The relationship between firm size and performance

by

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Abstract

The impact of firm size on performance of a firm has been widely debated. There is the view that large firms are able to outperform smaller competitors because of economies of scale. Harsh economic conditions have, however, led to a number of large firms collapsing. Advocates of small firms have noted that the knowledge of niche markets and unique offerings have allowed small firms to remain competitive.

This study investigates whether there exists a relationship between firm size and return on assets. To supplement the size variable, the study also considered control variables associated with firm size to determine how they influence the relationship between firm size and return on assets.

The study considered a sample of firms in the Industrial Goods and Services sector listed on the JSE to examine the nature of the relationship between firm size and performance, during the period 2004 to 2013.

Market capitalisation was used as measure for firm size and return on assets as a measure of firm performance. The study data was analysed by means of a comparative analysis applying descriptive statistics, correlation analysis and a regression analysis.

The findings from the correlation and regression analyses indicate that firm size has no influence on firm performance when the combined sample was investigated. However, the results indicate that for small listed firms, firm size has a moderate positive influence on firm performance. For large firms, firm size has no influence on firm performance.

The results of the study will be useful for management to focus their efforts on significant variables that influence return on assets.

Key words

Firm size, performance, market capitalisation, ROA, risk, leverage, corporate governance, tangibility

DECLARATION OF ORIGINAL WORK

I, Tinodiwanashe Adrian Mazhinduka, declare that this minor dissertation is my own unaided work. Any assistance that I have received has been duly acknowledged in the dissertation. It is submitted in partial fulfilment of the requirements for the degree of Master of Commerce at the University of Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

_____ _____

Signature Date

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

Contextualisation

1.1 Introduction

The purpose of a business with a profit motive is to create wealth for its shareholders or owners. This wealth is created by engaging in various economic activities that will generate returns for shareholders or owners. Therefore it is important to understand what will influence the performance of a business to create wealth.

There are two categories of factors that affect the performance of a firm: industry-specific factors and firm-specific factors. There are two schools of thought on these factors: the structure conduct performance paradigm (SCP) and the resource-based view (RBV) (Stierwald, 2010:3).

1.1.1 Structure conduct performance paradigm

With regards to industry-specific factors, the structure conduct performance paradigm asserts that performance is a result of largely industry-oriented factors (Galbreath & Galvin, 2008:110).

Going back as far as 1951, Bain (1951:294) highlights that firm and industry profits are a result of industry structure. According to the SCP, average profitability is higher in industries with a higher concentration of large firms and lower in industries where the concentration of large firms is less. A higher concentration of large firms also leads to more collusion and price-fixing which allows participants to maintain above average profits.

1.1.2 Resource-based view

In relation to firm-specific factors, the resource-based view places emphasis on the firm's intrinsic resources (Galbreath & Galvin, 2008:110). Resources are any attribute that a company possesses and can be a strength or a weakness (Galbreath & Galvin, 2008:110). Firm-specific factors are those that vary from firm to firm and

management can influence them to a certain degree (Hawawini, Subramanian & Verdin, 2003:3).

According to the resource-based view, performance is borne out of the differences in firm characteristics. In this view, the observed differences in performance are a result of the different characteristics across firms (Stierwald, 2010:3). As an illustration, a firm's efficiency is the reason for persistent profitability and the efficient firm garners competitive advantages which are reflected in improved performance (Stierwald, 2010:3). Stierwald (2010:4) concludes that firm characteristics play a much more significant role in determining firm performance when compared to sector or industry effects.

Despite the views on performance of a firm, economists and financial management practitioners have long debated whether larger firms are more profitable and if there is a relationship between firm size and firm performance (Amato & Burson, 2007:1).

It is interesting to establish which sectors or industries tend to show a positive relationship between firm size and performance and what characteristics they possess that make this relationship evident.

1.2 The perception that larger firms are more profitable

Previous studies indicate that as firms grow, they are able to generate economies of scale; this reduces the costs of doing business and enhances performance (Schmalensee, 1981:2). Large firms are also deemed to be more creditworthy than smaller firms and capital providers are more likely to finance larger firms (Bodie, Kane & Marcus, 2005:471). Larger firms can also market their products on a greater scale as well as finance costly research and development projects which, in the long run, give them an advantage over smaller firms (Bodie, Kane & Marcus, 2005:471). These advantages lead to the perception that larger firms are more profitable than smaller firms.

The global recession of 2008, however, contradicted the perception that large firm size equates to success. The 'too big to fail' belief came under scrutiny during the

recession when a number of large firms collapsed while others lost a large portion of their value (Hurley, 2010:352).

1.2.1 The effect of large versus small firms in South Africa

Vast amounts of foreign direct investment (FDI) have flowed into the South African economy to buy controlling stakes in local companies. FDI is an important factor in ensuring economic growth (Asafo-Adjei, 2007:30). However, when it creates monopolies, it can be harmful to the economy as it restricts the growth of small firms. Amato and Amato (2004:182) highlight the importance of understanding the effect of mergers and acquisitions on local industries and note that extensive consolidation in an industry will push out small firms which had been profitable. These adverse effects can restrict the growth of the industry as a whole (Amato & Amato, 2004:182).

The role played by small firms in an economy is important. Klapper, Sarria-Allende and Zaidi (2006:3) note that small to medium enterprises (SMEs) are one of the largest employers within the Polish economy. These firms are both profitable and their success translates into job creation in the economy (Klapper et al., 2006:3). In addition to this, SMEs are catalysts for change through creative advancement and the subsequent skills transfer that is gained through the process (Audretsch, Carree & Thurik, 2001:3). It is therefore important to understand how best to formulate policies that encourage their growth and survival.

Previous studies that investigated the relationship between firm size and performance have largely focused on firms operating within the United States of America. It is of interest to establish what a similar investigation from a South African point of view would yield.

1.3 Problem statement

It is generally accepted that larger firms can apply economies of scale based on the size of their operations. However, the relationship between the size of a firm and its performance is not always clear. This study examines South African firms listed on

the Johannesburg Stock Exchange Limited (JSE Ltd) to determine the nature of the relationship between firm size and performance.

1.3.1 The goal of this study

The goal of this study is to establish whether there is a relationship between firm size and firm performance.

1.3.2 Research questions

This study poses the research question: is there a relationship between firm size and performance?

Amato and Amato (2004:182) note that firm size is influenced by other factors such as corporate governance, leverage, risk and tangibility of assets. It is important that these should be included as variables when considering the relationship between firm size and firm performance.

To answer this research question, sub-research questions were formulated as follows:

- What is the association between return on assets and market capitalisation?
- Is there a relationship between corporate governance and return on assets?
- Is there a relationship between debt level and return on assets?
- Is there a relationship between risk and return on assets?
- Is there a relationship between tangibility and return on assets?

1.4 Research methodology

To establish whether there is an association between firm size and firm performance and to determine the nature of this relationship, a quantitative research methodology is adopted in the study.

Research of a quantitative nature systematically and objectively investigates concepts and their relationships, with the intent to establish and validate relationships that are generalisable to a larger population (Leedy & Ormrod, 2010:180).

A quantitative study does not necessarily establish a causal relationship between the studied variables. As such, the goal of the study is not to imply causality between firm size and firm performance, but to ascertain whether there is any association between firm size and firm performance, and if so, to determine the nature of this association.

1.4.1 Design

The study takes the form of a descriptive research design. This approach is suited to analysing quantitative information which can be summarised through statistical analysis (Leedy & Ormrod, 2010:182).

A scatterplot and correlation analysis is applied to selected variables to determine the strength and direction of the relationship between firm size and firm performance. A correlational analysis observes how differences in one variable are related to differences in one or more other variables. A correlation is present if an increase in one variable leads to an increase or decrease in another variable in a reasonably predictive manner (Leedy & Ormrod, 2010:183). Finally, a regression analysis is completed to quantify the relationship between firm size and firm performance.

1.4.2 Scope

This research is limited to companies that are listed on the Johannesburg Stock Exchange Limited under the Industrial Goods and Services sector since 2004 and which were still in operation at the end of 2013.

The study reflects on the performance of firms from 2004 to 2013.

1.4.3 Sample

A sample is a representative entity or group of the subject under review (Keller & Warrack, 1999:6).

The sample of this study consists of firms that have been listed on the JSE Ltd stock exchange within the Industrial Goods and Services sector since 2004 and were a going concern as at the end of 2013.

The Industrial Goods and Services sector was selected because industrial and manufacturing firms in South Africa have traditionally contributed significantly to the gross domestic product (GDP) and are represented by both large and small firms

(Bell & Farell, 1997:596). They are also significant employers in the industry with the second highest number of jobs created per tranche of investment (Pan-African Research Investment Services, 2001:15).

1.4.4 Data collection and description

To investigate the posed research question, it is necessary to measure both firm size and firm performance.

- Market capitalisation of a firm is used to measure firm size.
- The return on assets ratio is used to measure firm performance.

Other variables that influence the relationship between firm size and firm performance that are analysed include:

- Tangibility ratio which measures the level of fixed assets in the business.
- Beta metric which measures the riskiness of a firm.
- Firm debt level which measures the leverage of the firm.
- Percentage of independent or non-executive directors on the board which measures the level of corporate governance in a firm.

The independent variable, size, is measured by the market capitalisation of the firm as at the end of each year.

Safarova (2010:18) also uses market capitalisation because this reflects current firm size as opposed to total assets, which only provide a historical perspective (Safarova, 2010:18).

This study analyses four control variables known to have an effect on firm performance. Corporate governance, given by the percentage of independent or non-executive directors on the board (Safarova, 2010:18), firm debt level, measured by dividing the long-term debt by equity (Safarova, 2010:18), the tangibility of a firm, measured by the fixed assets divided by the total assets (Safarova, 2010:19) and lastly, risk of the firm, measured by the beta of the firm for each year (Safarova, 2010:18).

The dependent variable for this study is return on assets (ROA). Return on assets is a ratio of net income to total assets held in the company. It is an accounting measure of return. Prior studies such as Amato and Amato (2004) as well as Amato and Burson (2007) have made use of the ROA ratio to investigate the relationship between firm size and performance

This study uses yearly data from 2004 to 2013 in the analyses. The rationale is that the nature of the relationship between firm size and firm performance is better captured over a longer period of time as opposed to a single year. Secondary data in the form of financial statements is used as the input for calculating financial ratios. Financial statements were obtained from each firm's website. The Johannesburg Stock Exchange Ltd archive was also used to obtain the required information.

The following databases were used to obtain other firm-specific data employed in the study:

- McGregor BFA
- I-Net Bridge
- Sharenet

1.4.5 Data Analysis

The study uses SPSS and the Microsoft Excel software package to carry out empirical and statistical data analysis.

The analysis displays the descriptive statistics on the yearly values of all the variables during the period under consideration. Measures included are the mean, median, standard deviation and upper and lower bounds for the variables. The analysis also graphically illustrates the distribution of the selected variables for the period under consideration.

