanell & Bushee, 1997). As illustrated in Figure 1.2, Monahan (2005) and

Bernard (1995) state that the fundamental analysis technique involves three interrelated and integrated phases.

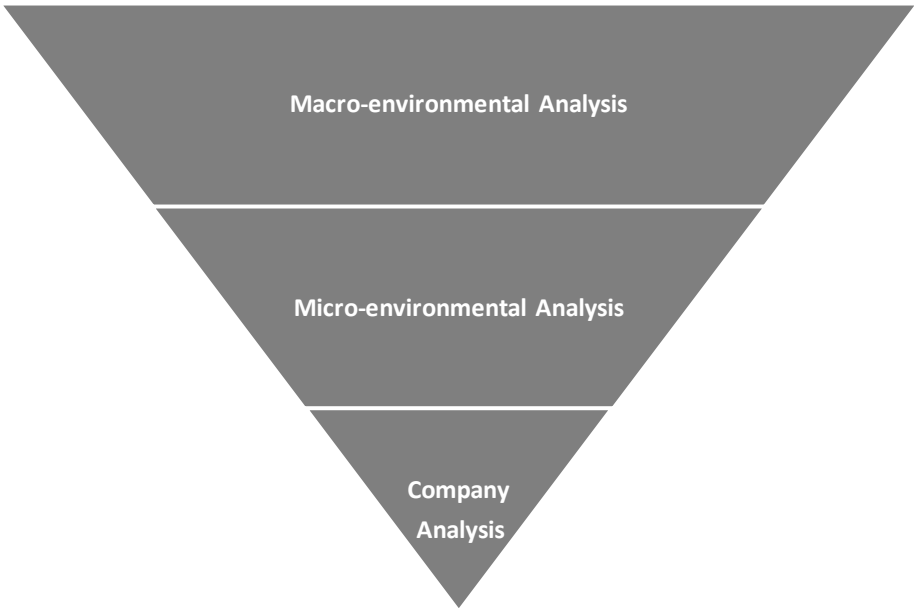

Figure 1.2: Fundamental Analysis Technique

As with the strategic management process, fundamental analysis begins by first evaluating the general economy in which the company operates. This macro-environmental analysis is undertaken to determine whether the economy is growing or declining because when an economy is growing, most industry sectors and companies benefit and grow; however, when the economy is declining, most industry sectors and companies usually suffer (Bernard, 1995). Thus, the macro-environmental analysis helps to determine whether growth prospects for the company exist within the economy. The next step in fundamental analysis is to evaluate the industry sector in which the company operates so as to determine the company's industry sector's prospects based on the current or future economic environment. The macro-environmental and micro-environmental analysis thereby identifies the opportunities that could be available to the company to increase its cash flows; as well as the threats affecting the company that could decrease its cash flows. The next step in the fundamental analysis process is to evaluate the company itself. The company

analysis involves evaluating: the company's business model, which is dictated by its strategy; the company's competitive positioning, as a company's long-term success is driven largely by its ability to maintain a competitive advantage that creates a moat around the company allowing it to keep competitors at bay while enjoying growth and profits; and the company's current and past performance, which includes an analysis of the company's accounting financial ratios to determine the company's asset management effectiveness, profitability and overall financial health (Monahan, 2005).

The information garnered from the macro-environmental, micro-environmental and company analysis can then be used to build a forecast of the company's future cash flows, which is subsequently used to calculate the intrinsic value of the company. One popular method of generating these forecasts involves forecasting the company's future accounting financial ratios by using the company's current and historical accounting financial ratios as a base, and then adjusting these ratios by considering how the macro-environmental, micro-environmental, and company specific factors would affect the company's accounting financial ratios in the future, so that by forecasting these ratios, a forecast of future cash flows can be generated (Ratnatunga & Montali, 2008; Nissim & Penman, 2001; Penman, 1996a). Accounting financial ratios can thus be inferred as being the building blocks of a future cash flow forecast, that is, as the attributes that are to be forecasted in order to build a forecast of cash flows. Current and historical levels of accounting financial ratios therefore provide the basis from which to forecast future levels of accounting financial ratios and future cash flows, and can therefore be considered as the basis from which the intrinsic value of a company is calculated.

1.2.3 *Relating Strategic Management to Valuation*

As illustrated in Figure 1.1 and Figure 1.2, both the strategic management process, as defined by Thompson et al. (2008), and the fundamental analysis technique for company valuation, as defined by Monahan (2005) and Bernard (1995), involve several common analysis steps, albeit for differing purposes.

The strategic management process and the fundamental analysis technique for company valuation can thus be unified as illustrated in Figure 1.3 to ultimately demonstrate the links between the levels of a company's accounting financial ratios and the level of shareholder wealth created by the company, and hence provide the basis for a shareholder wealth creation model that will be explained as part of this research study.

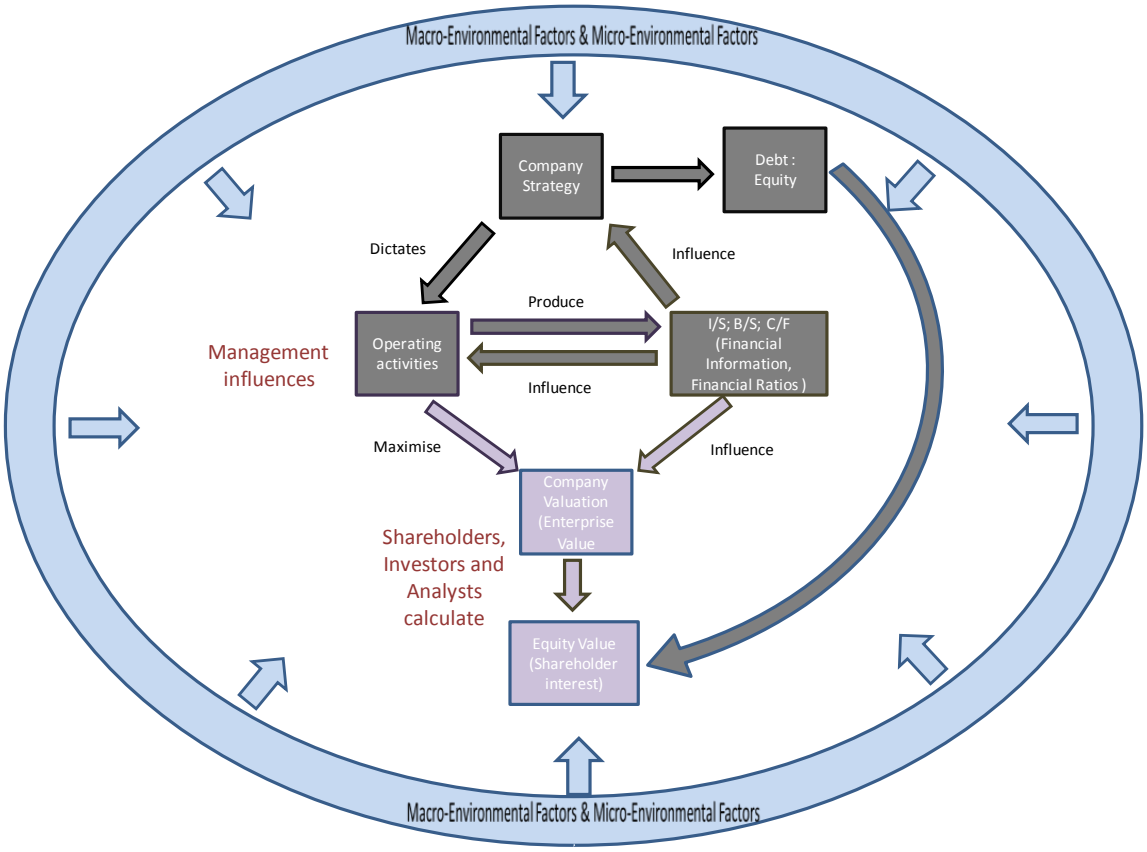

Figure 1.3: Strategic Management and Fundamental Analysis

Figure 1.3 illustrates that through an analysis of macro-environmental factors; micro-environmental factors; and company financial performance in prior periods, the management team of the company ultimately devises the company's strategy, that is, how shareholder's resources will be employed in the company's operations to maximise the shareholders' wealth. This strategy

includes the goals and targets that the company is required to achieve, and ultimately dictates the company's business model, that is, how the company will operate (Thompson et al., 2008). These goals and targets can be related to the financial performance of the company, as measured through the company's financial statements (Income Statement, Balance Sheet, and Cash Flow Statement). The financial statements can thus be seen as a scorecard of the company as they report on not only the current financial position of the company, but also the efficiency and effectiveness of the company's operating activities (Monea, 2009).

Using the financial statements as a scorecard of the company, the company's management team then continuously influences the variables impacting the company's financial statements in an attempt meet targets that they have set for the company and deliver upon the company's strategy (Yang & Chuang, 2010; Hall & Brummer, 1999).

Shareholders, investors and equity analysts perform a longer term fundamental analysis of the company, using the accounting financial ratios (calculated from the company's financial statements) as well as the results of their macro-environmental and micro-environmental analysis to forecast the company's future accounting financial ratios and thus the company's future cash flows to ultimately determine the intrinsic enterprise value of the company; and by subtracting the value of the debt that the company has employed in its operations, the shareholders, investors and equity analysts determine a fair value of the company's equity (Ratnatunga & Montali, 2008). If a company is found to have good fundamental finances and principles; and is constantly performing better than its industry rivals; its equity will be valued higher and will continue to appreciate in value over the long run.

It can therefore be inferred that favourable levels and trends of a company's current and past accounting financial ratios should ultimately result in an increase in the enterprise value of the company, and thereby a possible increase in the company's shareholders' wealth.

Based on this concept, this study will thus focus on identifying which accounting financial ratios have a significant relationship with shareholder wealth creation, and will thus enable a company's management to identify which accounting financial ratios and aspects of financial performance to focus on improving to drive the creation shareholder wealth.

1.3 Problem statement

To ascertain, for South African Johannesburg Securities Exchange (JSE) listed companies, whether a relationship between the levels of a holistic set of accounting financial ratios (Profitability, Performance, Asset Efficiency, Capital Structure and Liquidity) and the level of shareholder wealth created by these companies at their financial year end exists, and to determine whether this relationship differs for companies operating within different industry sectors; and to ascertain whether a relationship between the level of each individual accounting financial ratio (Profitability, Performance, Asset Efficiency, Capital Structure and Liquidity) and the level of shareholder wealth created by these companies at their financial year end exists, and to determine whether this relationship differs for companies operating within different industry sectors.

1.3.1 *Sub-problem 1*

The first sub-problem is to ascertain for South African JSE listed companies in each industry sector, whether a relationship exists between the level of a holistic set of accounting financial ratios (Profitability, Performance, Asset Efficiency, Capital Structure and Liquidity) and the level of shareholder wealth created by these companies at their financial year end.

1.3.2 *Sub-problem 2*

The second sub-problem is to ascertain for South African JSE listed companies in each industry sector, whether a relationship exists between the level of

individual accounting financial ratios (Profitability, Performance, Asset Efficiency, Capital Structure and Liquidity) of and the level of shareholder wealth created by these companies at their financial year end.

1.4 Significance of the study

The relationship between a company's external performance (shareholder wealth) and internal performance measures (accounting financial ratios) has been a topic of increased scrutiny by researchers since the late 1980s (Bernier & Mouelhi, 2012; Reimann, 1989). Several studies have explored the relationship between some measure of shareholder wealth and some accounting financial ratio at the company level, in an attempt to identify the accounting financial ratio that best explains and predicts shareholder wealth (Bernier & Mouelhi, 2012).

Many of these studies have sought to compare the predictive and explanatory power of EVA over other traditional accounting financial ratios in explaining shareholder wealth (Bernier & Mouelhi, 2012); and even though there has been no significant research on the relationship between a holistic set of a company's accounting financial ratios and the shareholder wealth creation ability of a company, many of these studies contend that EVA is better predictor of shareholder wealth than accounting financial ratios and punt the focus on and maximisation of EVA over accounting financial ratios based on EVA being better correlated to shareholder wealth than any single accounting financial ratio.

This is somewhat disappointing, because despite the linkages that have been highlighted between a company's accounting financial ratios and the level of wealth created (or destroyed) for the company's shareholders' (refer to Figure 1.3), and as Helfert (2003) contends, higher levels of performance that will ultimately lead to increased shareholder wealth depends on the coherence of all operational, investment and business funding actions, options and decisions; a

construct that cannot be fully captured by a single performance measure such as EVA. Creating shareholder wealth entails managing both the balance sheet as well as the income statement, and balancing long and short term perspectives (Koller, 1994). Therefore a research study testing whether a combined holistic set of accounting financial ratios (representing each facet of operational, investment and business funding actions) has a relationship with the creation of wealth for a company's shareholder is currently lacking. As the primary objective of the management team of any profit seeking company is the maximisation of the company's shareholders' wealth, understanding the combined effect that a holistic set of a company's accounting financial ratios has on its shareholder wealth is critically important to a company's management as it provides the path to maximisation of the company's shareholders' wealth.

Furthermore, previous studies testing accounting financial ratios against shareholder wealth creation either use a sample containing companies from a diverse range of economic groups without accounting for the industry sector differences, or use a sample containing companies from a single industry sector, without statistically testing whether the relationships between accounting financial ratios and shareholder wealth creation differs for companies operating in different industry sectors.

This study thus therefore aims to fill these gaps in research by firstly testing whether accounting financial ratios have a relationship with shareholder wealth creation, and secondly providing a detailed understanding of this relationship and identifying whether this relationship differs for companies operating in different economic groups.

As a company's accounting financial ratios and its shareholder wealth can both be calculated with relative ease using information that is readily available to a company's management team (Yang & Chuang, 2010), the results of this study will equip managers with the tools necessary to drive their company's future performance by ensuring that decisions taken in the course of managing the company can be quantitatively and objectively analysed to determine whether they align to the company's shareholders' expectations of wealth maximisation.

This study will help to focus management teams on value creation and motivate and guide their activities towards the identification of strategies and the prioritisation of the areas of their company's financial, investment and operational performance on which to focus their time and resources. This study will also enable shareholders' and investors to test announcements of strategic intent made by a company's management team for its potential to create shareholder wealth and thus identify the companies in which to invest, hold and divest.

1.5 Delimitations of the study

This study will focus solely on companies that have their equity listed and traded on the Main Board of the JSE.

The accounting financial ratios for these companies' annual financial reporting periods will be calculated using their audited annual income statements and balance sheets, while the shareholder wealth of these companies will be calculated using information contained within their audited balance sheets and a one week average of the daily JSE closing prices of these companies equity following the release of their annual financial statements. This conservatively ensures that the data used in this study was publicly available and incorporated into the market price of the companies' equity, and thus the shareholder wealth. [Refer to APPENDIX A for a detailed list of the formulas that will be used to calculate the accounting financial ratios and shareholder wealth of the companies used in this study].

Only changes in the monetary value of the companies' tangible and intangible assets that are declared in the companies' financial statements will be considered. Changes in the value of the companies' other intangible assets that are not declared in their financial statements, such as innovation capabilities; management capabilities; technology; brand value; employee relations; and environmental and community issues will not be explicitly considered.

1.6 Definition of terms

Accounting Financial Ratios – Accounting Financial Ratios are statistical yardsticks that relate to two numbers obtained from a company's income statement, balance sheet, or both, and measures the efficiency with which the organisation employs the resources provided by its shareholders' and debt-holders' (Georgescu, 2009).

Financial Ratio Analysis – Employing accounting financial ratios to perform a relative comparison of a company's performance over a period of time (Halim, Jaafar, & Osman, 2011) to determine how a company's performance is evolving from one period to the next (Monea, 2009).

Profitability ratios – Profitability ratios reveal a company's actual performance and its growth potential, and according to Georgescu (2009), are probably the most important indicators of the company's financial success. These ratios relate income to sales, and determine the ability of a company to generate earnings through the effective use of resources. A company is considered to be performing well when its profitability ratios are high and increasing over successive periods (Monea, 2009).

Asset efficiency ratios – Asset efficiency ratios provide an indication of how efficiently a company has used its assets, by turning the use of its assets into sales. Such ratios also indicate the level of management efficiency (Lan, 2012; Georgescu, 2009; Ibarra, 2009) as they measure a company's degree of success or failure in its operation by exposing its ability to generate an adequate return on invested capital (Ibarra, 2009). A company is considered to be using its assets efficiently when its asset efficiency ratios ratios are high and increasing over successive periods (Monea, 2009).

Capital structure ratios – Capital structure ratios indicate how a company is using long term debt to finance the company (Monea, 2009); and thus provide a measure of the financial risk of a company (Georgescu, 2009).

Liquidity ratios – Liquidity ratios provide an indication of the long term solvency of a company (Lan, 2012; Monea, 2009) through measuring a company's short-run ability to pay its debts as they fall due; providing a measure of the financial risk of a company as the ultimate cause of company failure is a lack of funds to pay debts as they fall due (Georgescu, 2009).

Sustainable Growth Rate – The sustainable growth rate is the maximum rate at which a company can grow its sales using internal financial resources and without having to issue new equity. This ratio measures by how much a company can increase its sales through increasing its assets by using only its retained earnings (Ashta, 2008).

Industry Sector – An industry, or economic group, consists of a group of establishments engaged in the same or similar kinds of activity.

Gross Domestic Product (GDP) – A production measure obtained through the sum of the gross values added of all resident institutional units, in their capacity as producers, plus the values of any taxes, less subsidies, on production or imports not already included in the values of the outputs and values added by resident producers.

Consumer Price Index (CPI) – An index that measures the prices of a fixed basket of consumer goods and services.

Johannesburg Securities Exchange (JSE) – a market place for the trading of financial products and a major provider of financial information.

1.7 Assumptions

- The sample used in this research will be of an adequate size and representation to infer statistical conclusions that could be inferred to the population.

- The annual financial statements and equity trading prices of the companies represented in the sample will be readily available, enabling the calculation of the companies' accounting financial ratios and shareholder wealth. Should any of the company's/companies' annual financial statements and/or equity trading prices not be available, these company's/companies' would then be excluded from the study, which could reduce the external validity of the results of the study.
- The financial statements of the companies considered in this study have been produced honestly and represent a fair and accurate picture of the financial position of the company at the time that they were produced. Should the financial statements of the companies considered in this study not represent a fair and accurate picture of the financial position of the company, the accounting financial ratios computed as part of this study will be incorrect, and the conclusions drawn from this study would not be valid. The JSE however requires that listed companies financial statements conform to International Financial Reporting Standards (IFRS), and that these financial statements be audited in accordance with International Standards on Auditing. This provides some assurance that the financial statements are free from material misstatement and provide a fair and accurate picture of the financial position of the company at the time that they were published.
- The JSE conforms to a semi-strong form of the Efficient Market Hypothesis as concluded by Magnusson and Wydick (2002); that is, all publicly available information about a company is impounded immediately and without bias into the company's share price (Patton 1982). Should the JSE not conform to a semi-strong form of the Efficient Market Hypothesis, the shareholder wealth computed as part of this study would be incorrect, and the conclusions drawn from this study would be invalid.
- The daily closing price of a company's equity reflects a weighted average of all investors' assessment of a company's prospects and therefore its current value.

- As the levels of shareholder wealth for the sample of companies used in this study will be calculated upon release of the companies' financial year end results and prior to the companies ex-dividend date, the level of shareholder wealth calculated will be inclusive of the returns that shareholders' receive via an increase (or decrease) in the value of their equity, and returns that shareholders' receive via dividend payments as the share price prior to the ex-dividend date would not yet have fallen to reflect the amount of the dividend payment.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter contains a literature review of the key themes of relevance to this research study. The definition of shareholder wealth; the methods of measuring shareholder wealth creation; the key financial drivers impacting shareholder wealth; and the financial structural differences between industry sectors will be investigated. This section concludes with an overview of the key learning's gained from the literature.

2.2 Background discussion

Creating wealth for a company's shareholders' is widely accepted as a dominant goal of every profit seeking company, and has been discussed widely both in the business press and academic literature (Madhavi & Prasad, 2015; Bernier & Mouelhi, 2012; Burja & Burja, 2009; Petravičius &Tamošiūnienė, 2008; de Wet & du Toit, 2007; Rappaport, 2006). It is a goal that is shared by a street vendor, as well as large multinational listed companies, with the only difference being that while the street vendor operates for the benefit of one person, a listed company operates for the benefit of a large number of shareholders' (de Wet & du Toit, 2007). This goal also helps to ensure that scarce resources are allocated efficiently, which benefits the economy as a whole (Petravičius & Tamošiūnienė, 2008; Crowther, Davies, & Cooper 1998). For a national economy, value creation means the efficient use of the national economic potential and an increase in the nation's gross domestic product, which in turn contributes to the increase of social welfare (Burja & Burja, 2009). However, while many managers may acknowledge that maximising the company's shareholders' wealth as an overriding objective, Muehlhauser (1995) contends that creating shareholder wealth is one of the most challenging

management tasks, as the path to shareholder wealth creation and shareholder wealth maximisation is often unclear (Reimann, 1989). This is due to firstly, there being many diverse definitions of shareholder wealth (Shukla, 2009); and secondly, there being varying views presented on how shareholder wealth should be calculated, and therefore how shareholder wealth creation should be measured (de Wet & du Toit, 2007). Thus, the first step in driving shareholder wealth creation is to clearly define what is meant by shareholder wealth, a term which according to Shukla (2009) is often used in a nebulous manner to indicate some desirable but unidentifiable objective. Only once shareholder wealth has been defined can a company's management team begin the task of identifying, and positively influencing those internal financial performance measures that drive the creation of shareholder wealth (Petravičius & Tamošiūnienė, 2008).

2.3 Definition and Measurement of Shareholder Wealth

Although shareholder interests have been recognised as important for a long time (Reimann, 1989); interest in shareholder wealth and shareholder wealth creation increased considerably since the late 1980's (Bernier & Mouelhi, 2012). This increased interest stemmed from developments being made in measuring shareholder wealth using economic based shareholder wealth measures that were developed (Reimann, 1989).

Prior to the development of economic based shareholder wealth measures, shareholder wealth was related to and measured using accounting based financial performance measures, measures which were easily and objectively quantified; and were often correlated with the rewards that the managers of the company received (Rappaport, 1986). However, there has been a considerable shift in focus from defining shareholder wealth using these accounting based profit measures to defining shareholder wealth using economic based measures. The shift in focus to defining shareholder wealth using economic based measures has been realised through the return to a consideration of the

importance of *economic value* and is based upon the assumption that maximising the value of a company to its shareholders' also maximises the value of that company to society at large (Burja & Burja, 2009).

Following on from the shift in focus to defining shareholder wealth using economic based measures, some researchers have defined shareholder wealth as being the market value of a company's equity, and state that shareholder wealth is created through an appreciation in a company's market value (Scott, 1998), while others have pointed out that shareholder wealth is created only when the combined return to the shareholder in the form of dividend payments and market value appreciation of equity exceed the risk-adjusted rate of return required by the shareholders' (Dalborg, 1999 as cited in Shukla, 2009). However, applying the definition of shareholder wealth creation proposed by Scott (1998) and focusing solely on the market value appreciation of a company's equity fails to consider a fundamental component of shareholder wealth, which is the total value of the funds that the shareholders' have had to invest in the company to obtain the current market value level of the company's equity; while, applying the definition of shareholder wealth creation proposed by Dalborg (1999) not only ignores the total value of the funds that the shareholders' have had to invest in the company, but it is also considered to be a short-term measure that can be easily influenced by management and accounting practices (Shukla, 2009).

To overcome these weaknesses in measuring shareholder wealth, other researchers have proposed that the calculation of shareholder wealth involve the comparison between the total market value of a company's equity (the company's equity trading price multiplied by the number of shares that the company has outstanding) and book value of the company's equity (total assets minus total liabilities as per the company's balance sheets) which also corresponds to the total value of funds that the shareholders' have invested in the company directly through share capital and indirectly through the company retaining some of the earnings due to shareholders'. This measure of shareholder wealth creation endeavours to obtain the true measure of shareholders' wealth enhancement as it compares the market value of

shareholders' equity (which also provides an indication of the performance potential and inherent risk of the company) with the net worth or shareholders' funds invested in the company (Stern, 1990 as cited in Shukla, 2009). There are two popular methods of calculating shareholder wealth using this approach, namely: Market Value Added (MVA), popularised by the New York based Consulting Firm Stern Stewart & Co.; and the Market-to-Book (MTB) ratio.

2.3.1 *Market Value Added*

This measure of shareholder wealth creation endeavours to obtain the true absolute measure of shareholders' wealth enhancement (Stern, 1990). The MVA concept recognises that the market value of a company's shareholders' equity by itself does not constitute a reliable measure of shareholder wealth creation (Thenmozhi, 2000) as any company can increase the total value of its shareholders' equity simply by both retaining most of its earnings and raising new capital. MVA accounts for this by seeking to measure how much a company has added to, or subtracted from its shareholders' investment in the company by comparing the increase (or decrease) in the market value of shareholders' equity with the increase (or decrease) in the net worth or shareholders' capital invested in the company (Madhavi & Prasad, 2015; Kramer & Pushner, 1997). MVA effectively measures the equity market's estimate of the net present value of a company's past and expected capital investment projects (Madhavi & Prasad, 2015), and is based on the underlying premise that an organisation's value is not based on what it has (its assets) but rather what it can do with both its tangible and intangible assets (its capability) in the execution of its strategies (Ratnatunga & Montali, 2008). A positive MVA value can therefore be thought of as the intangible assets that the market attributes to the company (Burja & Burja, 2009).

Using MVA, shareholder wealth created (or destroyed) is defined as the absolute difference between the market value of the shareholders' equity and the book value of the shareholders' equity (which using the fundamental balance sheet accounting equation, Assets = Equity + Liabilities, can be

restated as the company's net expected inflows of economic benefits, or earnings defined as the difference between the company's total assets which are the resources that are expected to generate inflows of economic benefits, and the company's total liabilities which are the company's obligations that are expected to result in outflows of economic benefits), where a positive MVA means that a company has generated economic profits and increased the value of the shareholders' capital entrusted to it, and thus created wealth for its shareholder; and a negative MVA means that a company has generated an economic loss and decreased the value of the shareholders' capital entrusted to it, and thus destroyed shareholder wealth (Petravičius & Tamošiūnienė, 2009). It can therefore be stated that an enhancement in shareholders' wealth results from an increase in market capitalisation for a lesser increase (or decrease) in shareholders' equity; and according to the MVA concept, successful companies are companies that consistently add to their MVA, thereby increasing the value of the capital invested in the company; while unsuccessful companies are companies that decrease the value of the capital invested in the company. Therefore, in assessing a company's performance, the focus should be on MVA instead of market capitalisation, as market capitalisation on its own can be a misleading indicator of success.

As MVA is calculated by measuring the difference between "cash in" (the value of the capital that shareholders' have contributed to the company) and "cash out" (the value that shareholders' could obtain by selling their equity at today's prices), it accounts for the value of capital that shareholders' have had to invest, either directly through investing capital into the company in return for their equity stake or through the reinvestment of earnings due to them (retained earnings), to obtain the current level of market value (Griffith, 2006). MVA is thus viewed as a representation of the value that a company's management team has generated for the company's shareholders' and encapsulates the following three elements: the market's valuation of the company, which represents the degree of wealth enrichment for the company's shareholders; an assessment of the company's performance, which is the market assessment of how effectively a company's management team have used the scarce

resources under their control; and how effectively the company's management has positioned the company to earn abnormal returns in the long term (Ehrbar, 1998).

MVA thus tells us how much value the company has added to, or subtracted from, its shareholders' investment. Whether a company succeeds in creating MVA or not, depends on its overall rate of return. If a company's overall rate of return exceeds its cost of capital and is forecasted to continually exceed its cost of capital, the company's equity will sell on the market with a premium compared to the original capital. On the other hand, companies that have a rate of return smaller than their cost of capital or is forecasted to have a rate of return smaller than their cost of capital sell at a discount compared to the original capital invested in company. Thus, an important element of whether a company has positive or negative MVA depends on the sustainability of the rate of return generated by the company compared to the cost of capital (Thenmozhi, 2000).

Although MVA is an excellent measure of how much value the company has added to, or subtracted from, its shareholders' investment, it does have a flaw in measuring short term shareholder wealth creation. As MVA is a cumulative measure of company performance, it measures the effects of managerial actions since the very inception of the company, and it does not distinguish between shareholder wealth created recently and shareholder wealth created in the distant past (Petravičius & Tamošiūnienė, 2009). However, the solution to this problem is straightforward. The change in MVA over an appropriate period represents a suitable measure of wealth created in that period (Griffith, 2006). Thus, to calculate how much wealth the company has created or destroyed over a specific period of time, the difference between the level of the company's MVA at the beginning of that period is subtracted from the level of a company's MVA at the end of that period (Madhavi & Prasad, 2015). As MVA is calculated using market value of a company's equity, this change in MVA also indicates any change in investor expectations about the company over this period (Griffith, 2006), and thus should investors believe that a company holds the potential to

earn abnormal economic profits in the future, the change in its MVA over the period would be positive, while a negative value for the change in MVA would indicate that the previsions concerning the ability of management to use efficiently the capital are unfavourable as MVA grows only if the additional capital invested generates a bigger return of present cost of capital (Griffith, 2006)..

Another flaw that has been identified with using MVA as a measure of shareholder wealth created is that MVA is calculated using the book value of a company's assets, which are subject to inflationary distortions. Kramer and Peters (2001) and Kramer and Pushner (1997) however contend that although the book value of a company's assets is subject to inflationary distortions, MVA still provides an excellent measure of a company's ability to create shareholder wealth as it offers a useful market indication of present and future value creation by representing the difference between the capital invested and the present value of the cash flows expected from that capita

A limitation that has been identified with the use of MVA as a measure of shareholder wealth is that since MVA is an absolute measure, it fails to reflect the impact of the size of a company on its potential ability to create value' and comparisons of MVA between companies of different sizes are, therefore, in themselves, not particularly meaningful.

2.3.2 *Market-to-Book Ratio*

Another popular measure used to calculate shareholders' wealth enhancement, and calculated using the same variables used in the calculation of MVA, is the Market-to-Book (MTB) ratio. The MTB ratio is similar in meaning to MVA, with the difference being that while MVA is an absolute measure of shareholder wealth created, the MTB ratio is a relative measure (Thenmozhi, 2000).

As is the case with MVA, the MTB ratio of a company relates the market value of the company's equity (the company's equity trading price multiplied by the number of shares that the company has outstanding) to the equity that

shareholders' have invested into the company (total assets minus total liabilities as per the company's balance sheets) (Auret & Sinclaire, 2006). However, while the book value of a company's equity is subtracted from the market value of the company's equity when calculating MVA, the market value of the company's equity is divided by the book value of the company's equity when calculating the MTB ratio, providing a relative measure of wealth created by the company for its shareholders.

The MTB ratio of a company evolves based on the financial, investment and operational decisions made by the company's management team in the course of operating the company. When a company is newly established, its market value equates to the investment made by its shareholders. As the company's operations begin to show promise of long term returns, the market value of the company's shares begins to take shape (Agrawal, Monem & Ariff 1996). Thus, upon the establishment of a company, its MTB ratio equals one (1) indicating that the market value and book value are identical. As the company begins to operate, its MTB ratio either rises to a value of greater than one (meaning that the company is effectively using the resources at its disposal in generating economic profits and creating shareholder wealth), or decreases to a value of less than one (1) indicating that the company is not generating economic profits and destroying shareholder wealth (Agrawal et al., 1996).

Since the MTB ratio is measured using the current market value of the company's equity which inherently includes an assumption regarding a certain level of future earnings and cash flow, an MTB ratio in excess of one indicates that the company has created intangible assets (Goodwill) arising from the company's current or future investments that are expected to generate returns that are greater than the expected return on equity capital (Kramer & Pushner, 1997). The market value component of the MTB ratio can thus be expressed as:

MV = BV + G

Where MV = current market value of equity

BV = current market value of equity

G = Goodwill created by the company from non-zero net present value (NPV) projects

Important to note is that both positive Goodwill (MTB ratio > 1) and negative Goodwill (MTB ratio < 1) values can (and do) arise. Negative Goodwill can be attributed in part to irreversible past investments that are “locked-in" at the present date from which expected future economic profits may be negative if future cash flow prospects from these investments are assessed less favourably at the present time compared to the time at which the investments were made (Monahan, 2005).

In addition to being used as a measure of shareholder wealth, the MTB ratio can also be considered as a measure of risk, as Auret and Sinclaire (2006) go on to state that investments in two companies, each with similar book value to the other, are likely to be valued differently if there is more uncertainty surrounding the returns of one versus the other. The investment with the lesser uncertainty (lower risk) is likely to be preferred to the investment with the greater uncertainty (higher risk), and since investors are likely to produce pessimistic cash flow forecasts of the investment with the greater uncertainty, the market value of this investment would be lesser than the market of the investment with the lesser uncertainty; resulting in the MTB ratio of the investment with the lesser uncertainty being greater than the MTB ratio of the investment with the greater uncertainty.

By its definition, the MTB ratio also encapsulates the productivity of capital, and the changes in a company’s MTB ratio, similarly to changes in a company’s MVA, can also be a useful indicator of a company’s management team’s performance as it indicates to shareholders’ whether the company’s management team, in employing the resources that the shareholders’ have provided, has created or destroyed value for the shareholders. An increase in market capitalisation for the same level of net worth or decreased net worth would cause enhancement in shareholders’ wealth (Stern, 1990 as cited in Shukla, 2009) and result in an increase in the company’s MTB ratio. The MTB ratio, similarly to MVA, thus provides an indication of how effectively the capital

invested in a company is being used, and can be viewed as the true measure of the productivity of capital in any company.

Although the MTB ratio is calculated using the book value of a company's assets which is subject to inflationary distortions, Kramer and Peters (2001) state that it still provides an excellent measure of a company's ability to create shareholder wealth; and as the MTB ratio is a relative measure of shareholder wealth, it accounts for the impact of the size of a company on its potential ability to create value, providing it with an advantage over MVA in that it can be used to make meaningful comparisons of the level shareholder wealth created by a company over a period time as well as between companies of different sizes and companies operating in different industry sectors.

2.4 Financial Based Drivers of Shareholder Wealth

With the acceptance that market based measures provide an adequate measurement of shareholder wealth, de Wet and du Toit (2007) state that the major controversy currently surrounding shareholder wealth has moved on from being about the measurement of shareholder wealth itself, and is now about identifying and influencing the internal driver(s) of performance that have the greatest impact on shareholder wealth. Laux (2010b) reasserts this when stating that actions taken by company management teams to enhance shareholder wealth sometimes fail maximise shareholder wealth. This destruction of shareholder wealth is not always as a result of poor management, and as de Wet and du Toit (2007) contend, the choice of company performance measures is one of the most critical challenges facing a company's management team, as poorly chosen performance measures could create incorrect signals for managers, leading them to make poor decisions which result in undesirable results for the company's shareholder wealth creation.

Over the years there have been numerous studies aimed at identifying the financial performance measure(s) that have the greatest impact on some

measure of shareholder wealth as defined by the researcher, with a number of financial performance measures being proposed as being the major driver of shareholder wealth (Bernier & Mouelhi, 2012). These financial performance measures can be classified into two broad groups; accounting based financial performance measures derived from a company's financial statements; and market based financial performance measures derived using a combination of the company's financial statements and the risk adjusted cost of the shareholders' capital. Accounting based financial performance measures have been criticised as they are said to reflect the perspective of managers, who are only interested in the performance of the company over the most recent period (Gentry & Shen, 2010; Ratnatunga & Montali, 2008); while market based financial performance measures have been hailed as they are said to reflect the perspective of shareholders' and potential investors who are interested in the long term financial performance of the company (Burja & Burja, 2009 and Petravičius & Tamošiūnienė, 2008).

Authors such as Biddle, Bowen and Wallace (1999); Kramer and Pushner (1997); Uyemura, Kantor and Pettit (1996); Dodd and Chen (1996); Milunovich and Tsuei (1996); O'Byrne (1996); Stern (1990); Finegan (1991) have researched a number of these accounting based financial performance measures and market based financial performance measures on the assumption of the performance measures having some correlation with shareholder wealth. The approach followed by these researchers was to test the correlation between a chosen financial performance measure (such as earnings per share) and a measure of shareholder wealth (such as shareholder returns), where a financial performance measure is said to be a driver of shareholder wealth should it be highly correlated with shareholders' wealth and not subjected to randomness inherent in the financial performance measure (de Wet and du Toit, 2007).

2.4.1 *Accounting Financial Ratios as a Proxy for Financial Performance*

Starting from an understanding that financial statements are prepared to provide an accurate representation of the financial position of a company, the next step is to consider how a company's management team, a company's shareholders, a company's stakeholders, and potential investors can extract the greatest meaning from a set of financial statements, and how management might use the information obtained to improve the performance of the company (Georgescu, 2009). While the figures and details in a set of financial statements contain sufficient information to provide an insight into the affairs of a company, financial ratios are still seen as an important tool for the management team of a company as they enable a deeper understanding of the financial position and performance of a company as there are a number of accounting financial ratios used to interpret and evaluate a company's financial performance which are computed from the information contained within the company's financial statements (Halim et al., 2011; Yang & Chuang, 2010; Ibarra, 2009). The financial statements used for the calculation of these accounting financial ratios include the company's Balance Sheet, Income Statement, and Cash Flow Statement.

Interpreting a company's accounting financial ratios is a complicated and multi-dimensional task. While developing and computing the different accounting financial ratios, consideration must be given to capture the various aspects of financial position and financial performance of a company. Financial ratio analysis is a useful measure to provide a snapshot of a company's financial position (Yang & Chuang, 2010; Ibarra, 2009) at any particular moment of time or to provide a comprehensive understanding of the financial performance of the company over a particular period of time. Accounting financial ratios assist in interpreting the financial performance of an entity, as it provides information relating to the company's solvency, the company's profitability, the company's return on its assets, and the company's ability to meet short-term and long-term liabilities; and are vital in gauging a company's health and its commercial

viability (Lan, 2012; Yang & Chuang, 2010; Ibarra, 2009; Monea, 2009; Georgescu, 2009). Financial ratio analysis is hierarchical, with accounting financial ratios lower in the ordering providing detailed information about the financial ratios higher up. As such, the accounting financial ratio analysis is then considered to be a judgemental process as not all ratios are useful in a given situation (Libby, Libby & Short, 2004).

However, accounting financial ratio analysis can still provide deep insight into a company and according to Moyer, McGuigan and Rao (2007), the information obtained from financial ratio analysis can aid a company's stakeholders in:

1. Identifying a company's strengths and weaknesses, thereby enabling an assessment of its viability and whether a satisfactory return could be earned from the risk taken;
2. Assessing whether a company's objectives are compatible with its resources; and
3. Planning to achieve company goals;

while Wong and Ng (2010) argue that financial ratio analysis enables a company's stakeholders to examine the operating performance of the company in terms of the following six criteria:

1. Whether the company is appropriately utilising its assets;
2. Whether profit margins of the company are in line with its assets;
3. Whether there is excessive investment in fixed assets;
4. Whether the company is adequately financed;
5. Whether there are signs of liquidity strain; and
6. Whether the collection of receivables is efficient.

The use of accounting financial ratios is multi-dimensional. It is not only useful for judging the financial health or performance of a particular company over time, it is also a useful tool for comparing a company's financial position and performance with respect to others in the same or different industry sector to pinpoint problem areas or to identify areas of further improvements (De, Bandyopadhyay, & Chakraborty, 2010).

Comparing a company's financial ratios with those of an industry group peer is common practice, and Gentry and Shen (2010) state that it has been well established that financial ratios tend toward industry group averages which are believed to represent some type of "optimal" operating structure.

2.4.2 *Accounting Based Drivers of Shareholder Wealth*

Trifan and Suciu (2015) state that although there is no consensus about measuring a company's performance it is certain that a company's financial performance is directly related to the creation of value. From strategic management literature, accounting based measures of company financial performance can be seen as the most important measures of company financial performance and the creation of value based on their popularity (Barney, 1997). While cynics would suggest that the reason for the popularity of accounting based measures is that the data is easily available for publicly traded companies, others contend that accounting numbers are important because managers use them when making strategic decisions (Georgescu, 2009). From a theoretical perspective, accounting based measures are believed to assess a company's short term performance (Ratnatunga & Montali, 2008) and thus reflect the perspective of managers, who are interested in the performance of the company over the most recent period. However, Hoskisson et al. (1994) have suggested that past performance measured using accounting data is also a good predictor of future performance measured using market data, as they have found a significant, positive relationship between accounting and market based measures of financial performance.

Traditional performance measures such as return on equity (ROE), along with return on net assets (RONA), are some of the all-time favourites and perhaps most widely used overall measure of a company's financial performance (Rappaport, 1986 as cited in de Wet & du Toit, 2007); and overall measure of whether value has been created for shareholders' (Reimann, 1989 as cited in de Wet & du Toit, 2007). Rappaport (1986, as cited in de Wet & du Toit, 2007) however states that ROE has gained appeal because it links the income

statement (earnings) to the balance sheet (equity), and according to (Reimann, 1989 as cited in de Wet & du Toit, 2007), the reason behind the adoption of ROE as a measure of financial performance is that it provides a more reliable measure of shareholder wealth than earnings per share (EPS).

The fact that ROE represents the end result of structured accounting financial ratio analysis, called the Du Pont analysis (Robinson, Henry, Pirie, Broihahn, & Cope, 2012; Firer, Ross, Westerfield, & Jordan, 2004) has also contributed towards its popularity among analysts, financial managers and shareholders' alike.

DuPont analysis, as illustrated in Figure 2.1 is a common form of financial statement analysis which decomposes ROE into two multiplicative components: return on net operating assets (RONA) and gearing (Debt to Equity ratio). RONA can be further decomposed into another two multiplicative components: operating profit margin and net asset turnover rate (measuring asset efficiency); and as these two accounting ratios measure different constructs, they accordingly have different properties. Hence, through the use of structured financial statement analysis, such as the DuPont analysis illustrated in Figure 2.1, Asset Efficiency Ratios and Profitability Ratios can be directly related to Performance Ratios, highlighting how management decisions affects shareholder wealth (Chakravarthy, 1986).

From the DuPont analysis, it can therefore be deduced that while maximisation of ROE is important in maximising shareholder wealth, the maximisation of shareholder ROE (and therefore shareholder wealth) can only be achieved through simultaneously maximising multiple internal measures of performance to their optimum levels.

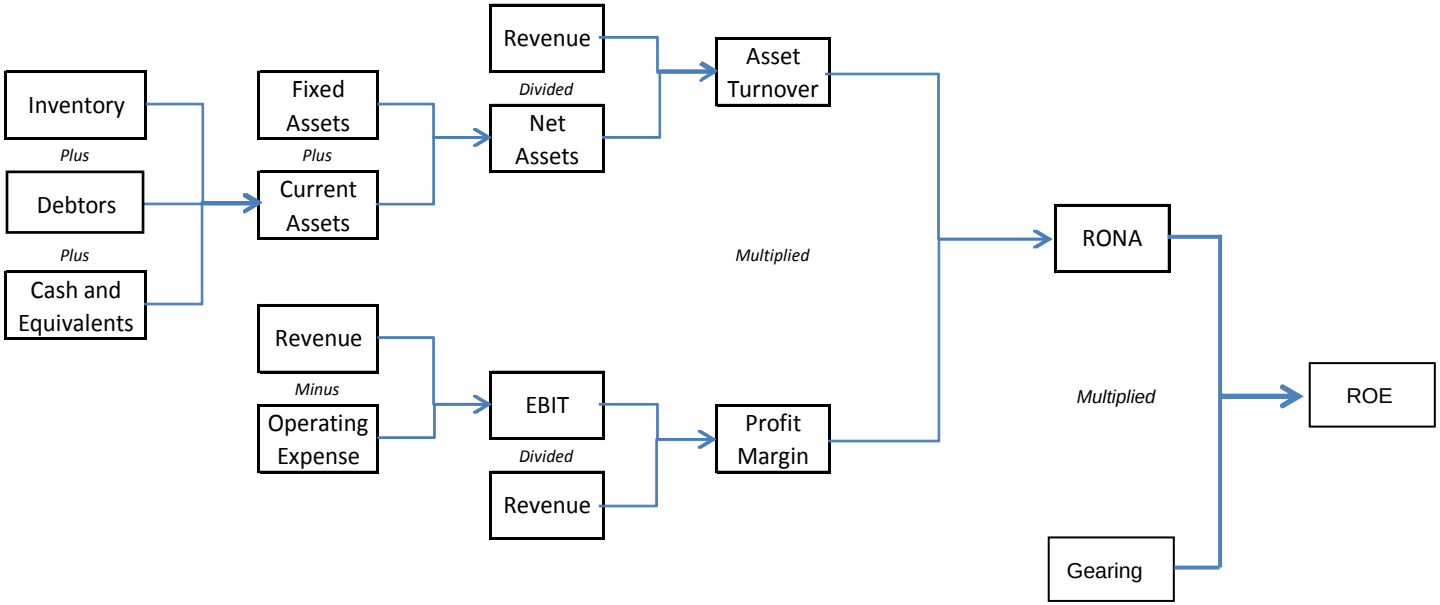

Figure 2.1: DuPont Analysis Model (Soliman, 2008, p.824)

And while there has been vast research conducted relating Return on Equity (ROE) to MVA and the MTB ratio (Gentry & Shen, 2010; Senthilkumar, 2009; Auret & Sinclaire, 2006; Kramer & Pushner, 1997; Fama & French, 1995); and further research conducted on relating MVA to Profitability ratios; Asset Efficiency ratios; Capital Structure ratios; Liquidity ratios; and Inventory Turnover ratios, only empirical research relating the MTB ratio to ROE has been found. However, referring to Figure 2.1, it can be inferred that as ROE, a Performance ratio, is the product of Profitability ratios, Asset Efficiency ratios and Financial Gearing; increases in Profitability ratios, Asset Efficiency ratios and Financial Gearing, increases in these ratios will ultimately result in an increase in Performance ratios.

Research conducted by Fama and French (1995) found that a positive direct relationship between the MTB ratio and ROE exists, where companies that have high MTB ratios also have high Performance ratios; while studies by Thomas and Lipson (as cited by Black, Wright, & Davies 2001), found through their research as far back as the 1980s, the coefficient of determination (R^2) of ROE to MTB ratios was only 19 percent, indicating that changes in the MTB ratio cannot be reliably explained by ROE.

Hall and Brummer (1999) have also found a weak positive relationship between ROE and MVA; and a slightly stronger weak positive relationship between MVA and RONA. RONA measures asset utilisation and efficiency, which is generally a result of the efficient use of property, plant, and equipment; efficient inventory processes; and other forms of efficient working capital management. It is not surprising then that RONA is positively related to shareholder wealth as efficiency has been researched and praised by both economists and accounting researchers. Firstly, economists maintain that efficiency gains are the engine for economic growth, with CEOs often citing efficiency as among the most important issues requiring their attention (Ratnatunga and Montali 2008). Secondly, management accounting literature hypothesises a positive association between a company's value and its efficiency, with the claim that a

company's value will eventually be increased through improving its efficiency (Kaplan & Norton, 1986).

While Lan (2012) states that Profitability ratios which measure the firm's ability to earn an adequate return are arguably the most widely used ratios in investment analysis, inferring that they would have a strong relationship with shareholder wealth, Hall and Brummer (1999) found that profitability ratios are very weakly correlated to MVA, which is in line with the findings of Kramer and Pushner (1997) and Gentry and Shen (2010). A possible explanation for this from Rapapport (1997) who introduced the concept of the "threshold" operating margin on new sales consistent with creating shareholder wealth, is that increasing profitability does not always result in an increase in shareholder wealth. According to Rappaport (1997), creating shareholder wealth involves not only increasing profitability, but also simultaneously reducing investment intensity and/or reducing the cost of capital.