The study conducts a comparative analysis of all companies within a specific category with the aim of determining whether, over time, firms with a larger market capitalisation outperform firms with lower market capitalisation for the chosen measure of performance, ROA.

The study also uses correlation analysis to determine the association between firm performance and firm size. Finally, the statistical significance of all the independent variables and their relation to the performance measure is determined by conducting a regression analysis of ROA and the independent variables.

1.5 Limitations of the study

The study focuses solely on the industrial goods and services sector, and as such, the findings may not be generalisable to other industries in South Africa.

Only listed firms are included in the sample and listed firms may not adequately capture the nature of the relationship for it to be generalisable to non-listed firms.

For a firm to be listed, it needs to meet certain criteria with regards to the amount of capitalisation it has. Therefore, listed firms, when compared to all types of businesses, are already large. The results of the study may thus not be generalisable to unlisted firms.

The study is unable to draw or establish any causal relationship. It can only establish the nature of the association between firm size and firm performance.

Lastly, other variables may have a concurrent effect on firm performance. These variables, such as a firm's culture, may be difficult to measure and may therefore be overlooked in the study.

1.6 Summary

This chapter noted that there are two schools of thought on the question of what influences the performance of a firm, namely, the structure conduct performance paradigm (SCP) and the resource-based view (RBV).

The goal of this study is to investigate the relationship between firm size and firm performance.

The sample of this study is limited to firms in the Industrial Goods and Services sector of the JSE Ltd for the period 2004 to 2013.

It is concluded in this chapter that a quantitative descriptive research methodology is applied in the study which determines the relationship between firm size and firm performance but does not establish a causal relationship between the studied variables.

Table 1.1 Chapter Outline

CHAPTER	CONTENT
Chapter 1:	**Contextualisation** In the first chapter the study is introduced. The background to the study which resulted in the research problem is explained.
Chapter 2:	**Review of firm size and performance** The second chapter reviews literature on firm size and performance.
Chapter 3:	**Research methodology** The research design and methodology used in the study are explained in the third chapter. Techniques to ensure the validity and reliability of the data are also considered in this chapter.
Chapter 4:	**Data analysis and interpretation** The results of the study are presented in the fourth chapter. The data is illustrated and interpreted in various statistical formats such as graphs and tables.
Chapter 5:	**Findings, conclusion and recommendations** Conclusions are drawn on the basis of the results of the study. Limitations and recommendations for further study are also addressed.

Source: Author's deductions

Chapter 2

Review of firm size and performance

2.1 Introduction

In the previous chapter the study goals and objectives were contextualised. The aim of this chapter is to analyse past literature on firm size and performance.

The literature review first looks at past studies which analyse the relationship between firm size and firm performance and then focuses on studies that examine variables influencing firm size and performance.

2.1.1 Measures of firm size and performance

Hobart (2006:34) investigates the relationship between firm size and firm performance by means of three different models: cash flow model, market model and profitability performance model.

In all the models mentioned above, total assets are regarded as the proxy for firm size. In the cash flow model, cash flows are used to measure firm performance. Cash flows are regarded as a more accurate reflection of profits due to shareholders (Hobart, 2006:34). However, in years that a firm does not issue dividends, the cash flow model is inaccurate (Hobart, 2006:35).

The market model is based on the percentage share price increase or decrease over a time period (Hobart, 2006:36). This percentage change is regarded as an indication of the market perception of the firm as well as the present value of any future earnings the firm is expected to realise (Hobart, 2006:36). Although it is regarded as an accurate measure of the expected future performance of a firm, it is prone to speculation. Hobart (2006:36) notes that despite the shortcomings, this model has been widely used in prior studies to determine the relationship between firm size and performance.

The profitability performance model defines performance as the return on investment. This is determined by dividing the income before extraordinary items by capital invested (Hobart, 2006:33). This ratio illustrates how efficiently a firm uses the available capital to generate profit (Hobart, 2006:33). Though it is ideal for making comparisons within the firm, different interpretations of income could lead to inaccurate comparisons across different firms (Hobart, 2006:33).

In his study of firm size and firm performance, Hobart (2006:2) concludes that there is an association between firm size and performance. Both the cash flow model and the market model indicate a negative association between firm size and performance. However, when applying the profitability performance model, results suggest that size has no significant effect on firm performance (Hobart, 2006:2). Hobart (2006:42) acknowledges that the use of total assets as a variable to measure size is subjective as firms tend to use different valuation methods.

In an investigation of the relationship between firm-specific factors and firm performance, Safarova (2010) finds firm size to be positively associated with firm performance. The study applies Tobins Q, Return on Assets (ROA) and economic profit to measure firm performance (Safarova, 2010:36). Similarly to Hobart (2006), this study used total assets to measure firm size.

The use of Tobins Q and Economic profit in addition to ROA offers a different perspective of measuring performance. Tobins Q reflects how the market views current and future performance of a firm, while Economic profit illustrates firm performance by taking into account the cost of capital (Safarova, 2010:15).

Similarly to both Hobart (2006) and Safarova (2010), Amato and Burson (2007) employ ROA as the measure of performance and total assets to measure the size of a firm. Though acknowledging the deficiencies of ROA as an accounting measure, Amato and Burson (2007) note that the ratio determines the total returns for the firm better than other measures (Amato & Burson, 2007:6).

It can be concluded that total assets have been widely employed to measure firm size in prior studies. This can largely be attributed to the ease of computation and accessibility of data to calculate it.

ROA can also be regarded as the preferred measure of performance, particularly because data to calculate it is widely available.

2.2 Resource-based factors that influence performance

This section of the literature review considers firm-specific factors that influence the performance of firms. The resource-based view asserts that firm-specific factors are more likely to influence the performance of a firm than industry-oriented factors (Galbreath & Gavin, 2008).

2.2.1 Economies of scale and productivity

Economies of scale can improve firm performance. As far back as 1962, Baumol (1962:1085) highlighted that once a firm reached a level where it had at its disposal considerable amounts of capital, it was able to apply economies of scale (Baumol, 1962:1085). Pagano and Schivardi (2003:264) note that larger firms can achieve productivity quicker than smaller firms. They have the ability to find capacity to innovate and grow as they increase in size. Being able to improve productivity as it grows in size means the firm is able to achieve profitability by maintaining high growth rates. The results of their study indicate that there exists a positive relationship between firm size and productivity growth. They conclude that a larger-sized firm is likely to achieve faster productivity growth than a smaller firm. This allows large firms to translate their superior productivity into improved performance (Pagano & Schivardi, 2003:264). The significant factor for large firms is maintaining a consistent growth rate through higher productivity which allows them to capitalise on economies of scale more efficiently than small firms, thereby achieving superior performance (Mittelstadt, Harben & Ward, 2003:69).

2.2.2.1 Diseconomies of scale

Waldman and Jensen (2001) contend that economies of scale do not result in improved firm performance. A firm can also experience diseconomies of scale in its operations, negating the advantages gained from size. Large firms tend to be slower in responding to changes in market conditions. This is due to the fact that lines of communication between management and low level employees tend to be slow. As

a result, response strategies are often implemented when competitors have already taken the lead (Waldman & Jensen, 2001:64).

Large firms frequently offer generic goods and services as they seek to lower costs of production. This excludes them from competing in markets where consumers require more unique, tailor-made products. Small firms traditionally thrive in such markets as they are more flexible and can quickly respond to consumer needs (Waldman & Jensen, 2001:64).

The above underlines how economies of scale and productivity can be important factors in driving firm performance. However, as the discussion notes, not all large firms enjoy better performance as a result of their size. Size does not always improve the performance of a firm and can in fact deter it. The industry in which a firm operates is also an important consideration.

Different studies offer contrasting views on the relationship between firm performance and firm size. In India, Bhattacharyya and Saxena (2009) carried out a study to examine whether Gibrat's law of proportionate effects holds. Gibrat (1931) states that "a firm's growth rate is independent of its size." The law considers performance to be independent of size, arguing that firms do not gain performance advantages due to their size. In their study, Bhattacharyya and Saxena (2009) examine Indian manufacturing firms and establish that size does matter. However, the authors do contend that not only size determines a firm's performance but other additional factors also have an effect (Bhattacharyya & Saxena, 2009:12).

2.2.2 Efficiency and 'luck'

Already in 1973, Demsetz highlighted that a positive relationship exists between firm size and performance (Demsetz, 1973:2). However, this is not as a result of economies of scale. According to Demsetz (1973:2), the underlying justification for a positive relationship between firm size and performance is the superior management and better efficiency that larger firms possess compared to smaller firms.

Mancke (1974:185) suggests that how fortunate a firm is with key performance factors, drives performance. These key performance factors include competitive advantages such as new markets entered or products introduced and additional

capital invested (Mancke, 1974:185). The 'lucky' firms are then able to leverage this good fortune and eventually outperform their competition.

2.2.3 Capital market imperfections

The degree to which firms of varying size have access to capital markets could explain the observed differences in firm performance. Large firms invariably possess more assets when compared to small firms. This allows them to use these assets as collateral when seeking external funding (Policy Board for Financial Services and Regulation, 2001:57).

Applying this approach implies that smaller firms struggle to gain access to financing as their assets are not comparable to those of large firms. Further to this, banks now apply the use of scoring models complemented by the available collateral to assess how much to lend to firms (Coravos, 2010:54). Credit-scoring models, however, do not entirely capture the full detail required to make an unbiased judgement. Coravos (2010) highlights that the broad models used often exaggerate the risk premium applied when lending to small firms as well as inaccurately estimate the likelihood of default for small firms, further adding to the cost of lending. Coravos (2010) notes that more bespoke models would be required to correct this bias against small firms (Coravos, 2010:54).

This asymmetry in capital markets is also observed by DeYoung, Hunter & Udell (2004). DeYoung et al. (2004) conclude that smaller banks are able to gauge and process information and risks associated with lending to smaller firms in a more efficient manner than larger banks and that small banks have access to 'soft information' which large banks may have but do not utilise or do not have at all. This then leaves small firms at a disadvantage as they are more likely to receive finance only from small banks, which have limited credit lines when compared to big banks (DeYoung et al. 2004:86).

Capital market imperfections also exist in mature financial markets. Segarra (2009:6) notes that in Spain, small firms face barriers in accessing external financial support due to information asymmetry. Often, lending institutions find information on small firms unclear and difficult to comprehend. This results in higher premiums for accessing finance, exorbitant agency costs, cumbersome paperwork and unreasonable transaction costs (Segarra, 2009:6).

National credit markets often lend at favourable rates which are much lower than those offered by local or regional markets (Alam & Ullah, 2006:61). In investigating SMEs in Bangladesh, Alam and Ullah (2006) highlight that small firms largely have access to local and regional credit markets but limited access to national credit markets. Furthermore, other finance options such as government and donor financing are also limited (Alam & Ullah, 2006: 65). This implicit barrier to entry within the financial markets contributes to why large firms more often than not have lower funding costs (Alam & Ullah, 2006: 65).