Although ROE is still used extensively for measuring a company's financial performance (de Wet & du Toit, 2007), it has received a large degree of criticism by authors such as Black et al. (2001) for not being consistent with the creation of shareholder wealth, as pursuing a higher ROE may lead to wealth destruction, which is not in line with the economic principles of shareholder wealth creation (Rappaport 1986 as cited in de Wet and du Toit 2007). De Wet and du Toit (2007) state that the flaw with ROE is that it is calculated after the cost of debt, but before taking into account the cost of shareholders' capital. As ROE increases with more financial gearing, a company may be able to improve its ROE as long as the returns earned on the borrowed funds exceed the cost of the borrowings, while at the same time earning a return that is below its weighted average cost of capital (WACC), and thereby destroy shareholder wealth. de Wet and du Toit (2007) go on to state that another danger inherent in increasing the financial gearing beyond a certain level is that the increased financial risk could increase the company's WACC, resulting in the company's share price and value falling. Furthermore, Rappaport (1986) pointed out that asset turnover is affected by inflation in such a way that it may increase even

when assets are not utilised better. He argues that sales immediately reflect the impact of inflation, whereas the book value of assets, which is a mixture of new and older assets, does not adapt as quickly to the effects of inflation; citing his studies in the 1970's which revealed that found that although the earnings of Standard & Poor's 400 companies decreased dramatically during the 1970's, their ROEs actually increased through increased levels of asset turnover and gearing. Rappaport found however, that the markets were not misled by this apparent 'better performance', resulting in poor market returns during this period. Koller (1994) has also found evidence supporting the view that the market uses a sophisticated approach to assess accounting earnings stating that earnings window dressing do not improve share prices (and shareholder wealth).

2.4.3 *Market Based Drivers of Shareholder Wealth*

While accounting based measures of financial performance have been criticised for being transaction-oriented, highly dependent on the choice of accounting measurement method, conservatively biased, ignoring some economic values and value changes that accountants feel cannot be measured accurately and objectively, ignoring the cost of shareholders' capital, and ignoring risk and changes in risk (Ratnatunga & Montali, 2008); market based measures of financial performance have been hailed as they are thought to be immune to the distortions introduced by deceptive managerial practices and/or accounting conventions under the assumption that efficient markets can see through such distortions. Furthermore, market based metrics such as Economic Value Added (EVA) Economic Profit (EP), Cash Flow Return on Investment (CFROI) and Cash Value Added (CVA) have attempted to divert management focus away from earnings and towards cash flows and claim to align management and shareholder interests. These measures recognise that capital invested in a company is not free, and make a charge for the use of the capital employed by the company in its operations (Madhavi & Prasad, 2015).

The market based measures of financial performance acknowledge that whilst it is crucial for a company to generate and measure profit from its operations, it is of equal importance to express that profit in relation to the value and the cost of the capital used to generate that profit. Thus, while a company may record a profit on its Income Statement, it would still generate a net loss to the economy if it returns to the economy less than it received as resources (Burja & Burja, 2009).

The most commonly used market based measure of financial performance is EVA. EVA was developed, refined and popularised by Stern and Stewart of the New York based consulting firm, Stern Stewart & Co. While traditional accounting based measures of financial performance account only for the cost of debt when calculating the profitability of a company, EVA realises that shareholder funds are not provided free of charge to a company and thus incorporates both the cost of debt and equity when measuring the profitability of a company (Madhavi & Prasad, 2015; Petravičius &Tamošiūnienė, 2008). EVA is an absolute measure of financial performance and is calculated by taking the spread between the return on capital (debt and equity) invested in the company and the cost of the capital invested in the company and multiplying this by the value of the capital committed to the company. The fundamental principle of EVA is that even though a company may report increases in earnings year after year, if it does not earn at least a minimum rate of return on the amount of capital that the company's shareholders' have invested then the company is failing to add value for its shareholders' (Madhavi & Prasad, 2015; Petravičius & Tamošiūnienė, 2008).

Stewart (1990) has also proposed a direct relationship between EVA and MVA. Stewart (1990) posits that EVA is the economic earnings that are capitalised by the market in arriving at a company's MVA, and thus MVA = Sum of Present Value of all future EVA. Therefore, by increasing EVA, a company increases its market value added which implies that only companies that earn in excess of their cost of capital are rewarded by the market with positive MVAs. Stewart (1990) therefore goes on to describe EVA as the fuel that fires MVA.

These theoretical links between EVA and MVA imply that EVA would be a better driver of MVA (and the MTB ratio as the both MVA and the MTB ratio are calculated using the same variables) than accounting financial ratios; however, studies by both Paula and Elena (2005) and Madhavi and Prasad (2015) have found mixed results with several studies concluding that EVA has a stronger correlation with MVA than the accounting financial ratios measures tested, while others studies indicating that EVA does not explain MVA better than the accounting financial ratios tested. Hall and Brummer (1999) in their study of the JSE listed industrial companies over the ten year period 1988 till 1997 found a weak positive correlation coefficient between EVA and MVA of only 0.16; which is only marginally stronger than the correlation they found between ROE and MVA (0.10), and RONA and MVA (0.11); two accounting financial ratios which have been heavily criticised for not taking account of the cost of shareholders' funds. Kramer and Pushner (1997) have also found that changes in MVA were better correlated to the levels of NOPAT than they were to EVA.

Although EVA has been hailed as being the best indicator of value creation for a company, and maximisation of the measure is often recommended by researchers as they believe that by maximising EVA shareholder wealth can be maximised; EVA does have a major drawback, that is, it is a short term measure, generally measuring a company's performance over a single year. EVA can therefore be manipulated by foregoing investments in NPV positive projects that will only yield benefits in later periods, thereby improving short term economic profits but destroying future economic profits. Considering the MTB ratio (and MVA) as a measure of shareholder wealth, a short term EVA maximisation focus could ultimately destroy shareholder wealth as a major component of the MTB ratio (and MVA) is the market value of a company's equity, which is based on the company's future cash flows. Further criticisms of the EVA measure include (Paula & Elena, 2005):

- Revenue recognition manipulation by choosing which customer orders to fill and which to delay.
- Discretionary expenditure termination to boost EVA.

- Completely depreciated assets may not be replaced because it lowers the asset base and ensures that no depreciation is charged, thereby increasing the EVA.

While EVA is seen as the performance measure that is most directly linked to the creation of shareholder wealth over time as it comes closer to capturing the economic profit of a company than any other measure (Madhavi & Prasad, 2015), by far, the largest criticism of EVA is that in order to calculate EVA, arbitrary adjustments need to be made to standard accounting numbers, raising doubts about the validity of this measure (Crowther, Davies, & Cooper, 1998).

2.5 Financial Structural Differences between Economic Groups

Industrial economics literature has defined an industry sector as a group of companies facing similar economic and competitive factors. Consequently, because of similar economic and competitive factors, the characteristics (and consequentially the accounting financial ratios) of companies within the same industry sector often tend to cluster (Yang & Chuang, 2010); and therefore, when evaluating an accounting financial ratio, the nature of the ratio must be considered in light of industrial organisation theory as industry sector membership could explain some of the cross-sectional variation present in the accounting financial ratio (Burgman & Clieaf, 2012). In fact, Burgman and Clieaf (2012) have stated that an untested but generally accepted rule of thumb is that 25% of long-term change in an equity's price is due to industry-specific factors.

2.5.1 *Financial Ratios Clustering within Industry Sectors*

Comparing a company's accounting financial ratios with those of an industry sector peer is common practice (Yang & Chuang, 2010; Ibarra, 2009; Monea, 2009). It has long been established that accounting financial ratios tend toward industry sector averages because companies within an industry sector

experience similar competitive factors (Yang & Chuang, 2010). Industry sector have unique operating structures that cause their accounting financial ratios to cluster by industry sector membership. Therefore, to compare the Asset Efficiency ratio of a company in the Resources industry sector with that of a Financial Services sector company would be futile because of differences in the way these two industries generate revenue. This concept is based on the notion that industry sector averages represent some type of “optimal” operating structure (Ibarra, 2009). It is for this reason that investment analysts often study companies in the context of industry sector peers and specialise in a particular industry sector. Most analysts’ reports begin with an in-depth analysis of the industry sector as a whole, before discussing the specific company (Yang & Chuang, 2010). Financial statement textbooks promulgate this type of economic group comparison as a method of analysing a company’s financial statements (Ibarra, 2009); while financial portals offer industry sector benchmarks as a point of comparison for an individual company.

Indeed, Selling and Stickney (1989) have found that while most companies achieve similar levels of RONA, the level of Profitability and Asset Efficiency tends to cluster by industry sector. They attribute the clustering of Profitability and Asset Efficiency to the permanent structural differences in the operations of companies in different industry sectors, and state that industry sector targets are more appropriate than economy wide targets for Profitability and Asset Efficiency. Selling and Stickney (1989) have added that ultimately, it is the technology and operating requirements of conducting business within a particular economic group that dictates the levels of Profit Margin and Asset Turnover within a company. Yang and Chuang (2010) concur with this, as they have stated that accounting financial ratio movements can be explained through two main effects: a passive adjustment effect that occurs due to exogenous factors that affect the entire industry in which a company operates; and the active adjustment effect that is caused due to the efforts of the management to achieve desired targets. If the extent of earnings of a company differs considerably from the industry average, investors may regard it as a good indication of the future success of the company (Yang & Chuang, 2010).

Ultimately, this is an important insight. Accounting information may not always be useful for forecasting the future, and, industry sector adjustment serves a useful purpose for certain financial ratios where the cross-sectional variation of those ratios can be explained by industry sector membership, and It may be that more information is required (e.g., industry sector specific) before the accounting numbers are useful and informative for predicting the future.

2.5.2 *Hypothesis 1*

The level of shareholder wealth generated by South African JSE listed companies is related to the level of a holistic set of the companies' accounting financial ratios.

2.5.3 *Hypothesis 2*

The level of shareholder wealth generated by South African JSE listed companies is related to the level of the companies' individual accounting financial ratios.

2.6 Conclusion of Literature Review

The literature review reveals that while there are many different accounting and market based profit measures used to define and calculate shareholder wealth, market based profit measures, in particular MVA and the MTB ratio provide the most accurate measure of shareholder wealth as these measures consider not only the current market value of shareholders' equity stake in a company, but also the value of funds that these shareholders' have had to invest in the company to obtain the current market value of the equity stake they hold in the company. These profit measures therefore not only provide a representation of the value that a company's management team has generated for the company's shareholders, it also encapsulates an assessment of the company's overall performance, which is the market assessment of how effectively a company's

management team have used the scarce resources under their control in an attempt to generate economic profits for the company's shareholders, providing an indication of how productively shareholders' funds are being utilised; and how effectively the company's management has positioned the company for the long term. The literature review has also revealed that while there is a limitation in using the MTB ratio to assess short term performance stemming from the MTB ratio being a cumulative measure of a company's performance since its inception, the change in the MTB over a period will accurately represent the measure of wealth created over that period. The literature review has also revealed that the MTB ratio has a practical advantage over MVA in that as the MTB ratio is a relative measure of shareholder wealth, it accounts for the impact of the size of a company on its potential ability to create value, which makes comparisons of MTB ratios between companies of different sizes and companies operating in different economic groups particularly meaningful.

While it was ascertained that accounting financial ratios can be used as a proxy for the financial performance of a company; and accounting financial ratios are theoretically related to shareholder wealth, the literature review has failed to conclusively identify which individual accounting financial ratios have a significant relationship with MVA and the MTB ratio. This can be attributed to prior research methods aiming to correlate either MVA or the MTB ratio to a single higher level financial ratio only, and not considering that the detail provided by lower level financial ratios is needed to fully assess a company's performance and financial state The literature review has also revealed that accounting financial ratios are interrelated, and a positive increase in the accounting financial ratio being correlated with MVA or the MTB ratio could be as a result of a negative increase or decrease in another financial ratio; and therefore, to understand how MVA or the MTB ratio can be improved, a single financial ratio cannot be considered in isolation. Thus, the topic of the relationship between the level of accounting financial ratios (Profitability, Performance, Asset Efficiency, Capital Structure and Liquidity) of South African JSE listed companies and the level of shareholder wealth created by these companies has not been conclusively resolved in the literature.

The literature review has also revealed that financial structural differences do exist across industry sectors with the accounting financial ratios of companies within the same industry sector tending to cluster due to them experiencing similar competitive factors. However, as a company is valued as a financial asset using the present value of future streams of cash flows, the literature review has failed to conclusively resolve the topic of whether the relationship between the level of shareholder wealth generated by companies at the time of the companies publishing their annual financial results and the level of the companies' financial ratios (Profitability, Performance, Asset Efficiency, Capital Structure and Liquidity) differs for companies operating within different industry sectors

2.6.1 Hypothesis 1

The level of shareholder wealth generated by South African JSE listed companies, at the time of these companies publishing their annual financial results is related to the level of a holistic set of the companies' accounting financial ratios (Profitability, Performance, Asset Efficiency, Capital Structure and Liquidity).

H_{01} : Shareholder wealth generated by South African JSE listed companies operating within different industry sectors is not related to a holistic set of these companies' accounting financial ratios.

2.6.2 Hypothesis 2

The level of shareholder wealth generated by South African JSE listed companies, at the time of these companies publishing their annual financial results is related to the level of the companies' individual accounting financial ratios (Profitability, Performance, Asset Efficiency, Capital Structure and Liquidity).

H_{02} : Shareholder wealth generated by South African JSE listed companies operating within different industry sectors is not related to the level of these companies' individual accounting financial ratios.

CHAPTER 3: RESEARCH METHODOLOGY

This chapter outlines the research methodology employed in conducting this research study. Firstly, literature explaining the quantitative research methodology is discussed, followed by a review of the research design and research instrument used in this research study. Issues of data collection and analysis in relation to this research study are provided, followed by a discussion of the validity and reliability of this research study.

3.1 Research methodology / paradigm

This research study is deductive in nature, aiming to analytically measure the relationship between the levels of a company's accounting financial ratios and the level of shareholder wealth it has created. This research study therefore employs the use of a quantitative research methodology to gather and analyse secondary data and thereby answer the research questions that have been proposed.

A quantitative research methodology can be defined as an empirical study that collects numerical data in order to systematically explain, predict and / or control phenomena of interest through statistical data analysis (Newman & Benz, 1998). This technique is used to test theory and is inclined to be deductive in nature (Roberts, 2006). Due to the numerical and deductive nature of this research study, this research methodology is best suited to gathering and analysing the data for this study.

The advantage of employing a quantitative research methodology is that the data collected as part of the study are numeric (ratio data in the case of this study), allowing for statistical tests and statistical analyses to be applied to the data to derive important conclusions. These statistical tests and statistical analyses are performed using standard prescribed methods, which improves

the validity and reliability of the analysis, and also allows for greater objectivity and accuracy of results. Using standard methods of analysis also means that the research can be replicated, and then analysed and compared with similar studies (Cohen; Manion, & Morrison, 2007).

3.2 Research Design

This research follows a non-experimental correlational research design to study in retrospect, the relationship between the levels of a company's accounting financial ratios and level of shareholder wealth created by the company, with a view to describing how the shareholder wealth created by the company varies in response to changes in the company's accounting financial ratios.

Non-experimental correlational research designs are used in situations where the research question relates to a relationship between variables being studied but manipulation of the levels of the variables; control over extraneous variables; or randomisation of research subjects cannot be effected (Cohen et al., 2007). These designs are focused on measuring and describing variables and their relationships. The goal of the non-experimental correlational research is therefore being to describe phenomena and explore and explain relationships between variables, not to prove causality (Creswell, 2014).

This is type of research design best fits this research study as:

- It is not possible for the researcher to manipulate any of the variables being studied;
- Randomisation may not be possible as this depends on the availability of secondary data resulting in the possibility of extraneous variables not being evenly distributed between the group of companies included in each sample; and

- The researcher is not able to incorporate all elements of control in this study, resulting in the evidence supporting a causal relationship being interpreted with a low level of confidence.

3.3 Population and sample

3.3.1 Population

The population for this research study comprises all South African companies that have their equity listed and actively traded on the main board of the JSE.

3.3.2 Sample and sampling method

Sample size is an important aspect of any study in which the goal is to make inferences about a population from a sample through the use of statistical analysis (Cohen et al., 2007). Using too small of sample could produce a statistic of inadequate precision, making statistical tests insensitive due to low statistical power; while using too large of a sample will make the statistical test overtly sensitive due to too much statistical power (Bezzina & Saunders, 2014). Therefore, the first step in identifying the sample to be used in this study was determining how large of a sample would be needed to enable statistical conclusions that are both accurate and reliable.

As this study involves the testing of hypotheses through multiple correlation analyses and bivariate correlation analyses, the sample size required for this study was based on the greater of the two sample sizes calculated for each of the statistical analysis methods.

The sample size for the multiple correlational analysis was determined using Power analysis and based on a desired statistical power level; desired probability level; number of variables included in the construct; and anticipated effect size (Lohr, 2010). The anticipated effect size was estimated to be large

based on the literature review of this study finding that accounting financial ratios can be used as a proxy for the financial performance of a company; and accounting financial ratios are theoretically related to shareholder wealth.

The following values were assumed in performing the multiple correlational analysis sample size calculation:

- Anticipated effect size (f^2) : 0.35
- Desired statistical power level (1-β) : 0.95
- Number of predictors : 18
- Probability level (α) : 0.05

The required sample based on these assumptions is **105** observations per industry sector.

The sample size for the bivariate correlational analysis was determined using the Fisher r-to-z transformation and based on a desired statistical power level, desired probability level and anticipated Pearson product-moment correlation coefficient under the alternative hypothesis (Lohr, 2010). As the sample size for a bivariate correlational analysis is inversely related to the Pearson product-moment correlation coefficient that is to be detected, a conservative Pearson product-moment correlation coefficient under the alternative hypothesis was selected, increasing the sample size required and conservatively ensuring that a sufficiently large number of observations would be collected so that all valid correlation coefficients found as part of this study would be statistically significant. This conservative Pearson product-moment correlation coefficient was determined using the lowest significant Pearson product-moment correlation coefficient found in the literature study for the shareholder wealth - accounting financial ratio relationship.

The following values were assumed in performing the bivariate correlational analysis sample size calculation:

- Desired statistical power level (1-B) : 0.95
- Probability level (*A*) : 0.05

- Expected Correlation Coefficient (r) : 0.03

The required sample based on these assumptions is **109** observations per industry sector.

The sample size required for this research study is therefore **109 observations per industry sector**. Considering that there are nine (9) economic groups and the sample for this study is limited by the number of companies listed on the main board of the JSE, it was decided to measure the companies included in the sample over a period of at least 10 years as this would conservatively ensure that sufficient observations for the multiple correlation analyses would be collected (i.e. data collected over a period of 10 years for 11 companies per economic group would provide up to 110 observations per economic group, meeting the required sample size and ensuring statistical validity of the results). The period for which to measure the companies needed to be determined, and it was decided to measure the companies over the period 2001 to 2010. Therefore to be included in the sample, a company would need to have had its equity continuously listed and actively traded on the JSE main board for the period 2001 to 2010.

Table 3.1: Research Study Sample Size

Multiple correlational analysis sample size	105 observations
Bivariate correlational analysis sample size	109 observations
Sample size required for this research study	**109 observations**
Number of companies per economic group to be sampled	11
Period over which data will be collected	2001 – 2010 (10 years)
Number of observations per economic group	110 observations

The last criterion is availability of data for the analysis. To be included in this study, a company's audited annual financial statements for each period and their daily closing share price must be readily available from a trusted source.

A profile of the sample required for this study is included in Table 3.2.

Table 3.2: Profile of research study sample

Economic Group	Number of Companies to be sampled	Number of Observations
Basic Industries	11	110
Financials	11	110
Information Technology	11	110
Cyclical Services	11	110
Non-Cyclical Consumer Goods	11	110
General Industrials	11	110
Non-Cyclical Services	11	110
Resources	11	110
Cyclical Consumer Goods	11	110

3.4 The research instrument

The secondary data collected for this study was in the form of standardised annual financial statements, daily closing share prices, and the daily number shares outstanding. Therefore, to obtain the information required for this study from the data collected; the level of each company's accounting financial ratios

and shareholder wealth created at the time of the company releasing its audited annual financial statements was calculated in an MS Excel model that was developed as part of this study. This model allowed for the capturing of a company's annual financial statements (income statement and balance sheet), daily equity prices and equity information; and included formulas that reference the company's annual financial statements, equity prices and equity information to calculate the level of the company's accounting financial ratios and level of shareholder wealth created at the time of the company releasing its audited annual financial statements. A detailed list of the accounting financial ratios employed in this study and the equations used to calculate these accounting financial ratios; and the equation used to calculate the shareholder wealth are provided in APPENDIX A.

3.5 Procedure for data collection

The objective of data collection is to produce reliable data, meaning that the data is consistent over both time and place (Farrell, 2011). As this research study conforms to a retrospective non-experimental correlational research design, it will make use of secondary data. Using secondary simplifies the data collection process and reduces the amount of time required to collect the data as the data is readily available (Cohen et al., 2007).

The data for this research study was sourced electronically from the Fin24 Expert Module of BFA McGregor. BFA McGregor is Africa's leading provider of financial data feeds and analysis tools covering African and global share prices, and providing company information including annual reports and financial statements.

BFA McGregor provides standardised financial statements for all JSE listed companies, which were used in this study. Using standardised financial statements ensures that the shareholder created and accounting financial ratios

calculations for each of the companies included in the sample are calculated in a consistent manner.

The sample companies' standardised annual financial statements (Income Statement and Balance Sheet) and daily equity price data for the period 1 January 2001 till 31 December 2010 were collected from the Fin24 Expert Module of BFA McGregor, while the date of release of the companies' annual financial statements were gauged from the companies' SENS announcements. All data were captured in the research instrument described in Chapter 3.4.

To ensure validity of the results from this study, the following assumptions have been made:

- All financial information reported by the companies in the sample is done so honestly and consistently over the period being analysed.
- All standardised financial information provided by BFA McGregor Fin24 Expert Module accurately matches the information reported in the financial statements of the companies used in the sample

3.6 Data analysis and interpretation

This research study involves statistical data analysis to test the following hypotheses:

H_{01} : Shareholder wealth generated by South African JSE listed companies operating within different industry sectors is not related to a holistic set of these companies' accounting financial ratios.

H_{02} : Shareholder wealth generated by South African JSE listed companies operating within different industry sectors is not related to the level of these companies' individual accounting financial ratios.

Statistical data analysis can be defined as the process by which data are transformed with the aim of extracting useful information and facilitating conclusions (Bezzina & Saunders, 2014).

Based on the research design employed in this research study and the nature of the hypotheses, it was determined that a multiple correlation analysis be used to statistically test H_{01}; and a series of bivariate correlation analyses be used to statistically test H_{02}.

3.6.1 Multiple Correlation Analysis

Multiple correlation analysis is a statistical method used to determine whether a linear relationship exists between a single response variable (y) and a composite of response variables (x's). The strength of the relationship is measured using the sample multiple correlation coefficient, R, which can vary from 0 (indicating there is no linear association) to +1 (indicating there is a perfect linear association). As the multiple correlation coefficient, R is never a negative value; it only provides the strength of the relationship between the y and the x's, and not the direction of the relationship (Huberty, 2003).

There is no precise definition of strength of the multiple correlation coefficient, R for values of R ranging between 0 and 1; however, values of R closer to 0 are considered to be weak linear associations, while values of R closer to 1 are considered to be strong linear associations. As part of this study, it was decided to use certain cut-off points for the value of R in classifying the strength of the relationship between the single response variable (the MTB ratio) and the composite of response variables (holistic set of accounting financial ratios). Based on the literature review of this study finding that accounting financial ratios can be used as a proxy for the financial performance of a company; and that accounting financial ratios are theoretically related to shareholder wealth, it was decided that a multiple correlation coefficient value below 0.4 would be classified as indicating a weak linear association, while a multiple correlation coefficient greater than 0.4 but below 0.8 would be classified as indicating a moderate linear association, and a multiple correlation coefficient greater than

0.8 would be classified as indicating a strong linear association. The strength of the linear relationship indicated by the different values of the multiple correlation coefficient, R is illustrated in Figure 3.1.

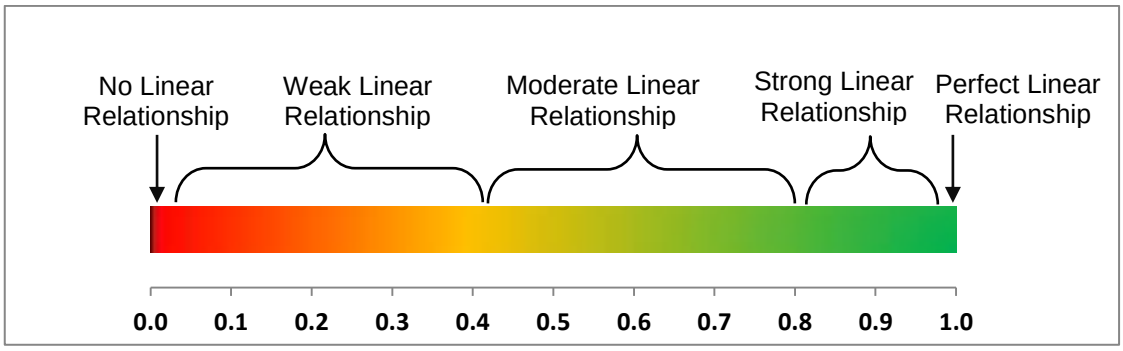

Figure 3.1: Multiple Correlation Coefficient Strength

While the multiple correlation coefficient, R indicates the strength of the relationship between the single response variable (y) and the composite of response variables (x's), another statistic calculated as part of the multiple correlation analysis, the coefficient of determination, R^2 measures proportionate amount of variation in the single response variable (y) explained by the composite of response variables (x's). Similarly to the multiple correlation coefficient, R, the coefficient of determination, R^2, also varies from 0 to +1, where an R^2 value of 0 indicates that the composite of response variables (x's) cannot explain any variation in the single response variable (y), while an R^2 value of 1 would indicate that the composite of response variables (x's) explains all of the variation in the single response variable (y).

Testing an hypothesis through multiple correlation involves analysing the multiple correlation coefficient, R to determine whether a linear relationship exists between the variables (i.e. $R \neq 0$), and determining whether the p-value for this statistic is less than the desired significance level ($p<0.05$). If $R \neq 0$ and the p-value is less than the significance level, the null hypothesis will be rejected. If however $R = 0$, or if the p-value is not less than the significance level, the null hypothesis will be not be rejected.

Null hypothesis 1 (H_{01}) states that shareholder wealth generated by South African JSE listed companies operating within different industry sectors is not related to a holistic set of these companies' accounting financial ratios and can be presented as:

H_{01i} : $R_{yi\ ,\ x1i\ x2i\ x3i\ x4i\ x5i\ x6i\ x7i\ x8i\ x9i\ x10i\ x11i\ x12i\ x13i\ x14i\ x15i\ x16i\ x17i\ x18i} = 0$

where:

i	=	industry sector
y	=	shareholder wealth (MTB ratio)
x1	=	Operating Profit Margin
x2	=	Earning After Interest & Tax Margin
x3	=	Return on Net Assets
x4	=	Return on Equity
x5	=	Fixed Asset Turnover Rate
x6	=	Net Asset Turnover Rate
x7	=	Working Capital Turnover Rate
x8	=	Debt to Equity
x9	=	Debt to Total Capital Employed
x10	=	Current Test
x11	=	Acid Test
x12	=	Interest Cover
x13	=	Debtor Days
x14	=	Sustainable Growth Rate
x15	=	Cash Ratio
x16	=	Financial Leverage
x17	=	South African GDP Growth Rate
x18	=	South African CPI

Extraneous variables x17 (South African GDP Growth Rate) and x18 (South African CPI) have been included as control variables in the multiple correlation analysis as it was found in the literature study that the economic conditions of the country in which a company operates does influence the financial performance of the company.

3.6.2 Bivariate Correlation Analysis

Bivariate correlation is a statistical method used to determine whether a relationship exists between two variables. The Pearson product-moment correlation coefficient is used specifically when testing whether a linear relationship exists between two approximately normally distributed variables that are measured on either an interval or ratio scale (Sharma 2005). The Pearson product moment correlation coefficient (r) is used to test whether this relationship exists, and to find the strength of the relationship. Pearson product moment correlation coefficients vary between -1 and +1, where a correlation coefficient of +1 indicates a perfect positive linear relationship between the two variables; a correlation coefficient of -1 indicates a perfect negative linear relationship between the two variables; and a correlation coefficient of 0 indicates no linear relationship between the two variables.

While values of the Pearson product moment correlation coefficient, r ranging between -1 and 0, and between 0 and 1 do not have a precise definition of strength, positive and negative values of r closer to 0 are considered to be weak linear associations, while values of r closer to -1 are considered to be strong negative linear associations, and values of r closer to 1 are considered to be strong positive linear associations. As part of this study, it was decided to use certain cut-off points for the value of r in classifying the strength of the relationship between the variables being studied. Based on the literature review and theoretical principles discussed in this study, it was determined that individual accounting ratios do indeed have marginal linear relationships with shareholder wealth measured a through the MTB ratio; and it was therefore decided that a Pearson product moment correlation coefficient between 0 and -0.2 would be classified as indicating a weak negative linear association, and a Pearson product moment correlation coefficient between 0 and 0.2 would be classified as indicating a weak positive linear association; while a Pearson product moment correlation coefficient between -0.2 and -0.5 would be classified as indicating a moderate negative linear association, and a Pearson product moment correlation coefficient between correlation 0.2 and 0.5 would

be classified as indicating a moderate positive linear association; and a Pearson product moment correlation coefficient less than -0.5 would be classified as indicating a strong negative linear association, and a Pearson product moment correlation coefficient greater than 0.5 would be classified as indicating a strong positive linear association. The strength of the linear relationship indicated by the Pearson product-moment correlation coefficient, r is illustrated in Figure 3.2.

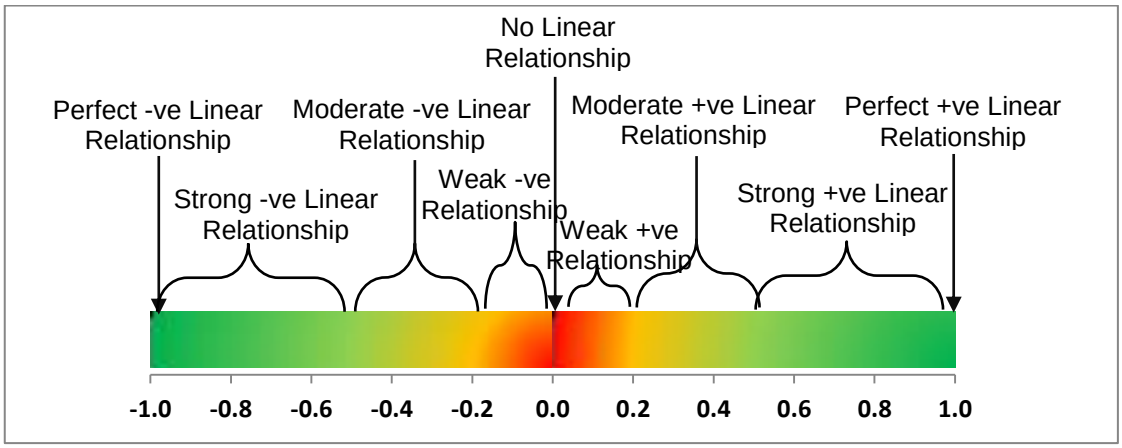

Figure 3.2: Pearson Correlation Coefficient Strength

Testing an hypothesis through bivariate correlation involves analysing the Pearson product-moment correlation coefficient to determine whether a linear relationship exists between the variables ($r \neq 0$), and determining whether the p-value is less than the desired significance level. If $r = 0$, or if the p-value is not less than the significance level, the null hypothesis will be not be rejected. If $r \neq 0$ and the p-value is less than the significance level, the null hypothesis will be rejected.

An important check that will be performed when calculating the Pearson product-moment correlation coefficients is to determine whether outliers are present, as even a single outlier can distort the nature and strength of Pearson product-moment correlation coefficients regardless of sample size used in the study (Bezzina & Saunders, 2014). Should such influential outliers be present,

observations representing these outliers would be removed prior to final analysis.

Null hypothesis 2 (H_{02}) states that there is no relationship between the level of a company's accounting financial ratios and the shareholder wealth created by the company, and can be presented as:

H_{02i} : $r_{x1iyi} = r_{x2iyi} = r_{x3iyi} = r_{x4iyi} = r_{x5iyi} = r_{x6iyi} = r_{x7iyi} = r_{x8iyi} = r_{x9iyi} = r_{x10iyi} = r_{x11iyi} = r_{x12iyi} = r_{x13iyi} = r_{x14iyi} = r_{x15iyi} = r_{x16iyi} = r_{x17iyi} = r_{x18iyi} = 0$

where:

i	=	industry sector
y	=	shareholder wealth (MTB ratio)
x1	=	Operating Profit Margin
x2	=	Earning After Interest & Tax Margin
x3	=	Return on Net Assets
x4	=	Return on Equity
x5	=	Fixed Asset Turnover Rate
x6	=	Net Asset Turnover Rate
x7	=	Working Capital Turnover Rate
x8	=	Debt to Equity
x9	=	Debt to Total Capital Employed
x10	=	Current Test
x11	=	Acid Test
x12	=	Interest Cover
x13	=	Debtor Days
x14	=	Sustainable Growth Rate
x15	=	Cash Ratio
x16	=	Financial Leverage
x17	=	South African GDP Growth Rate
x18	=	South African CPI

3.7 Limitations of the study

This research study aims to measure relationships between the level of a company's accounting financial ratios and the level of shareholder wealth it created and is reliant upon the accuracy of the sample companies' financial data and share price data. As this research study uses secondary data, the accuracy of this data can only be assumed, and not guaranteed by the researcher.

3.8 Validity and reliability

Validity and Reliability are two very important and related concepts in research study. If a research study cannot demonstrate that it is reliable and valid, it is considered 'worthless' (Farrell, 2011). Reliability and validity are both ways of demonstrating and communicating the rigour of the research process and the trustworthiness of research findings. This trustworthiness depends on a number of research features, which include: the initial research question, how the data was collected and analysed, and the interpretation and conclusions drawn from the results of the data analysis (Roberts, 2006).

While threats to validity and reliability can never be erased completely from a research study; the effects of these threats can be attenuated through careful attention to validity and reliability throughout research study (Cohen et al., 2007).

3.8.1 External validity

External validity refers to the extent to which the results of a study can be generalised from the sample to a population and therefore research that is context specific may have poor external validity. Establishing eternal validity for an instrument therefore relates directly to the sample and sampling process (Roberts, 2006).

To ensure external validity of the results of this research study, a minimum sample size providing the required level of statistical power (determined in Chapter 3.3) will be sought for each industry sector.

3.8.2 Internal validity

Internal validity can be defined as the extent to which a research instrument measures what it was intended to measure and represents the overarching quality of the measurement system (Roberts, 2006). Internal validity thus refers to the appropriateness of the content of an instrument, and assesses the accuracy with which the research instrument measures the subject being studied.

For this research study, the research instrument is used to measure the level of a company's financial ratios and, the level of shareholder wealth created by the company. Through the use of standardised financial statements for each subject being studied, and a standard set of computations; consistency and accuracy of the research instrument can be assured.

In the context of a multiple correlation analysis, internal validity aims to minimise specification error. Specification error refers to the omission of variables that are important to the study, or the inclusion of variables that are unimportant to the study; resulting in biased correlation coefficients being reported.

It is therefore important to make sure that variables of importance are not omitted, and unimportant independent variables are not included in the multiple correlation analysis. One way of ensuring this, as was applied in this study, is to rely on economic theory to identify the possible variables that should be included in the study and only include those variables.

3.8.3 Reliability

Reliability is concerned with the accuracy and precision of the measurement procedure, and describes how far a particular test, procedure or tool, will

produce similar results in different circumstances, assuming nothing else has changed (Bezzina & Saunders, 2014; Roberts, 2006).

In the context of a correlation analysis, reliability aims to minimise measurement error. Measurement error refers to imperfect measurements of the variables included in the study, resulting in imperfect relationships forming between the variables, and a reduced ability to explain the relationships between variables. Measurement error causes relationships between variables to be under-estimated increasing the risk of Type II errors (Cohen et al., 2007).

The variables used in this study are computed in a standard, repeatable method using the data collected. Therefore, to ensure reliability of the data used in this study, the sample companies' financial data and share price information will be collected from a reputable source, BFA McGregor, which guarantees the reliability of published information.

CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

This chapter discusses the sample of companies included in the study; presents the results of the multiple correlation analyses performed per industry sector using the sample data, and presents the bivariate correlation analyses performed per industry sector using the sample data; and provides a conclusion regarding the statistical significance of the Hypotheses.

4.2 Demographic profile of respondents

As this study follows a non-experimental research design, the sample obtained for use in this study is one of convenience rather than pure randomisation. From the sample size calculations that were performed, it was determined that a total of 99 companies would be required for this study (11 companies per industry sector), and while there are a total 134 JSE main board listed companies matching the sampling criteria listed in Chapter 3.3, the number of companies for which data was available for the Information Technology; Non-Cyclical Services; and Cyclical Consumer Goods industry groups were less than the minimum required. Further to this, in cleaning the data in preparation for the data analysis, a number of observations were removed due to them representing significant outliers that were affecting the overall correlation coefficients. A profile of the required vs. actual sample used in this study is provided in Table 4.1, and a detailed list of each company used in this study is included in APPENDIX B.

Table 4.1: Profile of sample

Economic Group	Min Number of Companies Required	Min Number of Observations Required	Actual Number Sampled	Actual Number of Observations
Basic Industries	11	109	16	159
Financials	11	109	21	205
Information Technology	11	109	6	59
Cyclical Services	11	109	29	285
Non-Cyclical Consumer Goods	11	109	15	143
General Industrials	11	109	21	210
Non-Cyclical Services	11	109	5	50
Resources	11	109	19	187
Cyclical Consumer Goods	11	109	2	19

Despite the number of companies sampled and resulting number of observations for the Information Technology; Non-Cyclical Services; and Cyclical Consumer Goods industry sectors being fewer than that calculated in Chapter 3.3; some statistically significant correlation results were still obtained for these industry groups. This is due largely to the sample size calculations in Chapter 3.3 being based on assumptions geared towards detecting small effect sizes in the correlation analyses. As the detection of larger effects requires fewer observations, some of the moderate to strong correlation results for these industry groups were found to be statistically significant even with smaller sample sizes.

4.3 Multiple Correlation Analysis Results

Table 4.2 presents the summarised results of the multiple correlation analyses conducted for each industry sector for the 2001 to 2010 period. Included in Table 4.2 per industry sector is the multiple correlation coefficient *R*, the adjusted multiple correlation coefficient *R-Adj,* the coefficient of determination R^2, the adjusted the coefficient of determination R^2-Adj, the *F-statistic, the p-value*, and the number of observations used in the analysis, *N*.

Table 4.2: Multiple Correlation Summary Results

	R	*R- Adj*	R^2	R^2- *Adj*	*F-statistic:*	*p-value*	*N*
Basic Industries	0.87	0.84	0.75	0.71	20.52	< 2.2e-16	159
Financials	0.44	0.33	0.20	0.11	2.238	0.00419	205
Information Technology	0.88	0.81	0.78	0.66	6.711	1.09E-06	59
Cyclical Services	0.85	0.84	0.73	0.70	34.71	< 2.2e-16	285
Non-Cyclical Consumer Goods	0.67	0.61	0.45	0.37	5.73	1.01E-09	143
General Industrials	0.87	0.86	0.76	0.73	29.56	< 2.2e-16	210
Non-Cyclical Services	0.97	0.95	0.94	0.90	22.4	1.90E-11	50
Resources	0.45	0.33	0.20	0.11	2.118	7.67E-03	187
Cyclical Consumer Goods	0.97	0.80	0.93	0.64	3.215	0.1829	19

As can be noted from Table 4.2, companies in all industry sectors with the exception of Cyclical Consumer Goods were found to have statistically significant linear relationships between a holistic set of their accounting financial ratios and their MTB ratios. The Non-Cyclical Services; Information Technology; General Industrials; Basic Industries; and Cyclical Services industry sectors show strong linear associations between accounting financial ratios and MTB ratio based on both the multiple correlation coefficient R and sample size adjusted multiple correlation coefficient R-Adj. The Non-Cyclical Consumer Goods industry sector shows a moderate relationship between accounting financial ratios and MTB ratio based for both the multiple correlation coefficient R and sample size adjusted multiple correlation coefficient R-Adj; while the Resources and Financial industry sectors show a moderate linear relationship between accounting financial ratios and MTB ratio based on the multiple correlation coefficient R, however after adjusting for sample size, the adjusted multiple correlation coefficient R-Adj for these industry sectors show a weak linear relationship between accounting financial ratios and MTB ratio.

4.3.1 *Basic Industries Industry Sector*

The multiple correlation analysis was conducted over the entire sample period from 2001 to 2010 and included 16 Basic Industries industry sector companies from which 159 observations were obtained. This sample size is larger than the minimum required sample size calculated in Chapter 3.3, which allows for statistically valid conclusions to be inferred from the results of the multiple correlation analysis.

As can be noted from Table 4.2, the Basic Industries industry sector companies holistic set of accounting financial ratios and the MTB ratio show a significant, strong linear correlation, $R=0.87$, $p<0.01$. Even after adjusting for the sample size, the adjusted correlation coefficient indicated a strong linear relationship, R-Adj=0.87.

The results of the multiple correlation analysis also indicated that the holistic set of accounting financial ratios used in this study explained 74.9% of the variance in the MTB ratio (R^2 =0.75, p<0.01) in the Basic Industries industry sector.

The null hypothesis, $H_{01i,}$ for the Basic Industries industry sector can therefore be rejected at the 5% significance level.

4.3.2 *Financials Industry Sector*

The multiple correlation analysis was conducted over the entire sample period from 2001 to 2010 and included 21 Financials industry sector companies from which 205 observations were obtained. This sample size is larger than the minimum required sample size calculated in Chapter 3.3, which allows for statistically valid conclusions to be inferred from the results of the multiple correlation analysis.

As can be noted from Table 4.2, the Financials industry sector companies holistic set of accounting financial ratios and the MTB ratio show a significant, moderate linear correlation, R=0.44, p<0.01. However, after adjusting for the sample size, the adjusted correlation coefficient indicated a weak linear relationship, R-Adj=0.33.

The results of the multiple correlation analysis also indicated that the holistic set of accounting financial ratios used in this study explained 19.6% of the variance in the MTB ratio (R^2 0.20, p<.01) in the Financials industry sector.

The null hypothesis, $H_{01i,}$ for the Financials industry sector can therefore be rejected at the 5% significance level.

4.3.3 *Information Technology Industry Sector*

The multiple correlation analysis was conducted over the entire sample period from 2001 to 2010 and included six (6) Information Technology companies from which 59 observations were obtained. Although this sample size is smaller than

the minimum required sample size calculated in Chapter 3.3, statistically significant results were obtained for the multiple correlation analysis.

As can be noted from Table 4.2, the Information Technology industry sector companies holistic set of accounting financial ratios and the MTB ratio show a significant, strong linear correlation, R=0.88, p<0.01. Even after adjusting for the sample size, the adjusted correlation coefficient indicated a strong linear relationship, R-Adj=0.81.

The results of the multiple correlation analysis also indicated that the holistic set of accounting financial ratios used in this study explained 78.0% of the variance in the MTB ratio (R^2 =0.78, p<.01) in the Information Technology industry sector.

The null hypothesis, $H_{01i,}$ for the Information Technology industry sector can therefore be rejected at the 5% significance level.

4.3.4 *Cyclical Services Industry Sector*

The multiple correlation analysis was conducted over the entire sample period from 2001 to 2010 and included 29 Cyclical Services industry sector companies from which 285 observations were obtained. This sample size is much larger than the minimum required sample size calculated in Chapter 3.3, which allows for statistically valid conclusions to be inferred from the results of the multiple correlation analysis.

As can be noted from Table 4.2, the Cyclical Services industry sector companies holistic set of accounting financial ratios and the MTB ratio show a significant, strong linear correlation, R=0.85, p<0.01. Even after adjusting for the sample size, the adjusted correlation coefficient indicated a strong linear relationship, R-Adj=0.84.

The results of the multiple correlation analysis also indicated that the holistic set of accounting financial ratios used in this study explained 72.5% of the variance in the MTB ratio (R^2 =0.73, p<.01) in the Cyclical Services industry sector.

The null hypothesis, $H_{01i,}$ for the Cyclical Services industry sector can therefore be rejected at the 5% significance level.

4.3.5 *Non-Cyclical Consumer Goods Industry Sector*

The multiple correlation analysis was conducted over the entire sample period from 2001 to 2010 and included 15 Non-Cyclical Consumer Goods industry sector companies from which 143 observations were obtained. This sample size is larger than the minimum required sample size calculated in Chapter 3.3, which allows for statistically valid conclusions to be inferred from the results of the multiple correlation analysis.

As can be noted from Table 4.2, the Non-Cyclical Consumer Goods industry sector companies holistic set of accounting financial ratios and the MTB ratio show a significant, moderate linear correlation, $R=0.67$, $p<0.01$. Even after adjusting for the sample size, the adjusted correlation coefficient indicated a moderate linear relationship, R-Adj=0.61.

The results of the multiple correlation analysis also indicated that the holistic set of accounting financial ratios used in this study explained 45.4% of the variance in the MTB ratio (R^2 =0.45, $p<.01$) in the Non-Cyclical Consumer Goods industry sector.

The null hypothesis, $H_{01i,}$ for the Non-Cyclical Consumer Goods industry sector can therefore be rejected at the 5% significance level.

4.3.6 *General Industrials Industry Sector*

The multiple correlation analysis was conducted over the entire sample period from 2001 to 2010 and included 21 General Industrials industry sector companies from which 210 observations were obtained. This sample size is larger than the minimum required sample size calculated in Chapter 3.3, which allows for statistically valid conclusions to be inferred from the results of the multiple correlation analysis.

As can be noted from Table 4.2, the General Industrials industry sector companies holistic set of accounting financial ratios and the MTB ratio show a significant, strong linear correlation, R=0.87, p<0.01. Even after adjusting for the sample size, the adjusted correlation coefficient indicated a strong linear relationship, R-Adj=0.86.

The results of the multiple correlation analysis also indicated that the holistic set of accounting financial ratios used in this study explained 75.8% of the variance in the MTB ratio (R^2 =0.76, p<.01) in the General Industrials industry sector.

The null hypothesis, $H_{01i,}$ for the General Industrials industry sector can therefore be rejected at the 5% significance level.

4.3.7 *Non-Cyclical Services Industry Sector*

The multiple correlation analysis was conducted over the entire sample period from 2001 to 2010 and included five (5) Non-Cyclical Services companies from which 50 observations were obtained. Although this sample size is smaller than the minimum required sample size calculated in Chapter 3.3, statistically significant results were obtained for the multiple correlation analysis.

As can be noted from Table 4.2, the Non-Cyclical Services industry sector companies holistic set of accounting financial ratios and the MTB ratio showed the highest significant linear correlation, R=0.97, p<0.01. Even after adjusting for the sample size, the adjusted correlation coefficient indicated a very strong linear relationship, R-Adj=0.95.