In addition to this, small firms are provided with financing at higher interest rates when compared to large firms in instances where markets experience credit rationing (Berkowitz & White, 2004:15). This is supported by Berkowitz and White (2004) who note that changes in bankruptcy laws have had the effect of constraining the supply of financing in the market and as a consequence, the interest rate and loan size accessed by small firms have increased and decreased respectively.

Firm-specific factors are the various attributes that a firm possesses and can either prove a strength or a weakness (Galbreath & Galvin, 2008:110). As noted above, the firm-specific factor, size, influences the performance of a firm to varying degrees.

2.3 The influence of structure conduct performance factors on performance

This section reviews literature that explains the performance of a firm in the context of the structure conduct performance paradigm which affirms that industry-oriented factors are more significant when compared to firm-specific factors.

2.3.1 Strategic groups

Strategic groups define intra-industry relationships and provide a framework with which to analyse firm performance. Strategic groups are a set of firms that exist within the same industry which are faced with similar operating conditions (Barney & Hoskisson, 1990:193). Firms in each cluster are likely to follow a similar strategy with regards to the amount spent on research and development, location of markets served and the type of distribution channels employed. It is the choice each firm makes with regards to key competitive decision variables that determines in which

cluster it falls (Barney & Hoskisson, 1990:193). Firms in higher strategic groups possess more market power, and as a result, their performance is enhanced when compared to firms in lower strategic clusters (Barney & Hoskisson, 1990:193).

Firms in lower strategic groups are also confronted with mobility barriers which serve to minimise intra-industry movement (Barney & Hoskisson, 1990:195). These barriers preclude lower strategic firms from the more profitable opportunities, relegating them to a lower cluster. The strength of these barriers is what determines how easy it is to move from one strategic cluster to another as well as the nature of the rivalry between the groups. When mobility barriers are not as strong, an intense rivalry between groups exists and the possibility of switching to another is very high (Barney & Hoskisson, 1990:195). However, in such circumstances the differences in market power are small and the gains made from moving may well be negligible. As size determines which strategic group a firm falls into, it therefore also influences the performance of the firm (Barney & Hoskisson, 1990:195).

2.3.2 'Stuck in the middle' hypothesis

Porter (1998:41) suggests that the relationship between firm size and performance is not strictly positive in nature, as implied by much of the literature. Porter (1998:41) proposes the possibility of a non-linear relationship which gives rise to the 'stuck in the middle' hypothesis. In an industry, the top performing firms are concentrated both on the upper and lower end of the size scale, implying the cluster of medium-sized firms will struggle when compared to their smaller and larger peers (Porter, 1998:41).

Small firms are suited to serve markets in which clients require streamlined services that meet their specialised needs. This inherently creates a niche for these small firms and hence gives them a competitive advantage in these localised markets (Porter, 1998:42). On the other hand, large firms focus their efforts on serving the entire market, using their strength to harness consumers on the basis of lower prices and extensive market presence (Porter, 1998:42). Caught in the middle are the medium-sized firms which are too small to take on the large firms for a share of the national market yet lack the expertise to compete in the smaller niche markets which are dominated by the small firms (Porter, 1998:42). This gives rise to the observed cubic relationship which shows a positive negative positive pattern illustrating that

returns for both large- and small-sized firms increase while those of medium-sized firms decrease (Porter, 1998:43).

Amato and Amato (2004:189) find that a cubic model exhibiting a positive, negative, positive relationship best describes the relationship between firm size and performance in the American retailing sector. Their study establishes that the 'stuck in the middle' group of firms are those with assets between the values of $125 million and $350 million (Amato & Amato, 2004:190). The evidence in their study pertains to three industries within the retailing sector namely, general merchandise, apparel and restaurants. Amato and Amato (2004:191) note that large firms form a strategic leader group which bases its strategy on adopting low cost and broad differentiation strategies. The smaller firms form a strategic group that places emphasis on niche strategies which leaves medium-sized firms without a unique strategic advantage (Amato & Amato, 2004:191).

Similarly, Amato and Burson (2007:78) establish that the cubic relationship between firm size and performance is evident within the financial services sector. These results are again consistent with Porter's 'stuck in the middle' hypothesis. They attribute the results to the superior performance of small banks in servicing small firm clients (Amato & Burson, 2007:78). Large banks pursue a strategy of servicing the entire market which enhances their performance. This leaves medium-sized banks without a unique offering for their clients, resulting in compromised performance (Amato & Burson, 2007:78).

2.4 Opposing views on the relationship between firm size and firm performance

Although there is a school of thought that argues that there is a positive relationship between firm size and firm performance, there is also research that offers differing views on the subject.

Managerial utility contends that managers who run the firm on behalf of the shareholders may have other self-interest motives other than maximising the wealth of their shareholders (James, 1999:43). This is due to the fact that managerial utility is a by-product of the degree of separation between management and ownership.

Managers will therefore always seek to maximise managerial utility before they maximise shareholder wealth and this implicitly becomes the firm's objective. However, a small firm often either has its owner as the manager or there exists a close relationship between the two. Therefore, the likelihood of managerial utility being set as the foremost objective is low. As the firm grows in size, the separation between management and ownership widens. This makes larger corporations more susceptible to managerial utility maximisation and, as a result, the performance of the firm declines (James, 1999:43).

A non-linear relationship is evident in a study carried out by Eichengreen and Gibson (2001) on banking performance and size in the Greek economy. Their results show that operating profit initially increases with size and then begins declining (Eichengreen & Gibson 2001:577). They attribute this to the presence of economies of scale that the small bank initially takes advantage of. As the bank grows and begins to exhaust these scale advantages, overall performance declines (Eichengreen & Gibson, 2001:577). This result infers the existence of an optimal bank size. However, the study does not establish this optimal size nor does it indicate whether this optimal size is small, medium or large (Eichengreen & Gibson 2001:578).

2.5 No relationship between firm size and firm performance

Not all studies affirm a specific type of relationship between firm size and firm performance. Athanasoglou, Brissimis & Delis (2008:135) find that there exists no significant relationship between size and performance when they studied bank-specific, industry-specific and macroeconomic determinants of bank performance within the Greek system. They give two possible reasons for this: firstly, banking institutions attempt to grow faster at the expense of their bottom line and secondly, banks are rarely profitable in the infancy years of their operations as they attempt to increase market share and gain traction in the industry (Athanasoglou et al., 2008:135). To further examine the results of their study, they removed size and ran the regression once more, which yielded an unchanged result, indicating that the variable is insignificant (Athanasoglou et al., 2008:135).

The contrasting views on the nature of the relationship between firm size and performance necessitate the need to carry out further investigation. This study considers the topic from a South African point of view to better understand the nature of the relationship.

2.6 Control variables that influence firm size and firm performance

As firm size is influenced by other factors and not only market capitalisation, it is necessary to consider other factors that through size, contribute toward the firm's performance. Depending on the industry in question, different factors have an impact on firms within that industry (Marcus, 1969:105).

Marcus (1969:105) concludes that since performance is the construct of many different factors and their subsequent interaction with the variable size, it would be imprudent not to consider these in determining a relationship between size and performance.

In this study, these factors act as a control in the investigation of the relationship between firm size and firm performance. The following factors that have an influence on the performance of a firm are considered in the study.

2.6.1 Risk

A firm's performance is determined by its level of risk. Firms with risky operations are more vulnerable in economic downturns and their performance is likely to be worse than that of less risky firms (Crouhy, Galai & Mark, 2006:41). Crouhy, Galai and Mark (2006) classify risk into the following seven types: liquidity, operational, legal, credit, firm, reputation and market risks. It is important to find a variable that measures risk in its entirety to capture the various types of risks.

Risk has become an important consideration in determining firm performance and firms have started to pay more attention to it. Many studies have focused on interpreting the relationship between how a firm manages its risk and its subsequent performance. Central to this has been the development of the theory of Enterprise Risk Management (ERM). Gordon, Loeb & Tseng (2009:302) articulate Enterprise

Risk Management as addressing the risk inherent in a firm using a holistic approach where the various risk threats are dealt with holistically as opposed to only considering the different types of risk on their own

Though many firms have widely begun to adopt the ERM systems, the empirical evidence supporting the positive relationship between the level of perceived risk in the firm and the firm's performance is limited (Gordon et al., 2009:302). Nonetheless, Hoyt and Liebenberg (2009) carried out a study to investigate the performance of firms that have adopted enterprise risk systems that help mitigate risk within the insurance industry. Applying Tobin's Q as the measure of performance, the results supported the theory that improved risk management and lower risk in the firm improves the overall performance of the firm (Hoyt & Liebenberg, 2009:2).

Different metrics can be employed to measure risk, however, few will capture all the types of risk that a firm is faced with. The standard deviation of profit returns can be used as a proxy for risk, however, Gschwandtner 2005 (cited in Lee, 2001:191) applies this methodology and the results illustrate that it is an insignificant variable when it comes to interpreting the variability in firm profits. Mueller 1990 (cited in Lee, 2001:191) uses the stock market return beta as a measure of risk and finds it to be statistically significant (Mueller 1990 [cited in Lee, 2001:191]). The strength of beta lies in the ability to capture information relating to the firm when compared to the market. Though useful and comprehensive, betas are applicable only for listed entities and have to be extrapolated for non-listed firms (Mueller 1990 [cited in Lee, 2001:191]). As this study is focused on listed firms, the beta is an appropriate measure of risk.

2.6.2 The influence of firm debt level on firm size and firm performance

Firm debt level is defined as the amount of debt a firm holds in comparison to the amount of equity invested by the firm's owners. According to Damodaran (2002:818), the indebtedness of a firm can also be measured by:

- Debt to total assets
- Total liabilities to total assets
- Debt to net assets

- Debt to net capitalisation

To analyse the relationship between debt and performance, the ratio long-term debt to shareholders equity is applied (Damodaran, 2002:818).

2.6.2.1 Tax advantages of debt

The benefits of using debt in a firm's capital structure are the potential tax advantages a firm can secure. Damodaran (2002:818) notes that by using debt as a source of financing operations, the firm can gain tax advantages as the interest payable on debt obligations is considered as tax deductible. However, this is only successful if the firm generates enough cash flows to meet its interest obligations. Once the level of indebtedness exceeds that which the firm can pay using the generated cash flows, the firm no longer benefits from this tax advantage and is prone to default. Debt can therefore be used to fund growth and expansion up until the point it no longer yields a tax advantage (Damodaran, 2002:247).