The results of the multiple correlation analysis also indicated that the holistic set of accounting financial ratios used in this study explained 93.9% of the variance in the MTB ratio (R^2 =0.94, p<.01) in the Non-Cyclical Services industry sector.

The null hypothesis, $H_{01i,}$ for the Non-Cyclical Services industry sector can therefore be rejected at the 5% significance level.

4.3.8 *Resources Industry Sector*

The multiple correlation analysis was conducted over the entire sample period from 2001 to 2010 and included 19 Resources industry sector companies from which 187 observations were obtained. This sample size is larger than the minimum required sample size calculated in Chapter 3.3, which allows for statistically valid conclusions to be inferred from the results of the multiple correlation analysis.

As can be noted from Table 4.2, the Resources industry sector companies holistic set of accounting financial ratios and the MTB ratio show a significant, moderate linear correlation, $R=0.45$, $p<0.01$. However, after adjusting for the sample size, the adjusted correlation coefficient indicated a weak linear relationship, R-Adj=0.33.

The results of the multiple correlation analysis also indicated that the holistic set of accounting financial ratios used in this study explained a mere 20.4% of the variance in the MTB ratio (R^2 0.20, $p<.01$) in the Resources industry sector.

The null hypothesis, $H_{01i,}$ for the Resources industry sector can therefore be rejected at the 5% significance level.

4.3.9 *Cyclical Consumer Goods Industry Sector*

The multiple correlation analysis was conducted over the entire sample period from 2001 to 2010 and included five (5) Cyclical Consumer Goods companies from which 50 observations were obtained. This sample size is smaller than the minimum required sample size calculated in Chapter 3.3, affecting the statistical significance of the multiple correlation analysis results.

As can be noted from Table 4.2, the Cyclical Consumer Goods industry sector was the only industry sector in this study to show an insignificant linear correlation between its companies holistic set of accounting financial ratios and the MTB ratio, $R=0.97$, $p>0.10$. The null hypothesis, $H_{01i,}$ for the Cyclical

Consumer Goods industry sector therefore cannot be rejected at the 5% significance level.

4.3.10 *Summary of Hypothesis 1 Results*

With the exception of Cyclical Consumer Goods industry sector, H_{01} can be rejected at the 5% confidence level (and even the 1% confidence level) as the multiple correlation coefficients for all other industry sectors are significantly different from zero at the 1% confidence level.

H_{01i} : $r_{yi,x1ix2ix3ix4ix5ix6ix7ix8ix9ix10ix11ix12ix13ix14ix15ix16ix17ix18i} = 0$ cannot be rejected at the 5% significance level for i = Cyclical Consumer Goods

H_{01i} : $r_{yi,x1ix2ix3ix4ix5ix6ix7ix8ix9ix10ix11ix12ix13ix14ix15ix16ix17ix18i} = 0$ can be rejected at the 5% (and 1%) significance level for i = Basic Industries; Financials; Information Technology; Cyclical Services; Non-Cyclical Consumer Goods; General Industrials; Non-Cyclical Services; and Resources

4.4 Bivariate Correlation Analysis Results

Table 4.3 presents the summarised results of the of the bivariate correlation analyses performed for each industry sector for the period 2001 to 2010. Included in Table 4.3 per industry sector are the Pearson product-moment correlation coefficients of each of the accounting financial ratios and the MTB ratio, an indication of the significance level of each of the Pearson product-moment correlation coefficients, and the number of observations used in the analysis of each industry sector, *N*. Detailed correlation matrices and summary statistics for the MTB and each financial ratio per industry sector are in included in APPENDIX C

Table 4.3: The relationship between Accounting Financial Ratios and the MTB Ratio per Industry Sector: Pearson Product-Moment Correlation Coefficients

	Basic Industries	*Financials*	*Information Technology*	*Cyclical Services*	*Non-Cyclical Consumer Goods*	*General Industrials*	*Non-Cyclical Services*	*Resources*	*Cyclical Consumer Goods*
x1	0.25 ***	0.00	0.22	0.47 ***	0.36 ***	0.33 ***	0.33 **	0.03	0.49 **
x2	0.03	0.11	0.18	0.41 ***	0.25 ***	0.18 **	-0.29 *	0.08	0.34
x3	0.13	0.12	0.16	0.41 ***	0.06	0.35 ***	0.63 ***	0.06	0.30
x4	0.43 ***	0.17 **	-0.14	0.71 ***	0.14	0.61 ***	0.79 ***	0.01	0.28
x5	-0.13	-0.06	0.12	-0.13 **	-0.29 ***	-0.04	0.30 **	-0.02	-0.40
x6	-0.16 *	-0.17 **	-0.13	0.05	-0.17 **	0.14 **	0.78 ***	0.07	-0.12
x7	-0.02	-0.02	0.01	-0.08	-0.22 ***	-0.20 ***	0.03	-0.08	0.31
x8	0.56 ***	0.17 **	0.29 **	0.42 ***	0.14	0.49 ***	0.85 ***	0.15 *	-0.13
x9	0.24 ***	0.06	0.14	0.16 ***	0.10	0.35 ***	0.81 ***	0.15 **	-0.21
x10	-0.25 ***	0.10	0.26 *	-0.30 ***	-0.46 ***	-0.18 **	-0.44 ***	-0.17 **	0.17
x11	-0.28 ***	0.16 **	0.28 **	-0.18 ***	-0.39 ***	-0.10	-0.41 ***	-0.13 *	-0.27
x12	-0.02	0.02	0.11	0.02	-0.12	0.31 ***	0.03	0.00	0.41
x13	-0.18 **	-0.04	0.08	-0.07	-0.14	0.05	-0.49 ***	0.25 ***	0.10
x14	-0.11	0.09	-0.18	0.39 ***	0.12	-0.46 ***	0.29 *	-0.01	0.23
x15	-0.13	0.14 *	0.19	-0.13 **	-0.22 ***	-0.09	-0.31 **	-0.17 **	-0.13
x16	0.37 ***	0.18 **	0.19	0.42 ***	0.12	0.46 ***	0.87 ***	0.18 **	-0.20
x17	0.07	0.22 ***	0.48 ***	0.05	0.04	0.27 ***	0.02	0.14 *	0.64 ***
x18	0.01	-0.08	-0.15	-0.11 **	0.02	-0.07	-0.01	0.08	-0.14
N	159	205	59	285	143	210	50	187	19

*Note: *p < 0.10, **p < 0.05, ***p < 0.01*

4.4.1 *Basic Industries Industry Sector*

The bivariate correlation analysis for the Basic Industries industry sector was conducted over the entire sample period from 2001 to 2010 and included 16 Basic Industries companies from which 159 observations were obtained. This sample size is larger than the minimum required sample size for the bivariate correlation analysis calculated in Chapter 3.3.

For the Basic Industries industry sector, variable x8 (Debt to Equity) and the MTB ratio have a significant strong positive correlation, r_{x8y} = 0.56, p<0.01. Variables x4 (Return on Equity), x1 (Operating Profit Margin), x9 (Debt to Total Capital Employed), and x16 (Financial Leverage) have significant moderate positive correlations with the MTB ratio, r_{x4y}=0.43, p<0.01; r_{x1y}=0.25, p<0.01; r_{x4y}=0.24, p<0.01; and r_{x4y}=0.37, p<0.01. Variables x10 (Current Test), and x11 (Acid Test) and have significant moderate negative correlations with the MTB ratio, r_{x10y}= -0.25, p<0.01; and r_{x11y}= -0.28, p<0.01; and variable x13 (Debtor Days) and the MTB ratio have a significant weak negative correlation, r_{x13y}= -0.18, p<0.05. For the Basic Industries industry sector, all other variables included in this study do not have significant linear associations with the MTB ratio at the 5% significance level.

H_{02i} : $r_{x2iyi} = r_{x3iyi} = r_{x5iyi} = r_{x6iyi} = r_{x7iyi} = r_{x12iyi} = r_{x14iyi} = r_{x15iyi} = r_{x17iyi} = r_{x18iyi} = 0$ cannot be rejected at the 5% significance level for i = Basic Industries

H_{02i} : r_{x1iyi}; r_{x4iyi}; r_{x8iyi}; r_{x9iyi}; r_{x10iyi}; r_{x11iyi} ; r_{x13iyi} ;r_{x16iyi} = 0 can be rejected at the 5% significance level for i = Basic Industries

4.4.2 *Financials Industry Sector*

The bivariate correlation analysis for the Financials industry sector was conducted over the entire sample period from 2001 to 2010 and included 21 Financials companies from which 205 observations were obtained. This sample size is larger than the minimum required sample size for the bivariate correlation analysis calculated in Chapter 3.3.

For the Financials Industry Sector, variable x17 (GDP) and the MTB ratio have a significant moderate positive correlation, r_{x17y}=0.22, p<0.01; variables x4 (Return on Equity), x8 (Debt to Equity), x11 (Acid Test), and x16 (Financial Leverage) have weak positive correlations with the MTB ratio, r_{x4y}=0.17, p<0.05; r_{x8y}=0.17, p<0.05; r_{x11y}=0.16, p<0.05; and r_{x16y}=0.18, p<0.05. Variable x6 (Net Asset Turnover Rate) has a significant weak negative correlation with the MTB ratio, r_{x6y}= -0.17, p<0.05. For the Financials Industrial Sector, all other variables included in this study do not have significant associations with the MTB ratio at the 5% significance level.

H_{02i} : $r_{x1iyi} = r_{x2iyi} = r_{x3iyi} = r_{x5iyi} = r_{x7iyi} = r_{x9iyi} = r_{x10iyi} = r_{x12iyi} = r_{x13iyi} = r_{x14iyi} = r_{x15iyi} = r_{x18iyi} = 0$ cannot be rejected at the 5% significance level for i = Financials

H_{02i} : r_{x4iyi}; r_{x6iyi}; r_{x8iyi}; r_{x11iyi}; r_{x16iyi}; $r_{x17iyi} = 0$ can be rejected at the 5% significance level for i = Financials

4.4.3 *Information Technology Industry Sector*

The bivariate correlation analysis for the Information Technology was conducted over the entire sample period from 2001 to 2010 and included six (6) Information Technology companies from which 59 observations were obtained. This sample size is smaller than the minimum required sample size calculated in Chapter 3.3, and therefore weak associations between the accounting financial ratios and the MTB ratio were detected with statistical confidence. Some moderate to large linear associations between the accounting financial ratios and the MTB ratio were however detected with statistical confidence, from which valid conclusions can be inferred.

For the Information Technology Industry Sector, variables x17 (GDP), x8 (Debt to Equity) and x11 (Acid Test) were found to have significant moderate positive correlations with the MTB ratio, r_{x17y}=0.48, p<0.01; r_{x8y}=0.29, p<0.05; and r_{x11y}=0.28, p<0.05. Given sample size, for the Information Technology Industrial Sector all other variables included in this study were found to not have significant correlations with the MTB ratio at the 5% significance level.

H_{02i} : $r_{x1iyi} = r_{x2iyi} = r_{x3iyi} = r_{x4iyi} = r_{x5iyi} = r_{x6iyi} = r_{x7iyi} = r_{x9iyi} = r_{x10iyi} = r_{x12iyi} = r_{x13iyi} = r_{x14iyi} = r_{x15iyi} = r_{x16iyi} = r_{x18iyi} = 0$ cannot be rejected at the 5% significance level for i = Information Technology

H_{02i} : r_{x8iyi}; r_{x11iyi}; $r_{x17iyi} = 0$ can be rejected at the 5% significance level for i = Information Technology

4.4.4 *Cyclical Services Industry Sector*

The bivariate correlation analysis for the Cyclical Services industry sector was conducted over the entire sample period from 2001 to 2010 and included 29 Cyclical Services companies from which 285 observations were obtained. This sample size is larger than the minimum required sample size for the bivariate correlation analysis calculated in Chapter 3.3.

For the Cyclical Services Industry Sector, variable x4 (Return on Equity) has a significant strong positive correlation with the MTB ratio, $r_{x4y} = 0.71$, $p<0.01$. Variables x1 (Operating Profit Margin), x2 (Earning After Interest & Tax Margin), x3 (Return on Net Assets), x8 (Debt to Equity), x14 (Sustainable Growth Rate), and x16 (Financial Leverage) have significant moderate positive linear correlations with the MTB ratio, $r_{x1y}=0.47$, $p<0.01$; $r_{x2y}=0.41$, $p<0.01$; $r_{x3y}=0.41$, $p<0.01$; $r_{x8y}=0.42$, $p<0.01$; $r_{x14y}=0.39$, $p<0.01$; and $r_{x16y}=0.42$, $p<0.01$, while variable x9 (Debt to Total Capital Employed) has a weak positive linear correlations with the MTB ratio, $r_{x9y}=0.16$, $p<0.01$. Variable x10 (Current Test) has a significant moderate negative linear correlation with the MTB ratio, $r_{x10y}= -0.30$, $p<0.01$; while variables x11 (Acid Test), x5 (Fixed Asset Turnover Rate), x15 (Cash Ratio) and x18 (CPI) have significant weak negative linear correlations with the MTB, $r_{x11y}= -0.18$, $p<0.01$; $r_{x5y}= -0.13$, $p<0.05$; $r_{x15y}= (-0.13)$, $p<0.05$. For the Cyclical Services Industry Sector, all other variables included in this study do not have significant linear associations with the MTB ratio at the 5% significance level.

H_{02i} : $r_{x1iyi} = r_{x2iyi} = r_{x3iyi} = r_{x5iyi} = r_{x7iyi} = r_{x9iyi} = r_{x10iyi} = r_{x12iyi} = r_{x13iyi} = r_{x14iyi} = r_{x15iyi} = 0$ cannot be rejected at the 5% significance level for i = Cyclical Services

H_{02i} : r_{x4iyi}; r_{x6iyi}; r_{x8iyi}; r_{x11iyi}; r_{x16iyi}; $r_{x17iyi;}$ r_{x18iyi} = 0 can be rejected at the 5% significance level for i = Cyclical Services

4.4.5 *Non-Cyclical Consumer Goods Industry Sector*

The bivariate correlation analysis for the Non-Cyclical Consumer Goods industry sector was conducted over the entire sample period from 2001 to 2010 and included 15 Non-Cyclical Consumer Goods companies from which 143 observations were obtained. This sample size is larger than the minimum required sample size for the bivariate correlation analysis calculated in Chapter 3.3.

For the Non-Cyclical Consumer Goods Industry Sector, variables x1 (Operating Profit Margin) and x2 (Earning After Interest & Tax Margin) have significant moderate positive linear associations with the MTB ratio, r_{x1y}= 0.36, p<0.01; and r_{x2y}= 0.25, p<0.01. Variables x5 (Fixed Asset Turnover Rate), x7 (Working Capital Turnover Rate), x10 (Current Test), x11 (Acid Test) and x15 (Cash Ratio) have significant moderate negative linear correlations with the MTB ratio, r_{x5y}= -0.29, p<0.01; r_{x2y}= -0.22, p<0.01; r_{x10y}= -0.46, p<0.01; r_{x11y}= -0.39, p<0.01; and r_{x15y}= -0.22, p<0.01. Variable x6 (Net Asset Turnover Rate) has a significant weak negative linear associations with the MTB ratio, r_{x6y}= -0.17, p<0.05. For the Non-Cyclical Consumer Goods Industry Sector, all other variables included in this study do not have significant linear associations with the MTB ratio at the 5% significance level.

H_{02i} : $r_{x3iyi} = r_{x4iyi} = r_{x8iyi} = r_{x9iyi} = r_{x12iyi} = r_{x13iyi} = r_{x14iyi} = r_{x16iyi} = r_{x17iyi} = r_{x18iyi}$ = 0 cannot be rejected at the 5% significance level for i = Non-Cyclical Consumer Goods

H_{02i} : r_{x1iyi}; r_{x2iyi}; r_{x5iyi}; r_{x6iyi}; r_{x7iyi}; r_{x10iyi}; r_{x11iyi}; r_{x15iyi} = 0 can be rejected at the 5% significance level for i = Non-Cyclical Consumer Goods

4.4.6 *General Industrials Industry Sector*

The bivariate correlation analysis for the General Industrials industry sector was conducted over the entire sample period from 2001 to 2010 and included 21 General Industrials companies from which 210 observations were obtained. This sample size is larger than the minimum required sample size for the bivariate correlation analysis calculated in Chapter 3.3.

For the General Industrials industry sector, variable x4 (Return on Equity) has a significant strong positive linear correlation with the MTB ratio, r_{x4y} = 0.61, p<0.01. Variables x1 (Operating Profit Margin), x3 (Return on Net Assets), x8 (Debt to Equity), x9 (Debt to Total Capital Employed), x12 (Interest Cover), x16 (Financial Leverage), and x17 (GDP) have significant moderate positive linear correlations with the MTB ratio, r_{x1y} = 0.33, p<0.01; r_{x3y} = 0.35, p<0.01; r_{x8y} = 0.49, p<0.01; r_{x9y} = 0.35, p<0.01; r_{x12y} = 0.31, p<0.01; r_{x16y} = 0.46, p<0.01; and r_{x17y} = 0.27, p<0.01. Variables x2 (Earning After Interest & Tax Margin) and x6 (Net Asset Turnover Rate) have significant weak positive linear associations with the MTB ratio, r_{x2y} = 0.18, p<0.05; and r_{x6y}= 0.14, p<0.05. Variables x14 (Sustainable Growth Rate) and x7(Working Capital Turnover Rate) have significant moderate negative linear correlations with the MTB ratio, r_{x14y} = -0.46, p<0.01; and r_{x7y} = -0.20, p<0.01. Variable x10 (Current Test) has a significant weak negative linear correlation with the MTB ratio; r_{x2y} = -0.18, p<0.05. For the General Industrials Industry Sector, all other variables included in this study do not have significant linear associations with the MTB ratio at the 5% significance level.

H_{02i} : $r_{x5iyi} = r_{x11iyi} = r_{x13iyi} = r_{x15iyi} = r_{x18iyi} = 0$ cannot be rejected at the 5% significance level for i = General Industrials

H_{02i} : r_{x1iyi}; r_{x2iyi}; r_{x3iyi}; r_{x4iyi}; r_{x6iyi} ; r_{x7iyi} ; r_{x8iyi} ; r_{x9iyi} ; r_{x10iyi} ; r_{x12iyi} ; r_{x14iyi} ; r_{x16iyi} ; r_{x17iyi} = 0 can be rejected at the 5% significance level for i = General Industrials

4.4.7 *Non-Cyclical Services Industry Sector*

The bivariate correlation analysis for the Non-Cyclical Services Industry Sector was conducted over the entire sample period from 2001 to 2010 and included five (5) Non-Cyclical Services companies from which 50 observations were obtained. This sample size is smaller than the minimum required sample size for the bivariate correlation analysis calculated in Chapter 3.3, and therefore small associations between the accounting financial ratios and the MTB ratio were not detected with statistical confidence. However, some statistically significant moderate to large linear associations between the accounting financial ratios and the MTB ratio were detected with statistical confidence.

As can be noted from Table 4.3 despite the small sample size, some statistically valid linear associations were found for the Non-Cyclical Services Industry Sector. Variables x3 (Return on Net Assets), x4 (Return on Equity), x6 (Net Asset Turnover Rate), x8 (Debt to Equity), x9 (Debt to Total Capital Employed) and x16 (Financial Leverage) were found to have significant strong positive linear correlations with the MTB ratio, $r_{x3y} = 0.63$, $p<0.01$; $r_{x4y} = 0.79$, $p<0.01$; $r_{x6y} = 0.78$, $p<0.01$; $r_{x8y} = 0.85$, $p<0.01$; $r_{x9y} = 0.81$, $p<0.01$; and $r_{x16y} = 0.87$, $p<0.01$. Variables x1 (Operating Profit Margin) and x5 (Fixed Asset Turnover Rate) were found to have significant moderate positive linear correlations with the MTB ratio, $r_{x1y} = 0.33$, $p<0.05$; $r_{x5y} = 0.30$, $p<0.05$. Variables x10 (Current Test), x11 (Acid Test), x13 (Debtor Days) and x15 (Cash Ratio) were found to have significant moderate negative linear correlations with the MTB ratio, $r_{x10y} = -0.44$, $p<0.01$; $r_{x11y} = -0.41$, $p<0.01$; $r_{x13y} = -0.49$, $p<0.01$ and $r_{x15y} = -0.31$, $p<0.05$. For the Non-Cyclical Services Industry Sector and the given sample size, all other variables included in this study were found to not have significant associations with the MTB ratio at the 5% significance level.

H_{02i} : $r_{x2iyi} = r_{x7iyi} = r_{x12iyi} = r_{x14iyi} = r_{x17iyi} = r_{x18iyi} = 0$ cannot be rejected at the 5% significance level for i = Non-Cyclical Services

H_{02i} : r_{x1iyi}; r_{x3iyi}; r_{x4iyi}; r_{x5iyi} ; r_{x6iyi}; r_{x8iyi}; r_{x9iyi}; r_{x10iyi}; r_{x11iyi}; r_{x13iyi}; r_{x15iyi}; $r_{x16iyi} = 0$ can be rejected at the 5% significance level for i = Non-Cyclical Services

4.4.8 *Resources Industry Sector*

The bivariate correlation analysis for the Resources Industry Sector was conducted over the entire sample period from 2001 to 2010 and included 19 Resources companies from which 187 observations were obtained. This sample size is larger than the minimum required sample size for the bivariate correlation analysis calculated in Chapter 3.3.

For the Resources Industry Sector, only variable x13 (Debtor Days) has a significant moderate positive linear correlation with the MTB ratio, $r_{x13y} = 0.25$, $p<0.01$. Variables x9 (Debt to Total Capital Employed) and x16 (Financial Leverage) have significant moderate positive linear correlations with the MTB ratio, $r_{x9y} = 0.15$, $p<0.05$; and $r_{x16y} = 0.18$, $p<0.08$; while variables x10 (Current Test) and x15 (Cash Ratio) have significant moderate negative linear correlations with the MTB ratio, $r_{x10y} = -0.17$, $p<0.05$; and $r_{x15y} = -0.17$, $p<0.05$. For the Resources Industry Sector, all other variables included in this study do not have significant linear associations with the MTB ratio at the 5% significance level.

H_{02i} : $r_{x1iyi} = r_{x2iyi} = r_{x3iyi} = r_{x4iyi} = r_{x5iyi} = r_{x6iyi} = r_{x7iyi} = r_{x11iyi} = r_{x12iyi} = r_{x14iyi} = r_{x17iyi} = r_{x18iyi} = 0$ cannot be rejected at the 5% significance level for i = Resources

H_{02i} : r_{x9iyi}; r_{x10iyi}; r_{x13iyi}; r_{x15iyi}; $r_{x16iyi} = 0$ can be rejected at the 5% significance level for i = Resources

4.4.9 *Cyclical Consumer Goods Industry Sector*

The bivariate correlation analysis for the Cyclical Consumer Goods Industry Sector was conducted over the entire sample period from 2001 to 2010 and included only two (2) Cyclical Consumer Goods companies from which 19 observations were obtained. This sample size is smaller than the minimum required sample size for bivariate correlation analysis calculated in Chapter 3.3, and therefore small associations between the accounting financial ratios and the MTB ratio were not detected with statistical confidence. However, some statistically significant moderate to large linear associations between the

accounting financial ratios and the MTB ratio were detected with statistical confidence.

Despite the small sample size, some statistically valid linear associations were found for the Cyclical Consumer Goods industry sector. Variable x17 (GDP) was found to have a significant strong linear correlation with the MTB ratio, r_{x17y} = 0.64, P<0.01; while variable x1 (Operating Profit Margin) was found to have a significant moderate positive linear correlation with the MTB ratio, r_{x1y} = 0.49, P<0.05. Given the small sample size for the Cyclical Consumer Goods Industry Sector, all other variables included in this study were found to not have significant associations with the MTB ratio at the 5% significance level.