2.6.2.2 The debt burden

However, debt has the adverse effect of creating fixed obligations in the form of interest payments that have to be paid to the parties that provide the finance. This effectively reduces the operating profit and returns to the firm, as the interest payments are made out of the pre-tax returns earned by the firm (Myers, 2001:82). Once the firm is overburdened by debt, it becomes susceptible to credit risk as its cash flows might not be enough to meet its expenses which would have been increased by the large interest payments it has to make. Hence firm debt level has a negative relationship with firm performance as an increase in debt tends to reduce the cash flows earned by the firm (Myers 2001:82). Opler and Tittman (1994:1016) also find that highly indebted firms are more likely to struggle during periods of economic downturn. These periods of declining sales revenue often significantly contribute to a firm's financial distress (Opler & Titman, 1994:1016). Hence in markets where goods and services are sensitive to consumer incomes, firms find that demand for their products decreases. Declining sales lead to lower revenue and consequently, poor performance. Firms which are already highly indebted are thus worse off when compared to other competitors who have less debt or none at all.

In comparison to highly indebted firms, those with less debt and extra capacity on their balance sheet are well positioned to increase market share. Firms that are in

financial distress then find it increasingly difficult to maintain their client base. This creates an opportunity for those firms which are in a strong financial position to take advantage of their competitor's weakness. This makes highly indebted firms vulnerable and they can then become a target in intra-industry takeovers (Opler & Titman, 1994:1016). Indebted firms often find themselves cash-strapped during economic recessions. This increases the likelihood of financial distress and ultimately, bankruptcy. Shareholders are then faced with the prospect of losing their investment with little or no return as bankruptcy provides an opportunity for competitors who are financially sound to buy up the competition at discounted prices and increase their market share. Selling their stake at a discount then becomes a more attractive option to shareholders who are faced with the possibility of losing everything. Often shareholders would rather sell to a competitor and recoup some of their investment than lose everything (Opler & Titman, 1994:1016).

2.6.2.3 Debt as a tool to curb agency costs

Indebtedness also impacts firm performance in another context. Apart from being a source of finance, leverage has been widely used in finance as a tool to curb and control agency costs. Agency costs are those incurred in ensuring that the choices managers make enhance shareholder value. The interests of management and shareholders are often not aligned and as Jensen and Meckling (1976:5) point out, the separation of ownership and control of firms is likely to result in managers maximising their own utility over firm value. Conflicts can exist in situations where managers are incentivised to take considerable risks to enhance firm performance. If unchecked, this could result in significant losses for the firm (Margaritis & Psillaki, 2010:622). This is formally acknowledged by Jensen (1986:325) in the free cash flow theory, where he notes that "the problem is how to motivate managers to disgorge the cash rather than investing it below the cost of capital or wasting it on organizational inefficiencies". It is in light of this that above-average debt ratios are applied as tools to rein in costs, as the priority of the firm is focused on meeting interest obligations while generating the required rate of return for shareholders (Grossman & Hart, 1982:108). Thus, as opposed to approving unreasonable incentive structures and other inefficient uses of free cash flow, management applies a thrift approach to the use of cash flows. In their study, Margaritis and Psillaki

(2010:631) show that higher debt levels reduce agency costs and increase efficiency which results in a marked improvement of a firm's performance.

In the same study they also introduce the possibility of reverse causality from firm performance to capital structure (Margaritis & Psillaki, 2010:631). Here, they highlight the possibility that better performing and more efficient firms are in a better position to determine their requisite capital structure as opposed to firms that perform poorly (Margaritis & Psillaki, 2010:631). By way of illustration, they outline how an efficient firm manages to intrinsically lower its bankruptcy costs and risk of default due to its strong financial performance. As a consequence, it can choose to attain a higher debt ratio and modify its capital structure accordingly as opposed to having it imposed by shareholders.

Efficient firms which expect to sustain superior performance over the foreseeable long-term future may choose to maintain a lower debt ratio (Margaritis & Psillaki, 2010:631). This is done to ensure that the economic value generated by the improved performance is not lost to servicing a capital structure burdened with a high debt level (Margaritis & Psillaki, 2010:631). In the present study, the focus remains on the relationship between firm performance and debt level without progressing into the reverse causality of firm performance and capital structure.

2.6.2.4 Access to debt and performance

In a study focusing on Small to Medium Enterprises (SMEs) within the Polish economy, Klapper et al. (2006) noted that the Polish economy transitioned from a largely centralised system inherited from the Soviet years to a more market and performance driven system. Their study highlights that financing during the Soviet era was to a large extent only available to the large, state-owned enterprises with the smaller firms having limited access to financing from traditional sources such as banks, a trend which is still visible in the present day. Though SMEs are becoming the most active employment generators in the Polish economy, their efforts are not being complemented by improving their access to credit (Klapper et al., 2006:10). Klapper et al. (2006:10) note that the large firms in the economy had higher indebtedness and a higher observed use of trade credit whilst the opposite was true of smaller firms. In addition to this, a number of small firms obtained a larger percentage of their financing through their suppliers, which is not a traditional means

of accessing debt and enhancing performance (Klapper et al., 2006:10). This highlights the importance of the role that debt can play in improving the performance of a firm.

Debt, when used optimally, can improve the overall performance of a firm. However, it is the balance of understanding what the requirements are and how much each firm can sustain that poses the challenge. Firms that consistently outperform their competitors use debt appropriately.

2.6.3 The influence of asset tangibility on firm size and firm performance

The assets that a firm holds form the core of its operations and the basis on which the firm generates sales and revenue. Fixed assets can be used as collateral to access expansionary capital and provide infrastructure from which products are manufactured in capital-intensive industries. Firms with considerable tangible assets generally receive lower interest rates on loans they hold as they are less of a risk due to the value of their tangible assets (Safarova, 2010:18). Rights to develop resources provide a firm with another potential income stream, allowing the firm to diversify its cash flows. Even when the firm is struggling financially and unable to exploit these resources, it can still provide an income injection if sold (Safarova, 2010:18). Therefore, the variable tangibility is expected to have a positive relationship with firm performance as an increase in these assets directly and indirectly improves the performance of the firm (Safarova, 2010:18).

2.6.4 The influence of corporate governance on firm size and firm performance

In the following section corporate governance and firm performance are considered.

2.6.4.1 Corporate governance decisions and firm performance

Corporate governance contributes to the overall performance of a firm, more so when considering agency costs and the role of management as custodians of shareholders' wealth (Hitt & Collins, 2007:354). Hitt and Collins (2007) highlight how management is increasingly obliged to make more ethical decisions as investors and shareholders closely scrutinise the choices made in a bid to curb corporate scandal (Hitt & Collins, 2007:354). A key question they pose is whether ethical decisions significantly improve the performance of a firm, to which they conclude that though it may be good practice to implement ethical decisions, it does not improve performance (Hitt & Collins, 2007:354). To support their assertion, they cite a study

on Canadian mutual funds which compared the returns of mutual funds that made investments on ethics-based criteria and those that did not. Results illustrated a statistically insignificant relationship between the performance of the two funds (Hitt & Collins, 2007:354). An important conclusion is that corporate governance alone does not form the basis for ensuring performance in a firm, but contributes to it, along with other factors.

When considering firm performance, astute corporate governance can result in higher share price multiples. This is attributed to the fact that shareholders feel that as there is good corporate governance, cash flows are likely to be returned to investors as dividends as opposed to being diverted away (Amann, Abdellatif & Jaussaud, 2010:37). Further to this, the return on equity that shareholders expect from the firm is lower as good corporate governance implies lower monitoring and auditing costs and this leads to an overall lower cost of capital (Amann et al., 2010:54).

In their study, Amann et al. (2010) construct a corporate governance study that is made up of 64 corporate governance indicators defined into six categories: board accountability, financial disclosure, internal control, shareholder rights, remuneration, market for control and corporate behaviour. Their dataset considers information from 22 countries excluding the United States which allows for a broader, more diverse study in comparison to previous studies (Amann et al., 2010:40). In investigating the economic performance of firms, given the level of corporate governance as defined by the index, Amann et al. (2010) noted that one standard deviation increase in the index results in an increase in Tobin's Q of 0.06. This lends strongly to the argument that better governance leads to stronger performance, and ultimately, higher valuations (Amann et al., 2010:40). On the whole, the study carried out by Amann et al. (2010) is more likely to capture the nature of the relationship more closely, given the size of their sample as well as the fact that their study focuses on a longer time period. The present study does not enter into a similar level of detail as corporate governance is not the focus of this research.

Though arguments assert the premise that strong corporate governance is the precursor to higher firm valuations, other studies do not explicitly support this theory and there still exists the opinion that the costs of ensuring a firm has good corporate

governance systems in place may outweigh the benefits derived (Bruno & Claessens, 2010:480).

2.6.4.2 Firm performance and board characteristics

The board composition and characteristics are also an important aspect of corporate governance. O'Connell and Cramer (2010) carried out a study in Ireland to establish the relationship between firm performance and board characteristics. Their study finds that board size shows a significant negative association with firm performance though this result is less negative for smaller firms. These findings indicate that large firms are likely to not perform when board size is large (O'Connell & Cramer, 2010: 395). A large board takes longer to agree on important resolutions, which slows down operational decisions, whereas a small firm is unlikely to have a large board to begin with (O'Connell & Cramer, 2010:395).

Their study also shows a positive and significant association between firm performance and the percentage of non-executive directors (O'Connell & Cramer, 2010:395). This result is consistent with prior studies such as Stiles and Taylor (2001) that suggest a higher proportion of outside directors should result in stronger performance. Other literature also shows that in the absence of well-defined corporate governance guidelines, the resources of the firm are open to misuse and expropriation for the benefit of management (O'Connell & Cramer, 2010:395). Managers may also invest in sub-optimal investments which may reduce shareholder wealth if incentives are not aligned with the overall objective of maximising shareholder wealth (O'Connell & Cramer, 2010:395).

A strong corporate governance policy also ensures that the board composition and the firm strategy adopted benefits the shareholders. This can be done by making sure that the composition of the board has independent directors in its majority. Independent directors are not directly involved with the day to day running of the firm and ensure that the interests of shareholders are safeguarded (Fama, 1980:293). This, along with the separation of the role of chairperson and chief executive officer, is regarded as a key sign of strong corporate governance within an organisation and reduces the risk of shareholders being exposed to self-serving management choices. A firm with a strong corporate governance policy tends to perform better than one with a weak corporate governance policy ([Zahara & Pearce, 1989] in Safarova).

2.6.4.3 Corporate governance legislature and firm performance

Chhaochharia and Grinstein (2007) investigated the effect of the Sarbanes Oxley Act on the performance of firms. Their study sought to establish whether the legislation had been effective since inception as it possibly may have been necessary to take into account the differing needs of firms given their varying sizes (Chhaochharia & Grinstein, 2007:2). They assert that such regulations burden small firms as they are likely unable to attract the required personnel in the form of experienced boards of directors and are saddled with high compliance costs (Chhaochharia & Grinstein, 2007:2).

Chhaochharia and Grinstein (2007) construct portfolios of firms using the degree of compliance as the criteria. They then contrast the performance of the firms at the time at which the regulation was announced. The constructed portfolios capture the main provisions stipulated in the regulations: insider trading, financial reporting, related party transactions, internal control and board and committee independence provisions (Chhaochharia & Grinstein, 2007:3). On the whole, their results suggest that firms that were less compliant with the rules earned above normal returns. The results illustrate that the provisions of the rules tended toward a suboptimal structure which often resulted in disproportionate costs for small firms (Chhaochharia & Grinstein, 2007:34). This highlights that at best, the provisions had relative as opposed to absolute benefits with regards to performance and seemed to reward non-compliance.

In a study that looked at different corporate governance legislature and how it affects firm performance, Anderson and Gupta (2009) concluded that a firm with good corporate governance tends to have a more transparent process with regards to capital allocation (Anderson & Gupta, 2009:62). Therefore a transparent corporate governance process allow such firms to access capital markets on favourable terms and ultimately perform better (Anderson & Gupta, 2009:77). Anderson and Gupta (2009:77), highlight that managers have an incentive to improve their corporate governance standing as long as the reduction in cost of capital outweighs the cost of implementation. Their results show that firms operating in a market-based, common law environment tend to demonstrate a positive relationship between firm performance and corporate governance. This is in comparison to firms operating in a bank/civil environment (Anderson & Gupta, 2009:77).

Corporate governance is still quite a contentious topic with reference to its impact on performance and other literature disagrees with the notion that a higher proportion of non-executive directors results in stronger performance. In a study carried out in the United States, Hermalin and Weisbach (1991:111) concluded that there was no relationship between the proportion of non-executive directors and firm performance. Similarly De Andres, Azofra and Lopez (2005) failed to establish a statistically significant association between firm performance and board composition when they examined a sample of countries within the OECD economic block (De Andres et al., 2005:203).

2.7 Summary

The literature review illustrates that prior studies have taken different approaches to investigating the relationship between firm size and firm performance. The different studies have used different definitions of size and performance with total assets and return on assets being the more common measurements across the studies considered.

Both the resource-based view and the structure conduct performance theories offer varying evidence of the relationship each have with the performance of a firm. Both theories illustrate how the performance of a firm is the construct of both firm-specific characteristics as well as factors that are industry-oriented.

This study considers firm-specific factors and the literature has shown that size alone does not influence the performance of a firm, but does so in conjunction with other factors highlighted in the study.

Finally, the literature review also highlights that not all studies affirm a particular relationship between firm size and firm performance, with other studies taking the view that no relationship exists. The objective of this study is to ascertain whether a relationship does exist and what the nature of this relationship is, particularly in the context of South African listed firms.

Chapter 3

Research methodology

3.1 Introduction

In Chapter 2 the differing views regarding the relationship between firm size and firm performance were considered. This chapter focuses on the research methodology applied to address the research question. In particular, this chapter elaborates on the scope of the study, research strategy, research instrument, sampling strategy, approach to data analysis, ethical considerations and finally, the limitations of the study.

3.2 Problem statement

The financial crisis of 2008 resulted in the collapse of a number of large firms. These firms were not only small firms but included conglomerates with operations in multiple continents (Hurley, 2010:352). Their collapse put into perspective the vulnerability of large firms to downturns in market conditions and hence questioned the stability of their performance. The problem is that the relationship between the size of a firm and its performance is not always clear.

3.3 Goal of the study

The goal of this study is to establish whether there is an association between firm size and firm performance and to describe the nature of this relationship.

Amato and Amato (2004:182) note that since firm size is influenced by other factors such as corporate governance, leverage, risk and tangibility of assets, it is important that they should also be included as variables when considering the relationship between firm size and firm performance.

3.4 Research question

This study poses the research question: is there a relationship between firm size and firm performance?

To provide an answer to this research question, sub-research questions were formulated as follows:

- What is the association between return on assets and market capitalisation?
- Is there a relationship between corporate governance and return on assets?
- Is there a relationship between firm debt level and return on assets?
- Is there a relationship between risk and return on assets?
- Is there a relationship between tangibility and return on assets?

3.5 Research strategy

A research strategy is a detailed plan of how the research question will be answered. It highlights the objectives, clearly illustrating how these will be met and how data will be collected (Saunders, Lewis & Thornhill, 2009:600).

The goal with a research strategy is to ensure that the study is suitably structured to answer the research question, given the existing evidence, without any uncertainty.

This study is exploratory in nature.

Exploratory research is defined as research whose goal is to seek a different understanding about a particular topic (Saunders et al., 2009:592). This study explores the relationship between firm size and firm performance of firms listed on the Johannesburg Stock Exchange Limited (JSE Ltd).

Prior studies which considered similar research problems applied a quantitative approach to carry out their investigation. A quantitative research method can be described as the numerical illustration and organisation of observations for the purposes of explaining what is represented by the selected observations (Saunders et al., 2009:81).

Taking into account the above and the quantifiable nature of the study data, a quantitative research approach is adopted in the present study.

3.5.1 Research paradigm

The strength of a quantitative research method is that it is numerical and can be analysed using a number of statistical techniques. As a result, data can be translated into measurable and identifiable results which have a practical application.

A quantitative approach is well-suited to this study as the research questions are descriptive statements that can be numerically answered (Saunders et al., 2009:73).

3.5.2 Research method

Maree (2010) defined quantitative research as a systematic and objective method of using numerical data from a sample to generalise the results to the larger population under observation (Maree, 2010:145). Taking note of this definition, a quantitative approach is ideal for a study of this nature as it allows the researcher to systematically observe the relationships within the study.

The important elements in quantitative research are objectivity, numerical data and generalisability. Objectivity is where the findings of the study are unbiased and any research that applies the same technique using similar data would be able to yield the same results. The data used in quantitative research should be numerical in nature and should therefore be defined by numbers. Finally, the results of quantitative research should be generalisable to a larger population, with the data from a smaller subset or sample providing input to carry out the analysis (Maree, 2010:145).

A quantitative research effort begins with a problem statement which results in a research question. A sample is taken from a larger population for the purposes of obtaining representative data. Once data is collected from the sample, statistical techniques are applied to yield results and findings. These findings should answer the research question and are subsequently tested for reliability and validity. This is done to ensure that the instruments used in analysing the data yield the same results if the research was to be repeated and that the instruments measure what they are intended to measure (Maree, 2010:145). Figure 3.1 below denotes the steps taken in a quantitative research study.

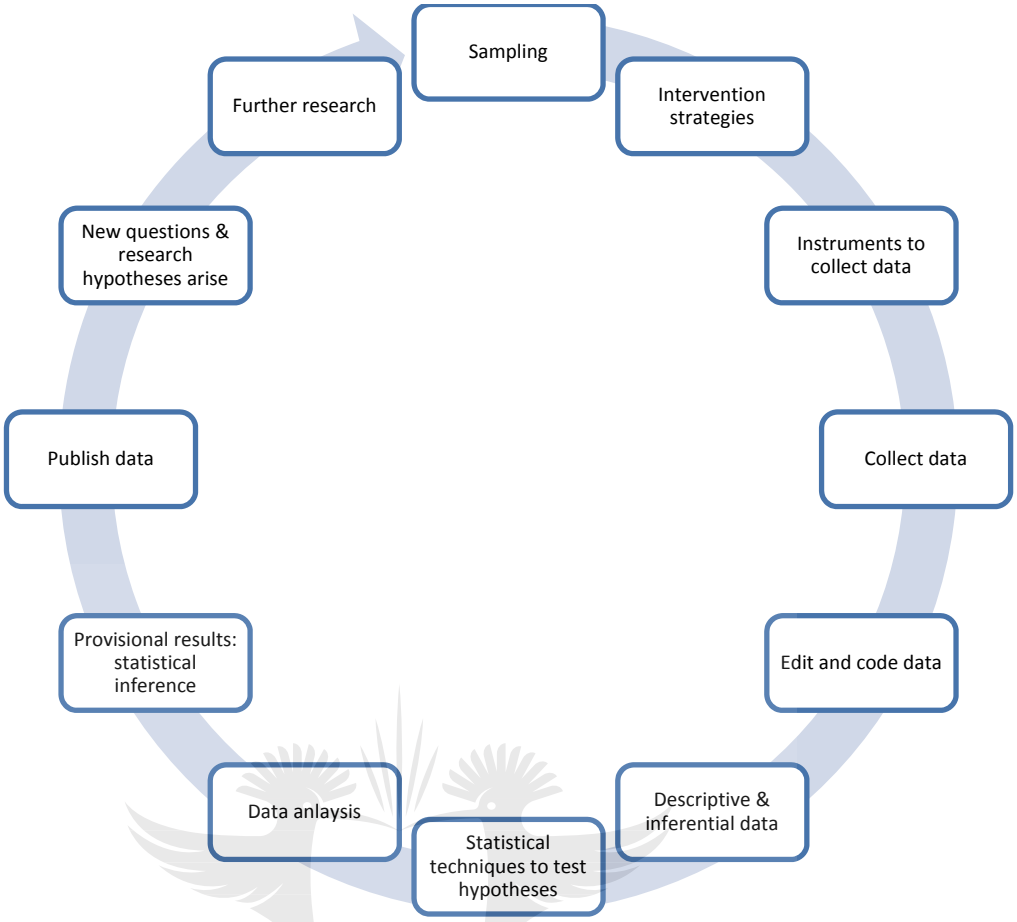

Figure 3.1 Research process

Source: (Maree, 2010)

3.6 Research instrument

A research instrument is used in a study to measure the outlined objectives (Saunders et al., 2009:452). This study seeks to establish whether there is an association between firm size and firm performance and to determine the nature of this relationship. The study applies a quantitative approach making use of the following research instruments:

- Descriptive statistics
- Scatterplot analysis
- Correlation analysis

- Regression analysis

The first instrument, descriptive statistics, is a summary of key characteristics that make up a data set (Keller & Warrack, 1999:19). Descriptive statistics provide a simple way to quantitatively describe data in an understandable way.

Descriptive statistics can be presented in the form of graphical presentations such as pie charts, histograms or trend graphs. They may also be presented in numerical form such as means, medians and standard deviations. In this study, descriptive statistics were used to give a sense of the quality and characteristics of the data being analysed.

A scatterplot analysis was conducted to illustrate the shape and tendency of the study data. A scatterplot is also useful in distinguishing between linear and non-linear relationships in the study data (Keller & Warrack, 1999:57).

The third research instrument that was applied in this study is correlation analysis. A correlation analysis shows the extent to which variables are related to each other. It is used to quantify the strength of the linear relationship between two variables. Variables with a negative relationship denote a negative sign before the correlation coefficient and variables with a positive relationship denote a positive sign before the correlation coefficient. When a relationship does not exist between variables, the coefficient value is zero (Saunders et al., 2009:459).