H_{02i} : $r_{x2iyi} = r_{x3iyi} = r_{x4iyi} = r_{x5iyi} = r_{x6iyi} = r_{x7iyi} = r_{x8iyi} = r_{x9iyi} = r_{x10iyi} = r_{x11iyi} = r_{x12iyi} = r_{x13iyi} = r_{x14iyi} = r_{x15iyi} = r_{x17iyi} = r_{x18iyi} = 0$ cannot be rejected at the 5% significance level for i = Cyclical Consumer Goods

H_{02i} : r_{x1iyi}; $r_{x16iyi} = 0$ can be rejected at the 5% significance level for i = Cyclical Consumer Goods

4.5 Summary of the results

As can be noted from Table 4.2, the results of the multiple correlation analysis have provided statistical evidence that, with the exception of the Cyclical Consumer Goods industry sector, accounting financial ratios are linearly associated with shareholder wealth represented as the MTB ratio South African JSE main board listed companies, and the hypothesis H_{01} can be rejected for the Basic Industries, Financials, Information Technology, Cyclical Services, Non-Cyclical Consumer Goods, General Industrials, Non-Cyclical Services, and Resources industry sectors at the 1% confidence level as the multiple correlation coefficients for these industry sectors are significantly different from zero at the 1% confidence level. While the multiple correlation coefficient for the Cyclical Consumer Goods industry sector is different from zero, the p-value for

this statistic indicates that it is not are significant at the 5% confidence level. The hypothesis H_{01i} therefore cannot be rejected for i = Cyclical Consumer Goods industry sector. One possible reason for this statistic not being significant could be the small sample used in the analysis.

The results of the bivariate correlation analysis indicate that across all industry sectors, there is at least one accounting financial ratio that has a moderate relationship with the MTB ratio at the 1% significance level, and at least one accounting financial ratio that has a moderate relationship with the MTB ratio at the 5% significance level. Therefore, H_{02i} cannot be rejected at the 5% significance level for all i.

CHAPTER 5: DISCUSSION OF THE RESULTS

5.1 Introduction

The results of the multiple correlation analyses and bivariate correlation analyses obtained in Chapter 4 will be presented and summarised in this chapter. Conclusions regarding the substantive significance of the statistically significant relationships between accounting financial ratios and shareholder wealth created by South African JSE main board listed companies operating in different industry sectors will be made.

5.2 Discussion pertaining to the results of the Multiple Correlation Analyses

From the literature review, and referring to Figure 1.3, it was found that in order for a company to create shareholder wealth; its management team needs to focus on simultaneously maximising all operational, investment and business funding actions. This is evident from the analyses conducted as part of this research which found that for eight out of the nine industry sectors examined, or 132 out of 134 (98.5%) companies sampled, there is a statistically significant linear relationship between the current levels of a company's holistic set of accounting financial ratios and the level shareholder wealth created by the company, as measured through the MTB ratio.

Not surprisingly, it was found that the degree of association between the current levels of a company's holistic set accounting financial ratios and the level shareholder wealth created by the company did vary by industry sector. This reaffirms the findings of the literature review that industry sector membership explains some of the cross-sectional variation present in the shareholder wealth created by a company. The variance of the MTB ratio and accounting financial ratios summary statistics (mean, standard deviation and range) across industry

sectors provide further evidence of the structural differences between the levels of accounting financial ratios across industry sectors.

Only one industry sector, Cyclical Consumer Goods, representing 1.5% of the sample used in this study was found to not present a statistically significant relationship between its holistic set of accounting financial ratios used in this study and the MTB ratio. Considering that the multiple correlation coefficient, R for Cyclical Consumer Goods industry sectors was 0.97 with a p-value of 0.1829, and the adjusted multiple correlation coefficient, R-Adj was 0.80; a possible reason for the lack of statistical significance could be the underpowered sample size used in this study.

The Basic Industries; Information Technology; Cyclical Services; General Industrials; and Non-Cyclical Services industry sectors were found to have substantive statistically significant linear relationships between their holistic set of accounting financial ratios employed in this study and their MTB ratios, with the multiple correlation coefficient, R for these industry sectors being in excess of 0.80. The coefficient of determination, R^2 for these industry sectors were also found to range between 0.73 for the Cyclical Services industry sector to 0.94 for the Non-Cyclical Services industry sector, meaning that between 72.5% and 93.9% of the variation in the MTB ratio is coupled with variation in the holistic set of accounting financial ratios employed in this study. For these industry sectors then, it means that a company's management team's efforts to strive towards favourable levels of their accounting financial ratios in attempt to create shareholder wealth are not wasted.

The literature review conducted as part of this study found criticisms of the relationship between accounting financial ratios and shareholder wealth. Researchers such as Gentry and Shen (2010) and Ratnatunga and Montali (2008) have stated that accounting based measures are short-term performance oriented. However, as the MTB ratio is a long term measure of company performance, for the Basic Industries; Information Technology; Cyclical Services; General Industrials; and Non-Cyclical Services industry sectors at least, the results of the multiple correlation analysis demonstrates

that there is a relationship between the current levels of accounting financial ratios and longer term performance of the company as captured by the MTB ratio. This could be attributed to the market believing that a company's past performance is a good predictor of future performance, and hence forecasting future accounting financial ratios at levels similar to the current level when building cash flow forecasts of the company.

While the linear relationships between the current levels of the holistic set of accounting financial ratios employed in this study and the MTB ratio for the Financials; Non-Cyclical Consumer Goods; and Resources industry sectors is statistically significant, this relationship is only moderate with the multiple correlation coefficient for these industry sectors varying between 0.44 for the Financials industry sector to 0.67 for the Non-Cyclical Consumer Goods industry sector. The coefficient of determination, R^2 for these industry sectors are also not substantial, varying between 0.2 and 0.45, meaning that only between 19.6% and 45.4% of the total variation in the MTB ratio s coupled with variation in the holistic set of accounting financial ratios employed in this study. As the multiple correlation analysis only tested whether a linear relationship exists between the holistic set of financial ratios employed in this study and the MTB ratio, one possible reason for the low correlation coefficients and coefficients of determination could be that for these industries, accounting financial ratios could have some form of a non-linear association with shareholder wealth. Another possible reason for the low correlation coefficients and coefficients of determination could be underspefication of the variables included in the multiple correlation analysis. The literature study conducted as part of this research and finance theory indicates that both macroeconomic and microeconomic factors influence shareholder wealth. This study included only two macro-economic indicators, GDP and CPI, as part of the multiple correlation analysis; however, there are a myriad of other leading macroeconomic and microeconomic indicators that could prove useful in explaining the variance of the MTB ratio.

5.3 Discussion pertaining to the results of the Bivariate Correlation Analyses

The results of the bivariate correlation analyses provide further evidence of the financial structural differences exist across industry sectors. The bivariate correlation analysis demonstrated that the set of financial ratios significantly related to the MTB ratio varied by industry sector. Even in situations where the same financial ratio was significantly related to the MTB ratio across multiple industry sectors, the level of the relationship between the individual financial ratios and the MTB ratio varied.

While no single industry sector was found to have significant linear correlations between every accounting financial ratio used in this study and the MTB ratio, every accounting financial ratio used in this study had a significant linear relationship with the MTB ratio in at least one industry sector.

Each industry sector was also found to have significant linear relationships between the MTB ratio and at least two (2) accounting financial ratios, with the Cyclical Services and General Industrials industry sectors having 13 accounting financial ratios significantly linearly related to the MTB ratio.

5.3.1 *Basic Industries Industry Sector*

In the Basic Industries industry sector, it was observed that one (1) accounting financial ratio, Debt to Equity ratio, has a strong significant positive linear relationship with the MTB ratio; four (4) accounting financial ratios, Return on Equity, Financial Leverage, Operating Profit Margin, and Debt to Total Capital Employed, have a moderate significant positive linear relationship with the MTB ratio; while three accounting financial ratios, Current Test, Acid Test and Debtor Days have moderate to weak negative significant linear relationships with the MTB ratio.

The significant drivers of shareholder wealth in the Basic Industries industry sector can therefore be inferred as being increased levels of Debt, directly

impacting the Debt to Equity, Debt to Total Capital Employed and Financial Leverage ratios, and indirectly impacting the Return on Equity; decreased operating costs, directly impacting the Operating Profit Margin and Return on Equity; and decreased levels of current assets, inventory and debtors directly decreasing the Current Test, Acid Test and Debtors Days.

Based on the magnitude of the correlation coefficients, the largest positive impact to the MTB ratio and growth in shareholder wealth would be achieved through sustainably increasing debt levels as this would increase the Debt to Equity ratio which has a correlation coefficient of 0.56 with the MTB ratio; and it would increase Return on Equity which has a correlation coefficient of 0.43 with the MTB ratio.

5.3.2 *Financials Industry Sector*

In the Financials industry sector, it was observed that three (3) accounting financial ratios, Debt to Equity, Return on Equity and the Acid Test have weak significant positive linear relationships with the MTB ratio; and one (1) accounting financial ratio, Net Asset Turnover Rate, has a weak significant negative linear relationship with the MTB ratio. Based on the multiple correlation coefficient between the holistic set of accounting financial ratios and the MTB ratio for the Financials industry sector, it is not surprising that there are no moderate and strong bivariate relationships between the MTB ratio and any accounting financial ratio for the Financials industry sector.

The drivers of shareholder wealth in the Financials industry sector can therefore be inferred as being increased levels of Debt, directly impacting the Debt to Equity and Financial Leverage ratios, and indirectly impacting the Return on Equity; Improved Sales, directly impacting the Return on Equity; and increased levels of current assets, with decreased levels of inventory and current liabilities, resulting in a decreased Acid Test.

Based on the magnitude of the correlation coefficients, the largest positive impact to the MTB ratio and growth in shareholder wealth would be achieved

through sustainably increasing debt levels as this would increase Financial Leverage which has a correlation coefficient with the MTB of 0.18, increase the Debt to Equity ratio which has a correlation coefficient with the MTB of 0.17; and it would increase Return on Equity which has a correlation coefficient with the MTB of 0.17.

Surprisingly, the Net Asset Turnover Rate has a significant negative linear relationship with the MTB ratio, which on face value is in contradiction with the positive linear correlation between Return on Equity and the MTB ratio, as a negative Net Asset Turnover Rate correlation implies that the MTB ratio and shareholder wealth increases as turnover in relation to net assets decreases, This would only be congruent with the positive Return on Equity correlation if the ratio of Earning after Interest & Tax : Turnover could be increased simultaneously.

5.3.3 *Information Technology Industry Sector*

In the Information Technology industry sector, it was observed that two (2) accounting financial ratios, Debt to Equity and the Acid Test have moderate significant positive linear relationships with the MTB ratio. It was also observed that the Information Technology industry sector GDP had a moderate (almost strong) significant positive linear relationships with the MTB ratio. Based on the multiple correlation coefficient between the holistic set of accounting financial ratios and the MTB ratio for the Information Technology industry sector, it is surprising that only two (2) accounting financial ratios have significant linear relationships with the MTB ratio.

The drivers of shareholder wealth in the Information Technology industry sector can therefore be inferred as being increased levels of Debt, directly impacting the Debt to Equity ratio; and increased levels of current assets, with decreased levels of inventory and current liabilities, resulting in a decreased Acid Test.

Based on the magnitude of the correlation coefficients, the largest positive impact to the MTB ratio and growth in shareholder wealth would be achieved

through sustainably increasing debt levels as this would increase the Debt to Equity ratio which has a correlation coefficient with the MTB of 0.29.

5.3.4 *Cyclical Services Industry Sector*

In the Cyclical Services industry sector, it was observed that one (1) accounting financial ratio, Return on Equity, has a strong positive significant linear relationship with the MTB ratio; six (6) accounting financial ratios, Operating Profit Margin, Debt to Equity , Financial Leverage, Earning After Interest & Tax Margin, Return on Net Assets, and the Sustainable Growth Rate have moderate significant positive linear relationships with the MTB ratio; one (1) accounting financial ratio, Debt to Total Capital Employed, has a moderate significant negative linear relationship with the MTB ratio; three (3) accounting financial ratios, Acid Test, Fixed Asset Turnover Rate, and the Cash Ratio have weak significant negative linear relationship with the MTB ratio.

The drivers of shareholder wealth in the Cyclical Services industry sector can therefore be inferred as being decreased operating costs, directly impacting Return on Equity, Return on Net Assets and Operating Profit Margin; sustainable increased levels of Debt, directly impacting the Debt to Equity and Financial Leverage ratios, and indirectly impacting the Return on Equity; decreased levels of Cash, directly impacting the Sustainable Growth Rate, Cash Ratio, Acid Test and Current Test; and increased levels of current assets (excluding cash), with decreased levels of inventory and current liabilities

Based on the magnitude of the correlation coefficients, the largest positive impact to the MTB ratio and growth in shareholder wealth would be achieved through decreased operating costs; as this would increase Return on Equity which has a correlation coefficient of 0.71 with the MTB ratio, increase Return on Net Assets which has a correlation coefficient of 0.41 with the MTB ratio; and sustainably increasing debt levels as this would directly increase Debt to Equity which has a correlation coefficient with the MTB of 0.42, increase the Financial Leverage which has a correlation coefficient with the MTB of 0.42; and it would indirectly increase Return on Equity.

Surprisingly, the Fixed Asset Turnover Rate has a significant negative linear relationship with the MTB ratio, which on face value is in contradiction with the positive linear correlations between Return on Equity and the MTB ratio, and Return on Net Assets and the MTB ratio as a negative Fixed Asset Turnover Rate correlation implies that the MTB ratio and shareholder wealth could be increased through decreasing sales in relation to fixed assets, This would only be congruent with the positive Return on Equity and Return on Net Asset correlations if the ratio of Earning after Interest & Tax : Turnover could be increased simultaneously.

Cyclical Services is the only industry sector to have a significant relationship between CPI and the MTB ratio. This relationship is a negative linear relationship, implying that as CPI increases, shareholder wealth decreases in this industry sector decreases.

5.3.5 *Non-Cyclical Consumer Goods*

In the Non-Cyclical Consumer Goods industry sector, it was observed that two (2) accounting financial ratios, Operating Profit Margin, and Earning After Interest & Tax Margin have strong significant positive linear relationships with the MTB ratio; five (5) accounting financial ratio, Current Test, Acid Test, Fixed Asset Turnover Rate, Cash Ratio, and Working Capital Turnover Rate, have strong significant negative linear relationship with the MTB ratio; and one (1) accounting financial ratio, Net Asset Turnover Rate has a weak significant negative linear relationship with the MTB ratio.

The drivers of shareholder wealth in the Non-Cyclical Consumer Goods industry sector can therefore be inferred as being decreased operating costs, directly impacting Operating Profit Margin, Earnings After Interest & Tax Margin; decreased levels of Current Assets including Cash, directly impacting the Current Test, Acid Test, Working Capital Turnover, Cash Ratio and Net Asset Turnover Rate.

Based on the magnitude of the correlation coefficients, the largest positive impact to the MTB ratio and growth in shareholder wealth would be achieved through decreased operating costs; as this would increase Operating Profit Margin which has a correlation coefficient of 0.36 with the MTB ratio, increase Earnings After Interest & Tax Margin which has a correlation coefficient of 0.25 with the MTB ratio; and decreasing Cash holdings.

5.3.6 *General Industrials Industry Sector*

In the General Industrials industry sector, it was observed that one (1) accounting financial ratios, Return on Equity has a strong significant positive linear relationships with the MTB ratio; eight (8) accounting financial ratio, Debt to Equity. Financial Leverage, Return on Net Assets, Debt to Total Capital Employed, Operating Profit Margin, Interest Cover, Earning After Interest & Tax Margin, and Net Asset Turnover Rate, have moderate significant positive linear relationship with the MTB ratio; two (2) accounting financial ratio, Sustainable Growth Rate and Working Capital Turnover Rate have moderate significant negative linear relationship with the MTB ratio; and one (1) accounting financial ratio, Current Test, has a weak significant negative linear relationship with the MTB ratio.

The drivers of shareholder wealth in the Non-Cyclical Consumer Goods industry sector can therefore be inferred as being decreased operating costs, directly impacting Return on Equity, Return on Net Assets, Operating Profit Margin and Interest Cover; sustainable increased levels of debt, directly impacting Return on Equity, Debt to Equity, Financial Leverage, and Debt to Total Capital Employed; and decreased levels of Current Assets, directly impacting the Working Capital Turnover Rate and Current Test.

Based on the magnitude of the correlation coefficients, the largest positive impact to the MTB ratio and growth in shareholder wealth would be achieved through decreased operating costs; as this would increase Return on Equity which has a correlation coefficient of 0.61 with the MTB ratio, increase Return on Net Assets which has a correlation coefficient of 0.35 with the MTB ratio,

increase Operating Profit Margin which has a correlation coefficient of 0.33 with the MTB ratio, increase Interest Cover which has a correlation coefficient of 0.31 with the MTB ratio, and increase Earning After Interest & Tax Margin which has a correlation coefficient of 0.18 with the MTB ratio; and increase debt levels as this would increase Return on Equity which has a correlation coefficient of 0.61 with the MTB ratio; increase Debt to Equity which has a correlation coefficient of 0.49 with the MTB ratio, and increase Financial Leverage which has a correlation coefficient of 0.46 with the MTB ratio.

5.3.7 *Non-Cyclical Services Industry Sector*

In the Non-Cyclical Services industry sector, it was observed that six (6) accounting financial ratios, Financial Leverage, Debt to Equity, Debt to Total Capital Employed, Return on Equity, Net Asset Turnover Rate, Return on Net Assets have strong significant positive linear relationships with the MTB ratio; two (2) accounting financial ratio, Operating Profit Margin and Fixed Asset Turnover Rate, have moderate significant positive linear relationship with the MTB ratio; and four (4) accounting financial ratio, Debtor Days, Current Test, Acid Test and the Cash Ratio have moderate significant negative linear relationship with the MTB ratio.

The drivers of shareholder wealth in the Non-Cyclical Consumer Goods industry sector can therefore be inferred as being sustainable increased levels of debt, directly impacting Return on Equity, Debt to Equity, Financial Leverage, and Debt to Total Capital Employed; decreased operating costs, directly impacting Return on Equity, Return on Net Assets, and Operating Profit Margin; decreased levels of Current Assets including Cash, directly impacting the Current Test, Acid Test, and Cash Ratio; decreased levels of current assets, inventory and debtors directly decreasing the Current Test, Acid Test and Debtors Days`; and decreased levels of Fixed Assets directly impacting the Fixed Asset Turnover Rate and indirectly impacting Return on Equity and Return on Net Assets.

Based on the magnitude of the correlation coefficients, the largest positive impact to the MTB ratio and growth in shareholder wealth would be achieved through increased debt levels as this would increase Financial Leverage which has a correlation coefficient of 0.87 with the MTB ratio, increase Debt to Equity which has a correlation coefficient of 0.85 with the MTB ratio, increase Debt to Total Capital Employed which has a correlation coefficient of 0.81 with the MTB ratio and increase Return on Equity which has a correlation coefficient of 0.79 with the MTB ratio.

5.3.8 *Resources Industry Sector*

In the Resources industry sector, it was observed that one (1) accounting financial ratios, Debtor Days has a moderate significant positive linear relationships with the MTB ratio; two (2) accounting financial ratio, Financial Leverage and Debt to Total Capital Employed, have weak significant positive linear relationship with the MTB ratio; and two (2) accounting financial ratio, Current Test and Cash Ratio have weak significant negative linear relationship with the MTB ratio.

The drivers of shareholder wealth in the Resources industry sector can therefore be inferred as being a sustainable increase in Debtors, which would directly impacting Debtor Days; sustainable increased levels of debt, directly impacting Financial Leverage, and Debt to Total Capital Employed; decreased levels of Current Assets including Cash, directly impacting the Current Test, Acid Test, and Cash Ratio.

Based on the magnitude of the correlation coefficients, the largest positive impact to the MTB ratio and growth in shareholder wealth would be achieved through increased credit granted to customers, increasing the Debtors portion of sales, which has a correlation coefficient of 0.25 with the MTB ratio; and through increasing debt levels as this would increase Financial Leverage which has a correlation coefficient of 0.18 with the MTB ratio, and increase Debt to Equity which has a correlation coefficient of 0.15 with the MTB ratio.

5.3.9 *Cyclical Consumer Goods Industry Sector*

Although there was an insufficient sample size to detect weak correlation coefficients in the Cyclical Consumer Goods industry sector bivariate correlation analyses, some moderate to large correlation coefficients were significantly detected. For the Cyclical Consumer Goods industry sector, it was observed that one (1) accounting financial ratios, Operating Profit Margin, has a moderate significant positive linear relationships with the MTB ratio.

The drivers of shareholder wealth in the Cyclical Consumer Goods industry sector can therefore be inferred as being a decrease in operating costs, which would directly impacting Operating Profit Margin.

5.4 Conclusion

This study examined the relationship between the level of accounting financial ratios and the level of shareholder wealth created by South African companies listed on the main board of the JSE over the period 2001 to 2010, with the aim of identifying whether the level of a company's accounting financial ratios is related with the level of shareholder wealth created by the company, and whether this relationship differs for companies operating in different industry sectors.

The study demonstrates that for eight (8) out of the nine (9) industry sector classifications studied, there is a significant linear relationship between the level of a holistic set of a company's accounting financial ratios and the level of shareholder wealth created by the company, and this relationship does differ for companies operating in different industry sectors. The hypothesis of the relationship between the level of a holistic set of a company's accounting financial ratios and the level of shareholder wealth created by the company cannot be rejected at the at 5% confidence level for the period 2001 – 2010 only for the Cyclical Consumer Goods industry sector, but can be rejected at even

the 1% confidence level for the period 2001 – 2010 for the Basic Industries; Financials; Information Technology; Cyclical Services; Non-Cyclical Consumer Goods; General Industrials; Non-Cyclical Services; and Resources industry sectors. Furthermore, the relationship between the level of a holistic set of a company's accounting financial ratios and the level of shareholder wealth created by the company are practically significant for the Basic Industries; Information Technology; Cyclical Services; General Industrials; and Non-Cyclical Services industry sectors where a minimum of 72.5% of the variance in a company's shareholder wealth is of the variation in the MTB ratio is coupled with variation in the holistic set of accounting financial ratios employed in this study.

This study further demonstrated the differences in the relationship between the level of accounting financial ratios and the level of shareholder wealth created by South African companies listed on the main board of the JSE across industry sectors when presenting the results of the bivariate correlation analyses of the accounting financial ratios and the MTB ratio for each industry sector. It was found that in order to drive shareholder wealth, each industry sector has a different set of accounting financial ratios that need to be optimised concurrently, and that the accounting financial ratios that significantly correlate to the MTB ratio differ for each industry sector. While not every individual accounting financial ratio is significantly correlated to the MTB ratio for every industry sector, it was observed that every individual accounting financial ratio is significantly correlated to the MTB in at least one of the industry sectors. Therefore, the hypothesis that the level of shareholder wealth generated by South African JSE listed companies, at the time of these companies publishing their annual financial results is related to the level of the companies' individual accounting financial ratios cannot be rejected at the 5% confidence level.

This study therefore demonstrates that accounting financial ratios can be regarded as indicators of value created by a company from its operating activities.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The findings and the conclusions of this research study will be summarised in this chapter. Recommendations to company management teams, shareholders' and investors will be provided. This chapter will conclude with suggestions for further research.

6.2 Conclusions of the study

The relationship between the level of South African JSE main board listed companies accounting financial ratios and level of shareholder wealth created by the companies in each of the industry sectors were examined over the period 2001 - 2010. In agreement with corporate finance theory and strategy research, but contrary to the claims of some of the pundits of economic based measures of company financial performance; this study was able to demonstrate that the current level of a company's accounting financial ratios are linearly related to shareholder wealth that it creates. The strength of the relationship between a company's accounting financial ratios and shareholder wealth created; and the individual accounting financial ratios best correlated with the shareholder wealth created was however found to differ across industry sectors.