The final research instrument employed in this study was regression analysis. A regression analysis is applied to analyse and quantify the relationship between two variables (Saunders et al., 2009:461).

By making use of a dependent and an independent variable, the analysis calculates a regression coefficient and regression equation from the sample data. A regression analysis is particularly useful in estimating how the value of the dependent variable changes for a given change in the independent variable (Saunders et al., 2009:462). The regression analysis also shows whether the relationship is statistically significant at a selected significance level.

3.7 Sampling strategy

The present study is limited to firms listed on the Johannesburg Stock Exchange Limited within the Industrial Goods and Services sector.

The study considers the period 2004 to 2013 to determine the performance of the firms for each year as well as their sizes. The study period is considered long enough to capture the true nature of the relationship between firm size and performance. The study period also includes a period of economic growth as well as a recessionary period.

The industrial and manufacturing sector was selected because it includes firms with a diverse range of sizes. This sector has varying firm sizes as the firms' activities have differing requirements, given the products they manufacture (Ligthelm, 2008:376).

3.7.1 Target population

A target population is a group or individuals which a researcher is interested in describing and making a statistical inference about (Saunders et al., 2009:92).

In this study, the target population is the manufacturing and industrial sector as listed on the JSE Ltd. The manufacturing sector in South Africa is made up of numerous industries which include agro-processing, automotive, chemicals, information, communication and technology and metals (Ligthelm, 2008:368).

The distribution of firms in the manufacturing and industrial sector, as listed on the JSE Ltd, consists of a number of large firms as well as small- and medium-sized firms.

This sector contributed 17% in 2010 to the national Gross Domestic Product (GDP). This underlines the significance of the industry to the economic growth of the country as a whole and illustrates the need to understand the drivers of performance in this sector to better inform economic policy formulation (Ligthelm, 2008:370).

3.7.2 Sample selection

To be able to draw statistical inference from a sample, it is imperative that the sample is representative of the given population. A large enough sample size

reduces the likelihood of errors when generalising the results to the rest of the population (Saunders et al., 2009:95).

To ensure that the results derived from the study data are not spurious, the data has to be normally distributed. However, according to the central limit theorem, if the data is not normal, a sample size greater than 30 will suffice to ensure that the sampling distribution for the mean is approximately normal (Saunders et al., 2009:101).

The study sample was selected from the population of listed public firms on the Johannesburg Stock Exchange Limited, classified under the Industrial Goods and Services sector.

Probability sampling was applied and a total of 32 firms out of a possible 50 were selected. Those not included in the study failed to meet the selection criteria.

3.8 Data collection method

The data applied to conduct the study was secondary data obtained from annual reports of the sampled firms in the study. The reports are widely available online from the firms' websites and a number of firms have an archive of all historical financial information. These annual reports contain information such as financial statements, details of the directorate, performance ratios and capital structure information.

Because all these reports are independently audited, it can be assumed that the data is reliable and valid. The following databases were also used to obtain the data for the study:

- McGregor BFA
- I-Net Bridge
- Sharenet

The above databases are widely used as reliable sources of information concerning Johannesburg Stock Exchange Limited listed entities.

Data was collected from 2004 to 2013 which forms the study period.

In instances where data was unavailable from the above sources with particular reference to information on corporate governance, the information was obtained from other industry-related websites that collect and maintain such information. The utilised websites were African Financials (www.africanfinancials.com) and Who's Who SA (www.whoswhosa.co.za). The websites are regularly updated with detailed data on listed firms and disclose information relating to board members and company executives for use by potential investors, buy and sell-side analysts as well as other interested parties.

The data was made up of independent, dependent and control variables to realise the objectives of the study. These are briefly described below.

3.8.1 Independent variables

Market capitalisation was applied to determine firm size. This is similar to the study of Safarova (2010) which investigates firm size and performance.

Market capitalisation is suited to this study, as information to determine the market capitalisation of the sample of firms is publicly available.

3.8.2 Dependent variables

The dependent variable applied to measure firm performance was return on assets (ROA). Return on assets is widely used as a ratio to measure the return on assets of a firm (Damodaran, 2002:43).

ROA is simple to compute and information to determine the ratio for listed companies is widely available in the public domain.

Though it is an accounting measure of performance, ROA provides a more realistic assessment of the return of a firm as a whole when compared to other ratios such as return on equity, which would be a performance measure for the providers of equity.

Similarly, Amato and Burson (2007) and Amato and Wilder (1985) make use of return on assets to measure firm performance whilst Safarova (2010) makes use of both return on assets and Tobin's Q.

3.8.3 Control variables

This study also includes other variables widely acknowledged to be associated with firm size and which have an effect on firm performance. These four variables are corporate governance, firm debt level, tangibility and risk (Safarova, 2010).

Corporate governance was measured by the proportion of independent or non-executive members on the board in relation to the board as a whole.

Firm debt level was measured by the ratio of long-term debt to equity.

Tangibility was measured by the ratio of fixed assets to total assets.

Finally, risk was measured by the firm's beta which is widely used as a proxy to measure the firm-specific risk of a firm.

The use of control variables is meant to improve the assessment of the relationship between firm size and firm performance, thereby enhancing the validity of the research findings.

3.9 Data analysis

Descriptive statistics were performed on all the variables to provide an indication of the dispersion of the data.

The analysis contained the mean, median and mode values as an indication of the location of the observed data. The summary of data also depicted measures of dispersion which included the standard deviation and variance. Histograms and normal quantile-quantile plots (Q-Q plots) were also compiled to illustrate the distribution of the data and confirm whether the data was normally distributed or not.

A histogram and Q-Q plot provide a visual analysis of whether a distribution displays some form of skewness or kurtosis. The presence of skewness or kurtosis is an indication that the data is not normally distributed (Albright, Winston & Zappe, 2006:44).

Where the data for a variable was non-normal, logarithm and square root transformations were used to transform the data into normally distributed data.

Where the distribution of the data did not conform to a normal distribution, non-parametric techniques were used for further statistical analysis.

A scatterplot analysis was carried out to provide a visual description of the observed data and establish whether the relationship between two variables is linear or non-linear. It also indicated the direction of the relationship (Keller & Warrack, 1999:57). The analysis included a scatterplot for each of the independent variables market capitalisation, beta, firm debt level, corporate governance and tangibility with the dependent variable, ROA.

A correlation analysis was also conducted and a correlation matrix constructed. The correlation analysis was used to investigate the strength of the relationship between the two variables, return on assets and market capitalisation, as well as the other variables of beta, firm debt level, corporate governance and tangibility. The analysis also displayed the interconnectedness of the different variables in the study.

A correlation analysis is useful to indicate the strength of a relationship between two variables. However, the usefulness of a correlation analysis is limited to linear relationships, which can be problematic when investigating non-linear relationships (Keller & Warrack, 1999:662). Two sets of correlation analyses were conducted. The first analysis was for the independent variables market capitalisation, beta, firm debt level, corporate governance and tangibility. The second one was for the dependent variable, ROA, with the independent variables.

Finally, a regression analysis was conducted. A regression analysis is used to quantify the relationship between two variables. It can indicate the predictive ability of an independent variable to approximate the value of a dependent variable for a given significance level (Keller & Warrack, 1999:625).

Single regression analyses were conducted for the independent variables market capitalisation, beta, firm debt level, corporate governance and tangibility with the dependent variable, ROA. The purpose of the regressions was to quantify the relationship between each of the independent variables and the dependent variable and establish whether each of the independent variables could explain some of the variation observed in the dependent variable at the chosen significance level.

Thereafter, a multiple regression analysis was conducted between ROA and the independent variables market capitalisation, firm debt level, beta, tangibility and corporate governance. A multiple regression analysis indicates the goodness of fit of the chosen model and the independent variables. It also indicates how well the selected variables account for the variation observed in the dependent variable (Keller & Warrack, 1999:681). Prior studies (Safarova 2010; Amato & Amato 2004) also apply the multiple regression method to investigate the association between firm performance and firm size.

The multiple regression equation applied to estimate the relationship between firm size and firm performance is presented below and a description of the variables is listed in Table 3.1.

$$\boldsymbol{Y_i = \alpha(Constant) + \beta_1(FirmMC)_i + \beta_2(FirmR)_i + \beta_3(FirmD)_i + \beta_4(FirmCG)_i + \beta_5(FirmT)_i + \mu_i}$$

Source: Author's deductions

Where for the *i*-th company,

Y = ROA

α = Intercept of the regression equation

β = Coefficient of the variable

μ = Error term

Table 3.1 Description of variables

Variable	Acronym	Definition
Return on assets	ROA	Percentage return on assets of the firm
Firm size	FirmS	Market capitalisation of the firm
Firm risk	FirmR	Firm-specific risk
Firm debt level	FirmD	Ratio of long-term debt to equity
Firm corporate governance	FirmCG	Proportion of independent or non-executive members on the board
Firm tangibility	FirmT	Level of fixed assets in the firm

Source: Author's deductions

SPSS® and Microsoft Excel® software packages were used to carry out the descriptive statistics and statistical analysis (SPSS, 2015; Microsoft Excel, 2010).

3.10 Validity and reliability of data

The data used in the study is valid, obtained from reliable and verifiable sources. These data sources include audited firm financial statements and the McGregor BFA database. The data sources are widely used in the financial industry and are commonly accepted as accurate sources of financial information for listed firms. The data provided by these sources is consistent over the years under consideration.

3.10.1 Validity of measurement

The extent to which the measurements are accurate can significantly influence the outcome of the data. Validity reflects the degree to which measurements measure what they are supposed to measure and perform as they are designed to perform (Saunders et al., 2009:275). Therefore, it is important to ensure that the choice of measurement is precise and is able to consistently quantify the variable it is meant to measure (Leedy & Ormrod, 2010:28).

The measuring instruments of this study are similar to those of Safarova (2010) where multiple regression and correlation analysis techniques were applied to assess the nature of the relationship between firm size and firm performance. The measuring instruments applied in the present study can therefore be accepted as valid.

3.10.2 Reliability

Reliability refers to the consistency of measurement. Of significance is whether the selected measurements would yield similar results if analysed by other researchers. Reliable measurements ensure that there is transparency in how conclusions are drawn from data (Saunders et al., 2009:274).

The measurements chosen in this study to quantify the variables have all been used in prior studies in the same capacity. To illustrate, beta and return on assets are both used in financial markets as measures of risk and performance respectively. It is this consistency of use and application that ensures that each variable is reliable (Leedy & Ormrod, 2010:28).

3.11 Ethical considerations

The goal of the study was to carry out research on the nature of the relationship between firm size and firm performance in South Africa. The study would inform private industry, the public sector and academia of how to best design policy and create an enabling environment for firms in South Africa.

The investigation used a wide variety of data which included quantitative and qualitative information relating to the firms included in the study. The information was sourced from firms' annual reports, financial databases and financial intelligence websites. As the firms analysed are listed entities all information is readily available in the public domain and collected from reliable sources.