The study contributes to academic literature in that it demonstrates that for all industry sectors except Cyclical Consumer Goods, the extent of the relationship between a company's holistic set of accounting financial ratios and the shareholder wealth created by the company. Furthermore, this study delves deeper into the company's holistic set of accounting financial ratios and identifies per industry sector which of the financial ratios are significantly related

to the shareholder wealth creation, and the extent of this relationship. Through identifying the accounting financial ratios that have the strongest relationship with shareholder wealth, this study could aid management teams in developing financial strategies that would optimise value creation for shareholders, and thereby provides management teams with a path to shareholder wealth maximisation.

6.3 Recommendations

This study has demonstrated that a company's single period financial performance is related to shareholder wealth created by the company, and further provides an indication of the degree of the relationship between individual financial ratios and shareholder wealth, information which company management teams, shareholders' and investors will find useful.

Company management teams can use this information as part of their strategic planning process. In the course of strategic planning, managers conduct an external analysis of the company to identify opportunities that could be available to the company and threats that could affect the company, and an internal analysis of the company to determine the company's strengths and weaknesses which involves analysing the financial performance of the company, which includes analysing the company's financial ratios. During the strategic planning process, the company's managers are faced with a number of potential strategies that could be followed. It is recommended that the company's managers generate pro-forma financial statements based on each possible strategy, and then compare the levels of changes in future accounting financial ratios with the bivariate correlation coefficients found as part of this study to determine whether both the level and direction of changes in forecast financial ratios are congruent with the relationship between the financial ratio and shareholder wealth. The company's management team can then identify which strategy to follow by assessing which of the proposed strategies best aligns to the company's shareholders' expectations of wealth maximisation. As this study

demonstrated that the financial year end level of a company's financial ratios are related to shareholder wealth at that time, the focus of a company's management team should be to ensure that the company consistently achieves stellar financial performance year after year.

Similarly to a company's' management team, a company's shareholders' and investors can generate pro-forma financial statements for a company based on its chosen strategy and use the relationships between a company's financial ratios and shareholder wealth identified as part of this study to test whether a company's proposed strategies and investment decisions will drive the creation or destruction of shareholder wealth, and thereby assess whether they should invest or divest from the company.

6.4 Suggestions for further research

This study presented evidence that for South African JSE main board listed companies in the Basic Industries; Financials; Information Technology; Cyclical Services; Non-Cyclical Consumer Goods; General Industrials; Non-Cyclical Services; and Resources industry sectors, a holistic set of a company's accounting financial ratios are linearly related to the shareholder wealth created by the company; however the level of this relationship does differ for companies operating in different industry sectors, ranging from a low of 0.44 in the Financials industry sector to a high of 0.97 in the Non-Cyclical Services sector. One possible reason for this variance and the low level of correlations in some industry sectors could be underspefication of the variables included in the study, and a follow up study that includes a sufficiently large sample size for each industry sector is recommended to confirm the results obtained from this study. The literature study conducted as part of this research and finance theory indicates that both macroeconomic and microeconomic factors influence shareholder wealth. This study included only two macro-economic indicators, GDP and CPI, as part of the multiple correlation analysis; however, further

research could explore the use of additional leading macroeconomic and microeconomic indicators in explaining the variance of the MTB ratio.

This research study failed to detect a statistically significant linear relationship between a holistic set of accounting financial ratios and shareholder wealth created for the Cyclical Consumer Goods industry sector. A possible reason for this could be the small sample used for this industry sector, which underpowered the statistical analysis. The statistical required 109 observations, but there were only 19 observations available for use in this study. An area of further research could be to test whether a statistically significant linear relationship between a holistic set of accounting financial ratios and shareholder wealth created in the Cyclical Consumer Goods industry sector does exist using a larger sample size of at least 109 observations.

Unlike other studies examined in the literature review, this study sought to identify differences between accounting financial ratios and the MTB ratio across industry sectors. This study focussed on the South African JSE main board listed companies. Further research could explore a similar study in other countries and markets.

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APPENDIX A

Financial Ratio Equations

1. Market-to Book Ratio

i. $$\text{Market to Book Ratio} = \frac{(\text{1 Week Average Equity Price}) * (\text{Number of Shares Outstanding})}{\text{Book Value of Equity}}$$

2. Financial Ratios

2.1 Profitability Ratios

i. $$\text{Operating Profit Margin} = \frac{\text{Operating Profit}}{\text{Sales}}$$

ii. $$\text{Earning after Interst \& Tax Margin} = \frac{\text{Earning after Interest \& Tax}}{\text{Sales}}$$

2.2 Performance Ratios

iii. $$\text{Return on Net Assets (RONA)} = \frac{\text{Earning after Interest \& Tax}}{\text{Net Assets}}$$

iv. $$\text{Return on Equity (ROE)} = \frac{\text{Earning after Interest \& Tax}}{\text{Total Equity}}$$

2.3 Asset Efficiency Ratios

v. $$\text{Fixed Asset Turnover Rate} = \frac{\text{Sales}}{\text{Fixed Assets}}$$

vi. $$\text{Net Asset Turnover Rate} = \frac{\text{Sales}}{\text{Net Assets}}$$

vii. $$\text{Working Capital T/O Rate} = \frac{\text{Sales}}{\text{Net Current Assets}}$$

2.4 Capital Structure Ratios

viii. $$\text{Debt to Equity} = \frac{\text{Long Term Loans}}{\text{Total Equity}}$$

ix. $$\text{Debt to Total Capital Employed} = \frac{\text{Long Term Loans}}{\text{Total Capital Employed}}$$

2.5 Liquidity Ratios

x. $\text{Current Test} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$

xi. $\text{Acid Test} = \frac{(\text{Current Assets} - \text{Inventory})}{\text{Current Liabilities}}$

xii. $\text{Interest Cover} = \frac{\text{Operating Profit}}{\text{Interest Paid}}$

xiii. $\text{Financial Leverage} = \frac{Total\ Assets}{\text{Total Equity}}$

xiv. $\text{Cash Ratio} = \frac{Cash\ and\ Equivalents}{\text{Current Liabilities}}$

xv. $\text{Debtor Days} = \frac{\text{Debtors}}{\text{Sales}}$

2.6 Sustainable Growth Rate

xvi. $\text{SGR} = \text{Retained Earnings Ratio x } \frac{\text{Earning after Interest \& Tax}}{\text{Total Equity}}$

APPENDIX B

Table B1: List of Companies Sampled

Company Name	Industry Sector	Number of Observations
A E C I Limited	Basic Industries	9
Absa Group Limited	Financials	8
Adaptit Holdings Limited	Information Technology	10
Advtech Limited	Cyclical Services	10
Afgri Limited	Non-Cyclical Consumer Goods	10
African And Overseas Enterprises Ld	Cyclical Services	10
African Bank Investments Limited	Financials	10
African Oxygen Limited	Basic Industries	10
Allied Electronics Corporation Ltd	General Industrials	10
Allied Technologies Limited	Non-Cyclical Services	10
Amalgamated Appliance Holdings Ld	Cyclical Services	10
Anglo American Plat Ltd	Resources	10
Anglo American Plc	Resources	10
Anglogold Ashanti Limited	Resources	10
Arcelormittal South Africa Limited	Resources	10
Argent Industrial Limited	General Industrials	10

Company Name	Industry Sector	Number of Observations
Aspen Pharmacare Holdings Limited	Non-Cyclical Consumer Goods	8
Assore Limited	Resources	10
Astral Foods Limited	Non-Cyclical Consumer Goods	10
Astrapak Limited	General Industrials	10
Aveng Limited	Basic Industries	10
Avi Limited	Non-Cyclical Consumer Goods	10
Barloworld Limited	General Industrials	10
Basil Read Holdings Limited	Basic Industries	9
Bell Equipment Limited	General Industrials	10
Bhp Billiton Plc	Resources	10
Brait Se	Financials	10
Brimstone Investment Corporation Ld	Financials	10
Buildmax Limited	Resources	10
Cape Empowerment Limited	Financials	10
Cashbuild Limited	Cyclical Services	10
Caxton Ctp Publishers & Printers Ld	Cyclical Services	10
Ceramic Industries Limited	Basic Industries	10
City Lodge Hotels Limited	Cyclical Services	10
Clicks Group Limited	Non-Cyclical Services	10

Company Name	Industry Sector	Number of Observations
Comair Limited	Cyclical Services	10
Combined Motor Holdings Limited	Cyclical Services	9
Compu-Clearing Outsourcing Limited	Information Technology	10
Control Instruments Group Limited	General Industrials	10
Crookes Brothers Limited	Non-Cyclical Consumer Goods	9
Cullinan Holdings Limited	Cyclical Services	10
Datacentrix Holdings Limited	Information Technology	9
Delta Emd Limited	Basic Industries	10
Digicore Holdings Limited	General Industrials	10
Discovery Holdings Limited	Financials	10
Distell Group Limited	Non-Cyclical Consumer Goods	10
Distrib. And Warehousing Network Ld	Basic Industries	10
Dorbyl Limited	Cyclical Consumer Goods	9
Drdgold Limited	Resources	10
Elb Group Limited	Cyclical Services	10
Eoh Holdings Limited	Information Technology	10
Evraz Highveld Steel & Vanadium Ltd	Resources	10
Excellerate Holdings Limited	Cyclical Services	10

Company Name	Industry Sector	Number of Observations
Famous Brands Limited	Cyclical Services	10
Firstrand Limited	Financials	10
Gijima Group Limited	Information Technology	10
Gold Fields Limited	Resources	10
Grindrod Limited	General Industrials	10
Group Five Limited	Basic Industries	10
Harmony Gold Mining Company Limited	Resources	10
Hosken Consolidated Investments Ltd	Financials	10
Howden Africa Holdings Limited	General Industrials	10
Hudaco Industries Limited	General Industrials	10
Iliad Africa Limited	Cyclical Services	10
Illovo Sugar Limited	Non-Cyclical Consumer Goods	10
Impala Platinum Holdings Limited	Resources	10
Imperial Holdings Limited	General Industrials	10
Intertrading Limited	Non-Cyclical Consumer Goods	9
Investec Limited	Financials	10
Invicta Holdings Limited	General Industrials	10
Italtile Limited	Cyclical Services	10
Jasco Electronics Holdings Limited	General Industrials	10
Jd Group Limited	Cyclical Services	10

Company Name	Industry Sector	Number of Observations
Kagiso Media Limited	Cyclical Services	10
Liberty Holdings Limited	Financials	10
Lonmin Plc	Resources	10
Masonite (Africa) Limited	Basic Industries	10
Massmart Holdings Limited	Cyclical Services	10
Mediclinic International Limited	Non-Cyclical Consumer Goods	10
Mercantile Bank Holdings Limited	Financials	10
Metair Investments Limited	Cyclical Consumer Goods	10
Metrofile Holdings Limited	Cyclical Services	6
Mr Price Group Limited	Cyclical Services	10
Mtn Group Limited	Non-Cyclical Services	10
Murray & Roberts Holdings Limited	Basic Industries	10
Mustek Limited	General Industrials	10
Nampak Limited	General Industrials	10
Naspers Limited	Cyclical Services	10
Nedbank Group Limited	Financials	10
Netcare Limited	Non-Cyclical Consumer Goods	10
Nictus Beperk	Cyclical Services	10
Northam Platinum Limited	Resources	10

Company Name	Industry Sector	Number of Observations
Nu-World Holdings Limited	Cyclical Services	10
Oceana Group Limited	Non-Cyclical Consumer Goods	9
Omnia Holdings Limited	Basic Industries	10
Palabora Mining Company Limited	Resources	8
Peregrine Holdings Limited	Financials	10
Pick N Pay Stores Limited	Non-Cyclical Services	10
Pinnacle Technology Holdings Ltd	Information Technology	10
Pretoria Portland Cement Company Ld	Basic Industries	10
Rainbow Chicken Limited	Non-Cyclical Consumer Goods	10
Remgro Limited	General Industrials	10
Reunert Limited	General Industrials	10
Rex Trueform Clothing Company Ltd	Cyclical Services	10
Rmb Holdings Limited	Financials	8
Sabmiller Plc	Non-Cyclical Consumer Goods	10
Sabvest Limited	Financials	10
Sanlam Limited	Financials	10
Sappi Limited	Basic Industries	10
Sasfin Holdings Limited	Financials	10
Sasol Limited	Resources	10

Company Name	Industry Sector	Number of Observations
Seardel Investment Corporation Ltd	Financials	10
Sekunjalo Investments Limited	Financials	10
Sentula Mining Limited	Resources	10
Shoprite Holdings Limited	Non-Cyclical Services	10
Simmer And Jack Mines Limited	Resources	9
Sovereign Food Investments Limited	Non-Cyclical Consumer Goods	8
Spanjaard Limited	Basic Industries	10
Spur Corporation Limited	Cyclical Services	10
Standard Bank Group Limited	Financials	9
Steinhoff International Holdings Ld	Basic Industries	10
Sun International Limited	Cyclical Services	10
Super Group Limited	General Industrials	10
The Bidvest Group Limited	General Industrials	10
The Don Group Limited	Cyclical Services	10
The Foschini Group Limited	Cyclical Services	10
Tiger Brands Limited	Non-Cyclical Consumer Goods	10
Trans Hex Group Limited	Resources	10
Transpaco Limited	General Industrials	10
Trencor Limited	Financials	10
Value Group Limited	General Industrials	10

Company Name	Industry Sector	Number of Observations
Wilson Bayly Holmes-Ovcon Limited	Basic Industries	10
Winhold Limited	Cyclical Services	10
Woolworths Holdings Limited	Cyclical Services	10

APPENDIX C

Bivariate Correlation Matrix per Industry Sector

Correlation matrices and descriptive statistics for the MTB ratio and each accounting financial ratio used in this study are provided per industry sector in Table C1, Table C2, Table C3, Table C4, Table C5, Table C6, Table C7, Table C8, and Table C9.

Table C1: The relationship between Accounting Financial Ratios and the MTB Ratio for the Basic Industries Industry Sector: Correlations and Descriptive Statistics

	y	*x1*	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*
y	1										
x1	0.25 ***	1									
x2	0.03	0.56 ***	1								
x3	0.13	0.60 ***	0.59 ***	1							
x4	0.43 ***	0.58 ***	0.44 ***	0.83 ***	1						
x5	-0.13	-0.19 **	-0.11	0.11	0.05	1					
x6	-0.16 *	-0.28 ***	-0.20 **	0.24 ***	0.19 **	0.64 ***	1				
x7	-0.02	-0.05	-0.03	-0.08	-0.06	-0.01	0.02	1			
x8	0.56 ***	-0.04	-0.10	0.03	0.31 ***	-0.08	0.08	-0.05	1		
x9	0.24 ***	-0.11	-0.11	0.09	0.15 *	0.00	0.22 ***	-0.05	0.87 ***	1	
x10	-0.25 ***	0.00	0.38 ***	-0.09	-0.17 **	-0.13	-0.44 ***	-0.07	-0.36 ***	-0.34 ***	1
x11	-0.28 ***	0.15 *	0.54 ***	0.07	-0.06	-0.15 *	-0.38 ***	-0.08	-0.32 ***	-0.27 ***	0.92 ***
x12	-0.02	0.18 **	0.06	0.04	0.00	-0.07	-0.11	-0.02	-0.09	-0.08	0.14
x13	-0.18 **	0.22 ***	0.09	-0.09	-0.12	-0.03	-0.31 ***	-0.10	-0.33 ***	-0.34 ***	0.32 ***
x14	-0.11	0.18 **	0.29 ***	0.55 ***	0.43 ***	0.26 ***	0.46 ***	-0.05	0.07	0.17 **	-0.34 ***
x15	-0.13	0.23 ***	0.67 ***	0.21 **	0.06	-0.21 **	-0.36 ***	-0.06	-0.22 ***	-0.19 **	0.82 ***
x16	0.37 ***	-0.17 **	-0.17 **	0.10	0.35 ***	0.14 *	0.61 ***	-0.01	0.63 ***	0.49 ***	-0.54 ***
x17	0.07	-0.02	0.04	0.09	0.00	0.03	0.09	0.04	-0.15 *	-0.09	0.00
x18	0.01	0.03	-0.05	0.02	0.02	-0.02	-0.03	-0.11	0.20 **	0.24 ***	-0.07
Mean	3.29	0.09	0.08	0.16	0.22	4.17	2.81	26.72	1.14	0.74	1.62
Std Dev	3.83	0.10	0.18	0.14	0.21	4.81	1.86	195.83	1.20	0.72	0.92
Range	22.74	0.79	2.41	0.93	1.60	38.98	10.44	2769.14	6.19	4.24	6.36

*Note: N=159, *p < 0.10, **p < 0.05, ***p < 0.01*

	x11	*x12*	*x13*	*x14*	*x15*	*x16*	*x17*	*x18*
y								
x1								
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
x10								
x11	1							
x12	0.2 **	1						
x13	0.22 ***	0.07	1					
x14	-0.14 *	0.01	-0.14 *	1				
x15	0.92 ***	0.18 **	0.07	-0.07	1			
x16	-0.48 ***	-0.15 *	-0.42 ***	0.31 ***	-0.36 ***	1		
x17	-0.02	0.06	0.01	0.09	0.00	-0.03	1	
x18	-0.07	-0.04	-0.03	0.05	-0.05	0.06	-0.25 ***	1
Mean	1.19	39.79	45.05	0.12	0.48	2.76	3.62	6.09
Std Dev	0.66	224.66	22.54	0.17	0.57	1.32	2.08	2.89
Range	5.23	2 565.02	130.55	1.75	5.13	7.09	7.10	10.10

*Note: N=159, *p < 0.10, **p < 0.05, ***p < 0.01*

Table C2: The relationship between Accounting Financial Ratios and the MTB Ratio for the Financials Industry Sector: Correlations and Descriptive Statistics

	y	*x1*	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*
y	1										
x1	0.00	1									
x2	0.11	0.65 ***	1								
x3	0.12	0.10	0.27 ***	1							
x4	0.17 **	0.08	0.24 ***	0.95 ***	1						
x5	-0.06	-0.01	-0.11	-0.03	-0.04	1					
x6	-0.17 **	-0.06	-0.17 **	-0.51 ***	-0.53 ***	0.52 ***	1				
x7	-0.02	-0.01	-0.02	0.00	0.03	-0.02	-0.02	1			
x8	0.17 **	-0.15 **	-0.12	0.05	0.21 ***	-0.26 ***	-0.21 ***	0.04	1		
x9	0.06	-0.10	-0.09	0.13 *	0.14 *	-0.17 **	-0.05	-0.02	0.52 ***	1	
x10	0.10	0.21 ***	0.21 ***	0.07	0.05	0.51 ***	-0.06	-0.03	-0.32 ***	-0.34 ***	1
x11	0.16 **	0.23 ***	0.24 ***	0.09	0.09	0.45 ***	-0.14 *	-0.02	-0.27 ***	-0.31 ***	0.98 ***
x12	0.02	0.36 ***	0.23 ***	0.09	0.08	0.07	0.01	-0.14 *	-0.16 **	0.01	0.09
x13	-0.04	0.27 ***	0.31 ***	-0.03	-0.08	-0.14 *	-0.14 *	-0.03	-0.17 **	-0.17 **	0.1
x14	0.09	0.08	0.22 ***	0.89 ***	0.90 ***	-0.09	-0.47 ***	0.01	0.14 *	0.11	-0.05
x15	0.14 *	0.37 ***	0.44 ***	0.09	0.03	0.17 **	-0.12	-0.03	-0.32 ***	-0.31 ***	0.64 ***
x16	0.18 **	-0.15 **	-0.17 **	-0.07	0.10	-0.29 ***	-0.17 **	0.02	0.84 ***	0.37 ***	-0.43 ***
x17	0.22 ***	0.03	0.01	0.09	0.14 *	0.10	0.04	0.07	0.03	-0.02	0.02
x18	-0.08	-0.07	-0.07	-0.12	-0.13 *	-0.09	0.06	-0.03	0.08	0.13 *	-0.08
Mean	2.16	0.13	0.32	0.03	0.13	0.98	0.65	28.88	5.47	1.31	1.49
Std Dev	2.99	1.41	0.95	0.26	0.37	1.91	1.08	343.08	7.12	1.76	1.35
Range	20.46	16.11	9.87	2.76	3.65	12.53	11.15	4 724.34	39.36	9.02	7.98

*Note: N=205, *p < 0.10, **p < 0.05, ***p < 0.01*

	x11	*x12*	*x13*	*x14*	*x15*	*x16*	*x17*	*x18*
y								
x1								
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
x10								
x11	1							
x12	0.1	1						
x13	0.13 *	0.1	1					
x14	-0.02	0.08	-0.05	1				
x15	0.68 ***	0.15 **	0.02	0.00	1			
x16	-0.38 ***	-0.11	-0.11	0.08	-0.39 ***	1		
x17	0.02	0.15 **	-0.04	0.11	0.03	0.08	1	
x18	-0.08	-0.07	-0.06	-0.11	-0.10	0.02	-0.26 ***	1
Mean	1.37	-1.89	149.54	0.07	0.41	8.60	3.60	5.99
Std Dev	1.31	16.64	347.37	0.38	0.48	8.13	2.09	2.87
Range	7.98	191.95	2 950.26	4.52	3.10	40.68	7.10	10.10

*Note: N=205, *p < 0.10, **p < 0.05, ***p < 0.01*

Table C3: The relationship between Accounting Financial Ratios and the MTB Ratio for the Information Technology Industry Sector: Correlations and Descriptive Statistics

	y	*x1*	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*
y	1										
x1	0.22	1									
x2	0.18	0.96 ***	1								
x3	0.16	0.61 ***	0.65 ***	1							
x4	-0.14	0.48 ***	0.50 ***	0.76 ***	1						
x5	0.12	0.16	0.11	0.50 ***	0.23 *	1					
x6	-0.13	-0.79 ***	-0.79 ***	-0.26 *	-0.26 *	0.28 **	1				
x7	0.01	-0.04	-0.04	0.17	0.23 *	-0.10	0.11	1			
x8	0.29 **	-0.57 ***	-0.53 ***	-0.42 ***	-0.73 ***	-0.08	0.45 ***	-0.17	1		
x9	0.14	-0.48 ***	-0.43 ***	-0.02	-0.02	0.05	0.6 ***	0.00	0.61 ***	1	
x10	0.26 *	0.76 ***	0.76 ***	0.15	0.14	-0.17	-0.75 ***	-0.18	-0.36 ***	-0.47 ***	1
x11	0.28 **	0.77 ***	0.77 ***	0.15	0.14	-0.17	-0.77 ***	-0.17	-0.36 ***	-0.48 ***	1 ***
x12	0.11	0.50 ***	0.50 ***	0.11	0.08	-0.03	-0.44 ***	-0.11	-0.22	-0.3 **	0.57 ***
x13	0.08	-0.15	-0.16	0.02	0.13	-0.23	-0.03	0.16	0.16	0.36 ***	-0.34 **
x14	-0.18	0.43 ***	0.47 ***	0.74 ***	0.99 ***	0.21	-0.22	0.24 *	-0.72 ***	0.00	0.10
x15	0.19	0.73 ***	0.77 ***	0.13	0.12	-0.21	-0.76 ***	-0.15	-0.34 **	-0.47 ***	0.97 ***
x16	0.19	-0.55 ***	-0.55 ***	-0.62 ***	-0.95 ***	-0.13	0.38 ***	-0.17	0.88 ***	0.22	-0.29 **
x17	0.48 ***	0.05	-0.02	-0.04	-0.06	0.03	0.00	0.08	0.01	-0.1	0.05
x18	-0.15	0.07	0.11	0.13	0.22	-0.01	0.00	-0.12	-0.11	0.11	0.05
Mean	2.34	0.11	0.08	0.19	0.11	10.35	3.54	10.40	0.97	0.62	2.99
Std Dev	1.01	0.08	0.07	0.20	0.73	8.68	1.63	30.35	1.46	0.61	2.75
Range	4.20	0.36	0.35	1.49	5.27	38.74	6.64	242.12	9.30	2.16	10.05

*Note: N=59, *p < 0.10, **p < 0.05, ***p < 0.01*

	x11	*x12*	*x13*	*x14*	*x15*	*x16*	*x17*	*x18*
y								
x1								
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
x10								
x11	1							
x12	0.59 ***	1						
x13	-0.30 **	-0.19	1					
x14	0.09	0.06	0.13	1				
x15	0.97 ***	0.54 ***	-0.36 ***	0.09	1			
x16	-0.29 **	-0.17	-0.02	-0.94 ***	-0.26 *	1		
x17	0.05	0.07	-0.03	-0.05	-0.02	0.06	1	
x18	0.04	0.17	0.09	0.24 *	0.05	-0.21	-0.24 *	1
Mean	2.86	922.91	65.79	0.04	1.58	2.71	3.60	6.14
Std Dev	2.77	2 225.15	17.07	0.72	2.09	3.52	2.10	2.88
Range	10.15	12039.51	75.65	5.27	7.82	25.20	7.10	10.10

*Note: N=59, *p < 0.10, **p < 0.05, ***p < 0.01*

Table C4: The relationship between Accounting Financial Ratios and the MTB Ratio for the Cyclical Services Industry Sector: Correlations and Descriptive Statistics

	y	*x1*	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*
y	1										
x1	0.47 ***	1									
x2	0.41 ***	0.92 ***	1								
x3	0.41 ***	0.47 ***	0.61 ***	1							
x4	0.71 ***	0.49 ***	0.57 ***	0.76 ***	1						
x5	-0.13 **	-0.28 ***	-0.26 ***	0.16 **	0.03	1					
x6	0.05	-0.4 ***	-0.37 ***	0.27 ***	0.14 **	0.67 ***	1				
x7	-0.08	0.00	-0.05	-0.12 *	-0.12 *	-0.02	-0.08	1			
x8	0.42 ***	-0.10	-0.09	0.02	0.39 ***	-0.06	0.12 *	-0.05	1		
x9	0.16 ***	-0.22 ***	-0.15 **	0.10 *	0.15 **	0.04	0.29 ***	-0.08	0.77 ***	1	
x10	-0.30 ***	-0.02	0.10	-0.07	-0.12 *	0.04	-0.25 ***	-0.03	-0.31 ***	-0.33 ***	1
x11	-0.18 ***	0.18 ***	0.28 ***	-0.07	-0.09	-0.14 **	-0.45 ***	-0.01	-0.3 ***	-0.36 ***	0.9 ***
x12	0.02	0.10	0.11 *	0.05	0.01	-0.06	-0.07	-0.01	-0.07	-0.07	0.12 *
x13	-0.07	0.01	0.08	-0.04	-0.05	-0.15 **	-0.31 ***	-0.01	0.09	0.17 ***	0.12 *
x14	0.39 ***	0.35 ***	0.48 ***	0.70 ***	0.78 ***	0.02	0.05	-0.08	0.27 ***	0.13 **	-0.09
x15	-0.13 **	0.18 ***	0.24 ***	0.01	-0.04	-0.07	-0.26 ***	0.00	-0.22 ***	-0.24 ***	0.73 ***
x16	0.42 ***	-0.16 **	-0.19 ***	-0.02	0.33 ***	0.02	0.24 ***	0.00	0.88 ***	0.55 ***	-0.37 ***
x17	0.05	0.06	0.06	0.12 *	-0.01	0.08	0.04	0.00	-0.13 **	-0.07	-0.03
x18	-0.11 **	-0.02	-0.02	-0.07	-0.03	-0.07	-0.01	-0.05	0.11 *	0.12 **	-0.02
Mean	2.62	0.11	0.08	0.15	0.21	7.75	3.11	11.50	1.13	0.70	1.96
Std Dev	2.29	0.12	0.09	0.14	0.22	11.00	2.73	158.25	1.58	0.85	1.22
Range	16.49	1.01	0.91	1.73	3.13	90.97	13.77	2 948.47	14.76	5.79	5.59

*Note: N=285, *p < 0.10, **p < 0.05, ***p < 0.01*

	x11	*x12*	*x13*	*x14*	*x15*	*x16*	*x17*	*x18*
y								
x1								
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
x10								
x11	1							
x12	0.17 ***	1						
x13	0.26 ***	-0.04	1					
x14	-0.09	0.03	-0.01	1				
x15	0.77 ***	0.21 ***	-0.22 ***	-0.05	1			
x16	-0.36 ***	-0.09	0.02	0.18 ***	-0.27 ***	1		
x17	-0.01	-0.01	0.04	0.07	-0.02	-0.09	1	
x18	-0.06	-0.01	0.01	-0.05	-0.07	0.04	-0.25 ***	1
Mean	1.41	122.42	48.64	0.13	0.66	2.61	3.61	6.07
Std Dev	0.90	781.94	42.22	0.18	0.70	1.72	2.08	2.89
Range	3.78	12166.14	271.97	2.35	3.37	16.38	7.10	10.10

*Note: N=285, *p < 0.10, **p < 0.05, ***p < 0.01*

Table C5: The relationship between Accounting Financial Ratios and the MTB Ratio for the Non-Cyclical Consumer Goods Industry Sector: Correlations and Descriptive Statistics

	y	*x1*	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*
y	1										
x1	0.36 ***	1									
x2	0.25 ***	0.75 ***	1								
x3	0.06	0.48 ***	0.59 ***	1							
x4	0.14	0.52 ***	0.6 ***	0.89 ***	1						
x5	-0.29 ***	-0.46 ***	-0.43 ***	0.00	-0.21 **	1					
x6	-0.17 **	-0.29 ***	-0.33 ***	0.04	-0.18 **	0.86 ***	1				
x7	-0.22 ***	-0.16 *	-0.09	0.02	-0.07	0.26 ***	0.27 ***	1			
x8	0.14	0.16 *	-0.02	-0.10	0.21 **	-0.27 ***	-0.16 *	-0.32 ***	1		
x9	0.10	0.21 **	0.08	0.11	0.23 ***	-0.17 **	0.01	0.00	0.50 ***	1	
x10	-0.46 ***	-0.17 **	0.10	0.00	-0.13	0.13	-0.10	0.05	-0.31 ***	-0.34 ***	1
x11	-0.39 ***	-0.18 **	0.09	-0.13	-0.17 **	-0.02	-0.18 **	0.05	-0.18 **	-0.24 ***	0.84 ***
x12	-0.12	-0.05	0.03	0.17 **	0.08	0.14 *	0.09	0.06	-0.12	-0.09	0.16 *
x13	-0.14	0.08	-0.03	0.08	0.12	0.06	0.08	0.13	0.27 ***	0.64 ***	-0.21 **
x14	0.12	0.51 ***	0.59 ***	0.73 ***	0.83 ***	-0.28 ***	-0.26 ***	-0.13	0.25 ***	0.17 **	-0.06
x15	-0.22 ***	0.07	0.08	-0.05	-0.02	0.00	-0.19 **	0.00	-0.12	-0.18 **	0.40 ***
x16	0.12	0.11	-0.07	-0.11	0.19 **	-0.19 **	-0.05	-0.32 ***	0.97 ***	0.43 ***	-0.37 ***
x17	0.04	0.03	-0.01	0.00	-0.03	0.09	0.17 **	0.11	-0.08	-0.13	-0.02
x18	0.02	0.09	0.07	-0.02	0.02	-0.07	-0.10	0.03	0.12	0.23 ***	-0.06
Mean	3.53	0.12	0.08	0.14	0.20	3.38	2.13	6.36	1.23	0.53	1.64
Std Dev	4.07	0.06	0.05	0.16	0.18	2.70	1.98	24.98	2.37	0.52	0.66
Range	30.71	0.38	0.37	1.64	2.00	19.41	20.75	266.08	19.79	3.11	3.68

*Note: N=143, *p < 0.10, **p < 0.05, ***p < 0.01*

	x11	*x12*	*x13*	*x14*	*x15*	*x16*	*x17*	*x18*
y								
x1								
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
x10								
x11	1							
x12	0.13	1						
x13	-0.14 *	-0.07	1					
x14	-0.08	0.05	0.08	1				
x15	0.48 ***	0.14 *	-0.06	0.09	1			
x16	-0.25 ***	-0.15 *	0.27 ***	0.21 **	-0.16 *	1		
x17	0.02	0.08	-0.08	-0.05	0.11	-0.03	1	
x18	-0.06	-0.08	0.10	0.04	-0.05	0.07	-0.25 ***	1
Mean	1.18	37.44	45.39	0.12	0.35	2.66	3.63	6.07
Std Dev	0.61	88.23	30.75	0.20	0.30	2.52	2.08	2.91
Range	3.48	553.74	212.80	2.00	1.96	22.58	7.10	10.10

*Note: N=143, *p < 0.10, **p < 0.05, ***p < 0.01*

Table C6: The relationship between Accounting Financial Ratios and the MTB Ratio for the General Industrials Industry Sector: Correlations and Descriptive Statistics

	Y	*x1*	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*
y	1										
x1	0.33 ***	1									
x2	0.18 **	0.75 ***	1								
x3	0.35 ***	0.49 ***	0.35 ***	1							
x4	0.61 ***	0.55 ***	0.34 ***	0.65 ***	1						
x5	-0.04	-0.09	-0.19 ***	0.42 ***	0.09	1					
x6	0.14 **	-0.12 *	-0.20 ***	0.68 ***	0.21 ***	0.69 ***	1				
x7	-0.20 ***	-0.10	-0.08	-0.17 **	-0.11	0.02	-0.04	1			
x8	0.49 ***	-0.09	-0.17 **	0.00	0.26 ***	-0.08	0.16 **	-0.04	1		
x9	0.35 ***	-0.15 **	-0.25 ***	0.08	0.19 ***	0.01	0.29 ***	-0.07	0.82 ***	1	
x10	-0.18 **	0.27 ***	0.44 ***	-0.05	-0.26 ***	0.02	-0.23 ***	0.05	-0.3 ***	-0.40 ***	1
x11	-0.10	0.29 ***	0.51 ***	-0.01	-0.17 **	-0.15 **	-0.23 ***	0.01	-0.26 ***	-0.36 ***	0.89 ***
x12	0.31 ***	0.50 ***	0.51 ***	0.39 ***	0.28 ***	0.03	0.00	-0.11	-0.19 **	-0.16 **	0.26 ***
x13	0.05	0.43 ***	0.27 ***	0.19 **	0.09	-0.07	-0.10	0.00	-0.10	-0.16 **	0.26 ***
x14	-0.46 ***	0.14 *	0.16 **	0.19 ***	0.08	0.03	-0.01	0.07	-0.55 ***	-0.24 ***	-0.02
x15	-0.09	0.21 ***	0.52 ***	-0.03	-0.15 **	-0.10	-0.2 ***	-0.02	-0.23 ***	-0.31 ***	0.79 ***
x16	0.46 ***	-0.09	-0.18 **	0.29 ***	0.37 ***	0.20 ***	0.48 ***	-0.06	0.84 ***	0.60 ***	-0.34 ***
x17	0.27 ***	0.21 ***	0.18 **	0.12 *	0.17 **	0.07	0.00	0.07	-0.10	-0.10	-0.06
x18	-0.07	-0.07	-0.03	0.00	-0.03	-0.01	0.08	0.00	0.20 ***	0.24 ***	-0.03
Mean	1.95	0.08	0.06	0.12	0.20	4.34	2.29	1.51	1.15	0.63	1.68
Std Dev	1.72	0.05	0.05	0.12	0.14	4.17	2.00	83.75	1.36	0.51	0.76
Range	14.57	0.46	0.43	0.89	1.12	24.94	15.21	958.96	11.69	2.34	4.57

*Note: N=210, *p < 0.10, **p < 0.05, ***p < 0.01*

	x11	*x12*	*x13*	*x14*	*x15*	*x16*	*x17*	*x18*
y								
x1								
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
x10								
x11	1							
x12	0.36 ***	1						
x13	0.23 ***	0.15 **	1					
x14	-0.03	0.08	0.02	1				
x15	0.92 ***	0.33 ***	0.00	-0.04	1			
x16	-0.31 ***	-0.16 **	-0.1	-0.49 ***	-0.24 ***	1		
x17	-0.05	0.12 *	0.17 **	0.00	0.00	-0.06	1	
x18	-0.04	-0.08	0.07	0.01	-0.06	0.16 **	-0.25 ***	1
Mean	1.12	9.16	52.21	0.12	0.38	2.53	3.62	6.06
Std Dev	0.66	13.33	16.60	0.29	0.49	1.40	2.07	2.90
Range	3.90	102.27	80.84	4.26	3.02	13.03	7.10	10.10

*Note: N=210, *p < 0.10, **p < 0.05, ***p < 0.01*

Table C7: The relationship between Accounting Financial Ratios and the MTB Ratio for the Non-Cyclical Services Industry Sector: Correlations and Descriptive Statistics

	y	*x1*	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*
y	1										
x1	0.33 **	1									
x2	-0.29 *	0.80 ***	1								
x3	0.63 ***	-0.31 **	0.06	1							
x4	0.79 ***	-0.21	0.06	0.91 ***	1						
x5	0.30 **	-0.70 ***	-0.46 ***	0.44 ***	0.32 **	1					
x6	0.78 ***	-0.64 ***	-0.55 ***	0.61 ***	0.69 ***	0.56 ***	1				
x7	0.03	-0.03	-0.02	0.00	-0.03	-0.02	-0.02	1			
x8	0.85 ***	-0.21	-0.22	0.46 ***	0.67 ***	0.14	0.57 ***	0.08	1		
x9	0.81 ***	-0.25 *	-0.26 *	0.48 ***	0.62 ***	0.13	0.52 ***	0.15	0.97 ***	1	
x10	-0.44 ***	-0.01	0.22	-0.09	-0.30 **	0.38 ***	-0.47 ***	-0.05	-0.43 ***	-0.42 ***	1
x11	-0.41 ***	0.33 **	0.48 ***	-0.07	-0.23	0.16	-0.56 ***	-0.06	-0.40 ***	-0.42 ***	0.88 ***
x12	0.03	-0.16	0.01	0.22	0.07	0.28 *	-0.04	-0.04	-0.08	-0.08	0.54 ***
x13	-0.49 ***	0.66 ***	0.62 ***	-0.36 **	-0.39 ***	-0.46 ***	-0.77 ***	-0.14	-0.35 **	-0.38 ***	0.45 ***
x14	0.29 *	0.11	0.44 ***	0.75 ***	0.68 ***	0.05	0.16	0.03	0.22	0.27 *	-0.14
x15	-0.31 **	0.26 *	0.40 ***	0.00	-0.15	0.28 *	-0.42 ***	-0.05	-0.34 **	-0.37 **	0.86 ***
x16	0.87 ***	-0.45 ***	-0.42 ***	0.55 ***	0.75 ***	0.38 **	0.94 ***	-0.04	0.75 ***	0.66 ***	-0.58 ***
x17	0.02	0.00	0.19	-0.08	-0.03	0.08	0.00	0.15	-0.13	-0.20	0.17
x18	-0.01	0.00	-0.10	-0.04	-0.02	-0.18	-0.05	0.04	0.22	0.26 *	-0.16
Mean	4.87	0.09	0.06	0.23	0.32	8.14	7.57	108.27	1.47	0.98	1.21
Std Dev	3.79	0.09	0.06	0.11	0.19	5.05	6.14	673.42	1.75	0.98	0.50
Range	16.33	0.29	0.28	0.48	0.85	27.09	21.37	5316.36	6.90	3.52	2.52

*Note: N=50, *p < 0.10, **p < 0.05, ***p < 0.01*

	x11	*x12*	*x13*	*x14*	*x15*	*x16*	*x17*	*x18*
y								
x1								
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
x10								
x11	1							
x12	0.55 ***	1						
x13	0.67 ***	0.15	1					
x14	-0.05	-0.05	-0.07	1				
x15	0.97 ***	0.58 ***	0.54 ***	-0.07	1			
x16	-0.59 ***	-0.14	-0.66 ***	0.20	-0.47 ***	1		
x17	0.11	0.21	-0.01	-0.02	0.11	-0.01	1	
x18	-0.13	-0.14	0.09	-0.03	-0.15	0.03	-0.25 *	1
Mean	0.80	22.53	21.80	0.18	0.42	3.25	3.62	6.06
Std Dev	0.56	26.54	14.77	0.12	0.44	1.66	2.09	2.93
Range	2.61	121.11	43.35	0.69	2.22	6.48	7.10	10.10

*Note: N=50, *p < 0.10, **p < 0.05, ***p < 0.01*

Table C8: The relationship between Accounting Financial Ratios and the MTB Ratio for the Resources Industry Sector: Correlations and Descriptive Statistics

	Y	*x1*	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*
y	1										
x1	0.03	1									
x2	0.08	0.35 ***	1								
x3	0.06	0.29 ***	0.55 ***	1							
x4	0.01	0.36 ***	0.70 ***	0.70 ***	1						
x5	-0.02	0.04	0.00	0.24 ***	0.05	1					
x6	0.07	-0.02	-0.05	0.35 ***	-0.06	0.70 ***	1				
x7	-0.08	0.00	-0.03	0.01	0.04	-0.01	0.00	1			
x8	0.15 *	-0.26 ***	-0.31 ***	-0.15 **	-0.37 ***	-0.01	0.15 **	-0.03	1		
x9	0.15 **	-0.24 ***	-0.29 ***	-0.12	-0.21 ***	0.02	0.23 ***	0.02	0.82 ***	1	
x10	-0.17 **	0.02	0.15 *	0.07	0.13	0.18 **	-0.09	-0.04	-0.28 ***	-0.39 ***	1
x11	-0.13 *	-0.04	0.13 *	0.09	0.12	0.10	-0.07	-0.02	-0.22 ***	-0.31 ***	0.95 ***
x12	0.00	0.53 ***	0.32 ***	0.27 ***	0.23 ***	0.09	0.04	-0.02	-0.21 ***	-0.24 ***	0.12
x13	0.25 ***	0.00	0.12	0.09	0.12	0.23 ***	0.13 *	0.10	-0.15 **	-0.15 **	-0.07
x14	-0.01	0.32 ***	0.67 ***	0.63 ***	0.97 ***	0.02	-0.11	0.03	-0.35 ***	-0.2 ***	0.14 *
x15	-0.17 **	-0.04	0.11	0.06	0.07	0.00	-0.10	-0.01	-0.17 **	-0.25 ***	0.89 ***
x16	0.18 **	-0.28 ***	-0.35 ***	-0.27 ***	-0.50 ***	0.07	0.35 ***	-0.04	0.88 ***	0.70 ***	-0.32 ***
x17	0.14 *	0.03	0.00	0.07	0.07	0.14 *	0.09	-0.19 **	0.04	0.01	-0.07
x18	0.08	0.10	0.18 **	0.19 **	0.20 ***	0.05	0.05	0.04	-0.02	0.12	0.08
Mean	5.41	0.07	0.10	0.06	0.07	1.18	0.77	17.11	0.99	0.49	1.80
Std Dev	7.24	0.55	0.27	0.38	0.79	1.65	1.39	187.20	1.47	0.34	1.15
Range	52.98	6.55	3.22	3.94	7.90	15.80	12.80	2 712.43	12.82	2.98	7.30

*Note: N=187, *p < 0.10, **p < 0.05, ***p < 0.01*

	x11	*x12*	*x13*	*x14*	*x15*	*x16*	*x17*	*x18*
y								
x1								
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
x10								
x11	1							
x12	0.08	1						
x13	-0.12	-0.02	1					
x14	0.13 *	0.14 *	0.14 *	1				
x15	0.96 ***	0.10	-0.25 ***	0.08	1			
x16	-0.26 ***	-0.19 **	-0.09	-0.50 ***	-0.21 ***	1		
x17	-0.05	0.09	0.08	0.05	-0.08	0.10	1	
x18	0.09	0.21 ***	-0.03	0.19 **	0.10	-0.08	-0.24 ***	1
Mean	1.27	24.28	31.95	-0.01	0.73	2.16	3.59	6.10
Std Dev	0.99	54.55	20.41	0.77	0.93	1.67	2.08	2.91
Range	7.30	611.11	88.14	7.90	6.99	13.84	7.10	10.10

*Note: N=187, *p < 0.10, **p < 0.05, ***p < 0.01*

Table C9: The relationship between Accounting Financial Ratios and the MTB Ratio for the Cyclical Consumer Goods Industry Sector: Correlations and Descriptive Statistics

	y	*x1*	*x2*	*x3*	*x4*	*x5*	*x6*	*x7*	*x8*	*x9*	*x10*
y	1										
x1	0.49 **	1									
x2	0.34	0.79 ***	1								
x3	0.30	0.76 ***	0.99 ***	1							
x4	0.28	0.75 ***	0.98 ***	1 ***	1						
x5	-0.40	-0.44 *	-0.48 **	-0.45 *	-0.42 *	1					
x6	-0.12	-0.07	-0.12	-0.05	-0.01	0.78 ***	1				
x7	0.31	0.31	0.29	0.34	0.36	0.13	0.69 ***	1			
x8	-0.13	-0.50 **	-0.59 **	-0.59 **	-0.57 **	0.31	0.22	0.16	1		
x9	-0.21	-0.56 **	-0.64 ***	-0.65 ***	-0.63 ***	0.30	0.14	0.04	0.99 ***	1	
x10	0.17	0.25	0.2	0.13	0.10	-0.37	-0.66 ***	-0.69 ***	-0.39	-0.33	1
x11	-0.27	-0.23	-0.31	-0.34	-0.34	0.27	-0.25	-0.77 ***	-0.28	-0.19	0.63 ***
x12	0.41	0.84 ***	0.55 **	0.51 **	0.50 **	-0.02	0.19	0.30	-0.29	-0.35	0.16
x13	0.10	0.32	0.42 *	0.48 *	0.47 *	-0.58 **	-0.32	0.00	-0.40	-0.45 *	0.04
x14	0.23	0.46 *	0.86 ***	0.85 ***	0.84 ***	-0.42 *	-0.14	0.23	-0.41 *	-0.46 *	0.09
x15	-0.13	-0.06	-0.32	-0.27	-0.26	0.08	-0.15	-0.49 **	-0.25	-0.20	0.32
x16	-0.20	-0.25	-0.27	-0.20	-0.15	0.69 ***	0.84 ***	0.55 **	0.46 *	0.36	-0.67 ***
x17	0.64 ***	0.45 *	0.25	0.25	0.23	-0.46 *	-0.36	-0.12	-0.45 *	-0.48 *	0.38
x18	-0.14	-0.47 *	-0.42 *	-0.37	-0.35	0.17	0.23	0.23	0.60 ***	0.55 **	-0.42 *
Mean	1.06	0.02	0.03	0.06	0.07	5.15	2.45	4.93	0.42	0.33	2.27
Std Dev	0.44	0.13	0.06	0.16	0.19	1.64	0.46	1.01	0.27	0.21	0.34
Range	1.45	0.42	0.20	0.54	0.69	5.75	1.74	4.52	0.83	0.66	1.31

*Note: N=187, *p < 0.10, **p < 0.05, ***p < 0.01*

	x11	*x12*	*x13*	*x14*	*x15*	*x16*	*x17*	*x18*
y								
x1								
x2								
x3								
x4								
x5								
x6								
x7								
x8								
x9								
x10								
x11	1							
x12	-0.02	1						
x13	-0.29	-0.11	1					
x14	-0.39	0.25	0.48 *	1				
x15	0.71 ***	-0.02	0.09	-0.48 **	1			
x16	-0.31	-0.04	-0.08	-0.16	-0.14	1		
x17	0.09	0.19	0.42 *	0.02	0.36	-0.36	1	
x18	-0.45 *	-0.50 **	0.16	-0.12	-0.28	0.55 **	-0.27	1
Mean	1.46	-43.55	38.07	-0.02	0.64	1.75	3.66	6.16
Std Dev	0.39	187.67	9.63	0.27	0.40	0.26	2.19	3.04
Range	1.42	792.82	40.55	1.12	1.32	1.00	7.10	10.10

*Note: N=187, *p < 0.10, **p < 0.05, ***p < 0.01*