In instances where relevant information was not readily available in the required form, the combination of annual reports, firm websites and financial databases was used to establish the required data. Therefore, all information was collected in an ethical manner without breach of privacy or use of coercion.

The study was carried out in an objective manner. The data used in the study was accurately identified, measured and analysed using the appropriate statistical techniques. As a consequence, the findings of the study are precise and recorded without bias. Inferences and conclusions drawn from the findings are thus based solely on the evidence from the study and are without favour.

3.11.1 Anonymity and confidentiality

Due to the nature of the study, no confidential data has been used as all information is secondary data which is available in the public domain. The study has not requested personal information of any nature and in instances where it has assessed the board members of firms, it has not disclosed their names, age, gender or any other information deemed to be personal.

3.12 Limitations

As with any study or research effort, there will be limitations. Firstly, the chosen methodology could not establish a causal link between the two variables, firm performance and firm size. The study could only ascertain the nature of the association and whether there is a relationship between the two variables.

Secondly, the study was limited to firms that are listed on the Johannesburg Stock Exchange Limited. For a firm to be listed, it needs to meet a number of criteria and raise a minimum amount of capital, which is often a considerable amount. Therefore, it must be noted that the study excluded unlisted firms and further analysis is required for the results to be generalisable to that grouping.

The performance of a firm is the result of a number of factors such as a firm's culture, which would be difficult to quantify or access for research purposes. Therefore, the study could possibly have overlooked such other variables.

Finally, the study focused on the Industrial Goods and Services sector and the results may not necessarily be generalisable to other sectors as there may be specific characteristics unique to a sector that would yield different findings.

3.13 Summary

This chapter highlights the problem statement, the research question and research methodology adopted in this study.

A quantitative research approach is considered the best approach to analyse the data based on three significant elements. Firstly, a quantitative approach would yield objective results and secondly, these findings would be generalisable to the population of firms listed on the JSE Ltd. Lastly, because the data obtained from the JSE Ltd was numerical in nature, a quantitative approach would be better suited to analyse the data.

The study sample was selected from the population of listed public firms on the Johannesburg Stock Exchange Limited, classified under the Industrial Goods and Services sector. Probability sampling was applied and a total of 32 firms out of a possible 50 were selected for analysis.

Descriptive statistics were performed on all the variables to provide an understanding of the data.

The following research instruments were applied to establish whether there is an association between firm size and firm performance and to determine the nature of this relationship: scatterplot analyses, correlation analyses and regression analyses.

This chapter provides a brief overview of the data analysis techniques and how they were applied.

Finally, the chapter addresses the reliability, validity and ethical considerations of the study and notes the existing limitations.

Chapter 4

Data analysis and interpretation

4.1 Introduction

Chapter three discussed the research design, the problem statement, the research objectives, the scope of the study, the variables employed to achieve the objectives and the manner in which the analysis was performed.

This chapter provides a description of the sample and analysis of the data. Data is first described with descriptive statistics and thereafter, a bivariate analysis using scatterplot analysis, correlation analysis and regression analysis is applied. Finally, the chapter highlights the limitations, assesses the reliability and validity of the findings and provides a summary of the data analysis.

4.2 Description of sample

The sample of this study was obtained from firms listed on the Johannesburg Stock Exchange Limited (JSE Ltd) under the Industrial Goods and Services sector. Firms selected had to be listed on the stock exchange from 2004 to 2013 and should still have been operational as at the end of the 2013 financial year.

The selection of a specific manufacturing sector as a sample aimed to remove the selection bias. The sample selection of this study was based on comparative studies in different countries that also focus on the manufacturing sector (Amato & Amato, 2004; Amato & Wilder, 1985). The sample was made up of 32 firms out of a possible 50. The firms' annual data from 2004 to 2013 was used as a separate data point. Some of the variables had instances of missing data, with tangibility being the worst case. As the sample size was large enough, missing data was not considered to

materially affect the study and results. Firms not selected had either been listed post 2004 or delisted prior to 2013.

4.3 Data analysis

The purpose of the data analysis was to establish whether there is a relationship between firm size and firm performance.

The data was analysed with descriptive statistics, histograms and normal quantile-quantile plots (Q-Q plots) with the focus on the location, dispersion and distribution of the observed values (Albright, Winston & Zappe, 2006:539).

4.3.1 Distribution of sample variables

The sample data variables were first analysed with descriptive statistics, histograms and normal quantile-quantile plots (Q-Q plots), with the focus on the location, dispersion and distribution of the observed data (Albright, Winston & Zappe, 2006:539).

The histograms analysed are displayed below and the Q-Q plots have been included in Appendices 4.1 to 4.6 Normal Q-Q plots.

4.3.1.1 Distribution of market capitalisation

The variable market capitalisation measured firm size in the study. Prior to the analysis, all market capitalisation variables were divided by 100 000 to simplify the analysis.

Market capitalisation was analysed for the study period 2004 to 2013. The results of the analysis are presented in Figure 4.1 below.

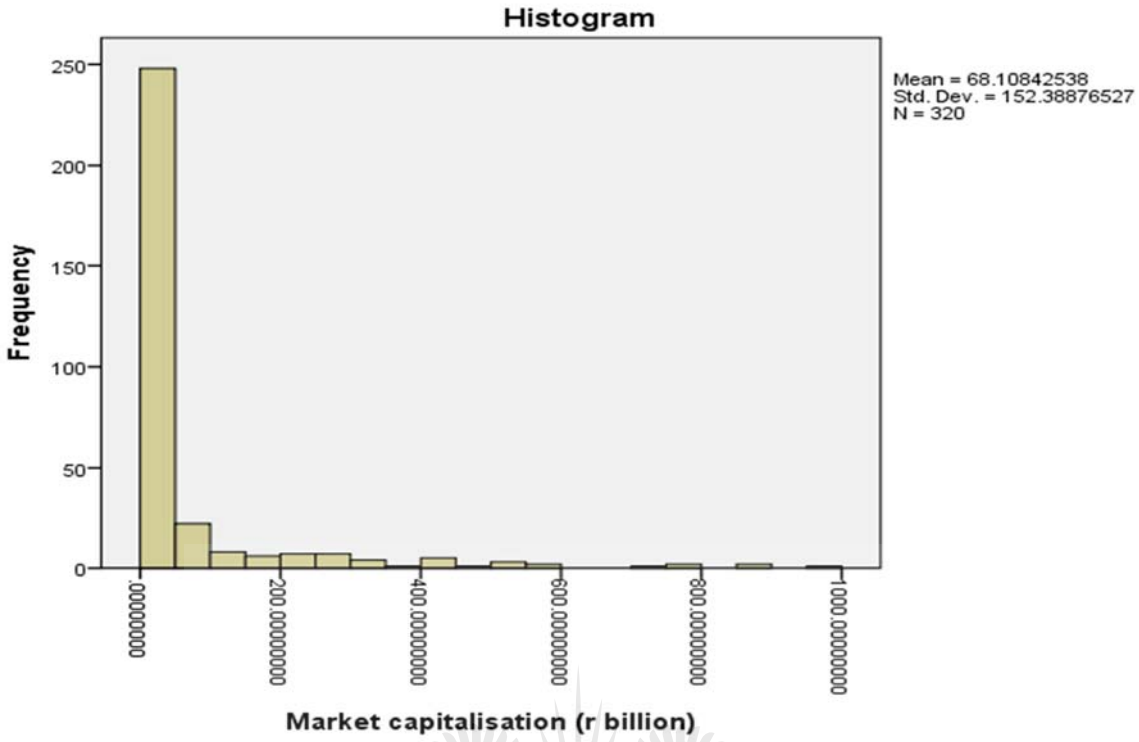

Figure 4.1 Market capitalisation for the period 2004 – 2013

Source: Author's deductions

The result in Figure 4.1 indicates that the distribution of market capitalisation was positively skewed.

A positively skewed distribution is defined as a distribution where the mode is greater than the mean and median (Albright et al., 2006:43). The histogram in Figure 4.1 illustrates that the distribution of the market capitalisation variable is made up of a majority of small market capitalisation values. The frequency of the histogram also indicates a majority of small values. These findings are also supported by the Q-Q plot in Appendix 4.1 Normal Q-Q plot of market capitalisation. Since the data for market capitalisation was not normally distributed, a log transformation was used to reduce the skewness and kurtosis.

4.3.1.2 Distribution of ROA

Return on assets was used in the study to measure firm performance for the period 2004 to 2013.

Figure 4.2 below illustrates the ROA of the sample for the study period.

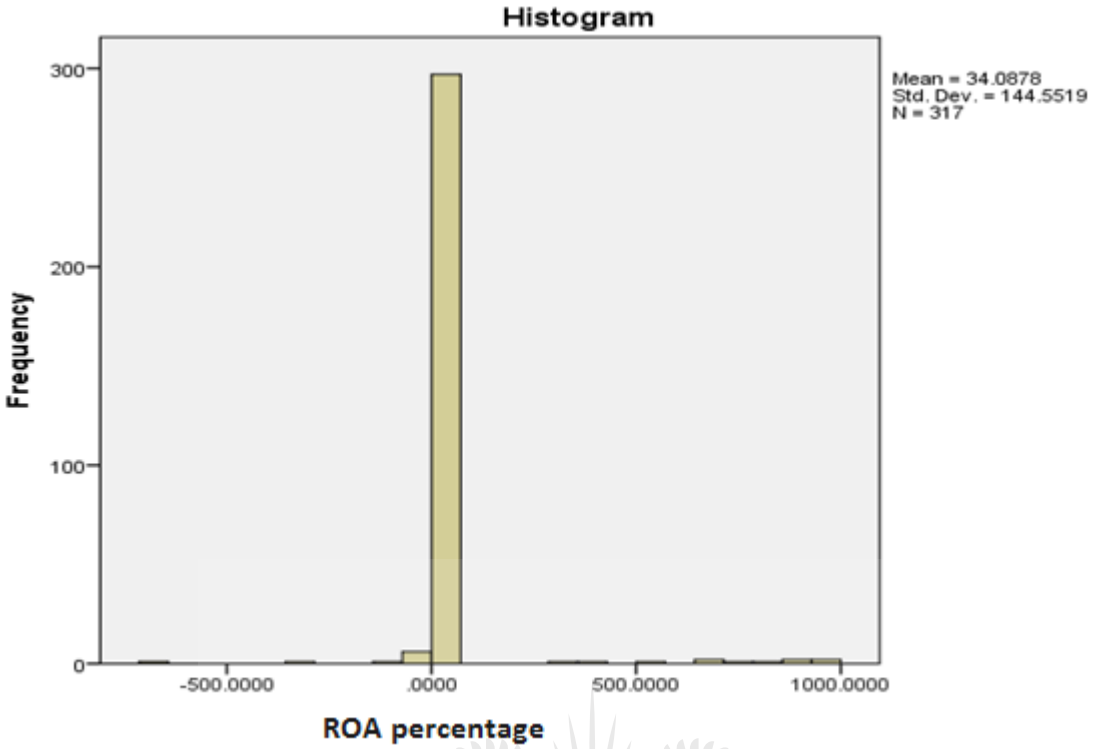

Figure 4.2 ROA for period 2004 – 2013

Source: Author's deductions

Figure 4.2 indicates that the distribution of ROA is not normal as the majority of ROA values were concentrated around the mean. The remaining ROAs were outliers, occurring as extreme negative or extreme positive values. This indicates that the distribution is leptokurtic (Albright et al., 2006:102). The normal Q-Q plot in Appendix 4.2 Normal Q-Q plot for ROA also illustrates that the distribution is not normal. Since the data for ROA was not normally distributed, a log transformation was used to reduce the skewness and kurtosis.

4.3.1.3 Distribution of leverage

Leverage was used in the study to measure the level of debt in firms. Figure 4.3 illustrates the distribution of firm leverage of the sample in the study period.

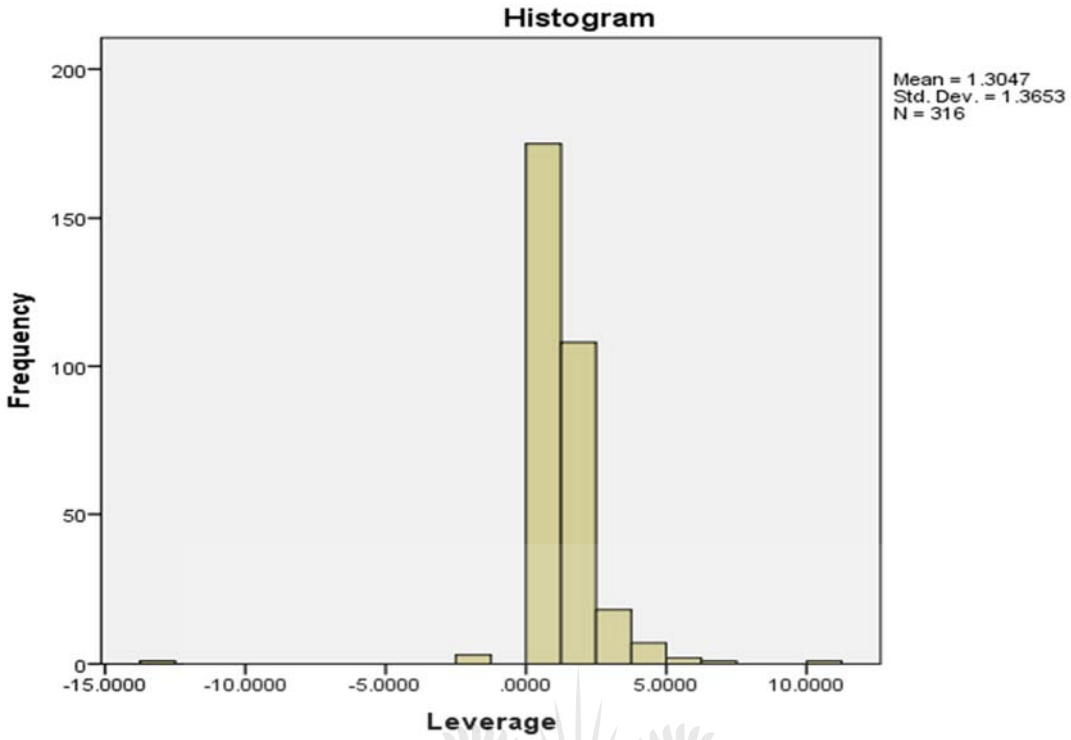

Figure 4.3 Leverage for period 2004 – 2013

Source: Author's deductions

Figure 4.3 indicates that the sample leverage had negative skewness. This highlights that the sample consisted of more firms with higher debt levels relative to the mean. The negative skewness was also evident in the normal Q-Q plot in Appendix 4.3 Normal Q-Q plot for leverage. Since leverage was not normally distributed, a log transformation was used to reduce the skewness and kurtosis.

4.3.1.4 Distribution of risk

Beta was used in the study to measure the riskiness of firms.

Figure 4.4 below illustrates the firm betas of the sample over the study period.

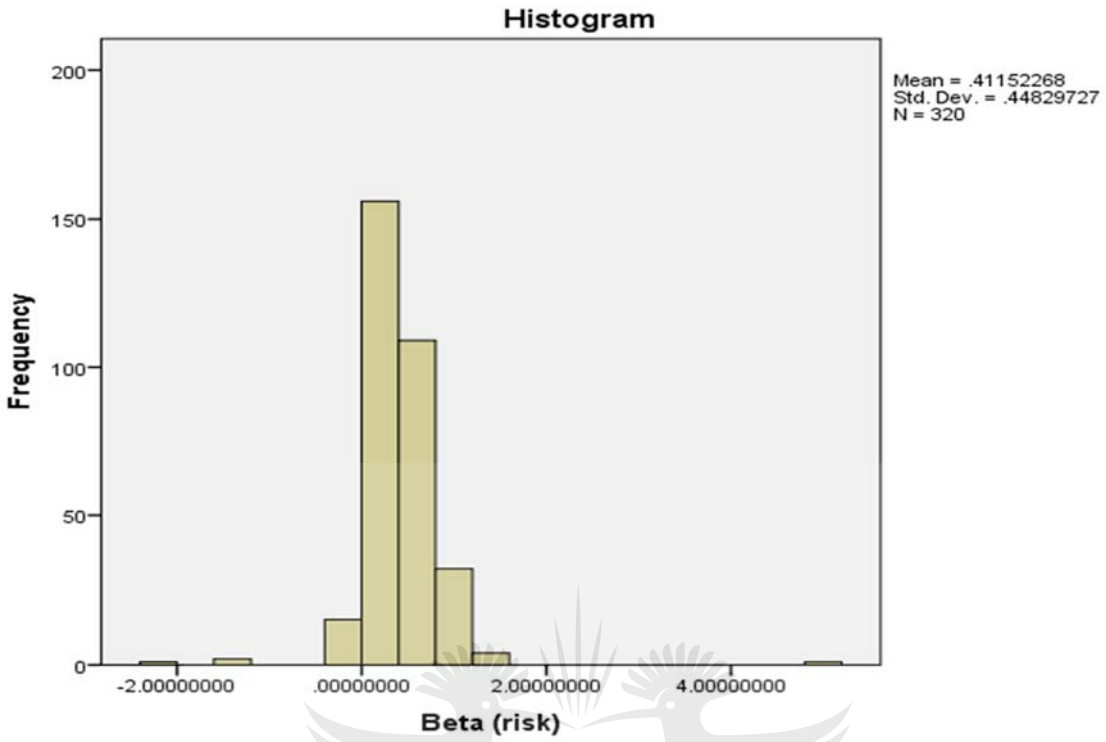

Figure 4.4 Beta for period 2004 – 2013

Source: Author's deductions

Figure 4.4 illustrates the firm betas of the sample over the study period were not symmetric but skewed to the right. The normal Q-Q plot in Appendix 4.4 Normal Q-Q plot for beta had the majority of observed values occurring along the line of best fit. However, there were outliers on either side of the fitted line which resulted in skewness. This indicates that the distribution had more beta values that were greater than the mean beta.

Since the sample data for beta was not normally distributed, a square root transformation was used to reduce the skewness and kurtosis.

4.3.1.5 Distribution of tangibility

The variable tangibility was used in the study to measure levels of fixed assets in a firm. The distribution of tangibility for the sample is indicated in Figure 4.5 below.

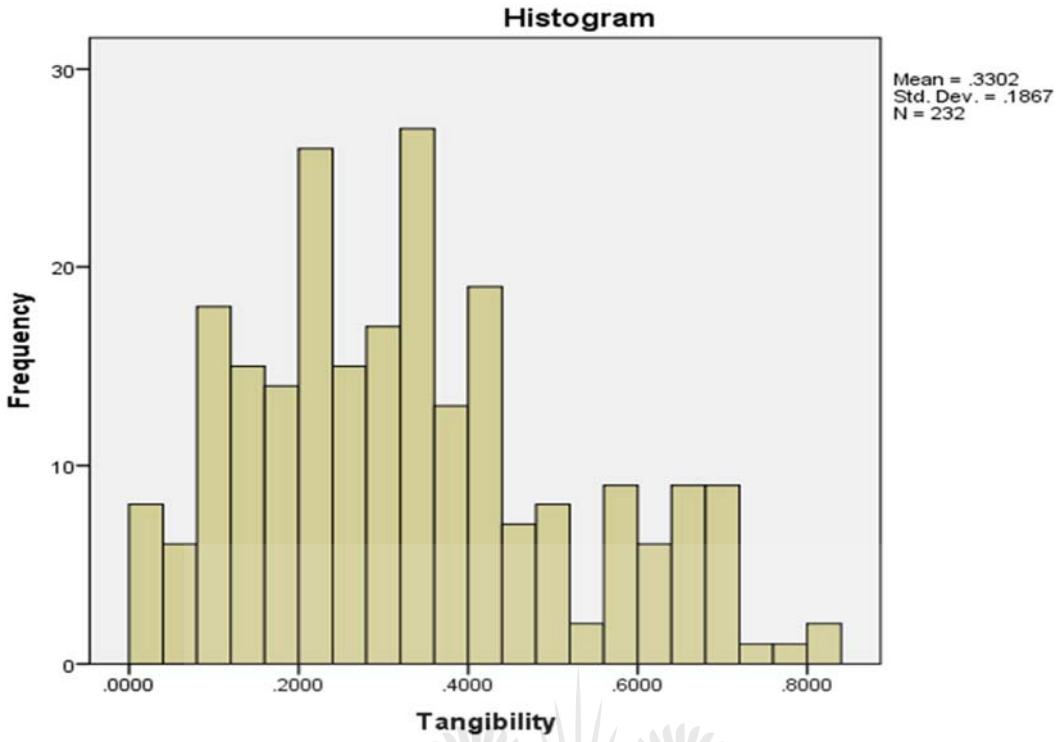

Figure 4.5 Tangibility for period 2004 –2013

Source: Author's deductions

Figure 4.5 indicates that tangibility followed a normal distribution for the period 2004 to 2013. This was confirmed by the normal Q-Q plot in Appendix 4.5 Normal Q-Q plot for tangibility, and the Shapiro-Wilk test in Appendix 4.7 Shapiro-Wilk test for normality. Where observed values followed a normal distribution, data transformations were not done.

4.3.1.6 Distribution of corporate governance

Corporate governance measures the extent to which the interests of shareholders and other stakeholders are represented at an executive level and in the decision-making process (Safarova, 2010).

Figure 4.6 illustrates the dispersion of corporate governance data over the study period.

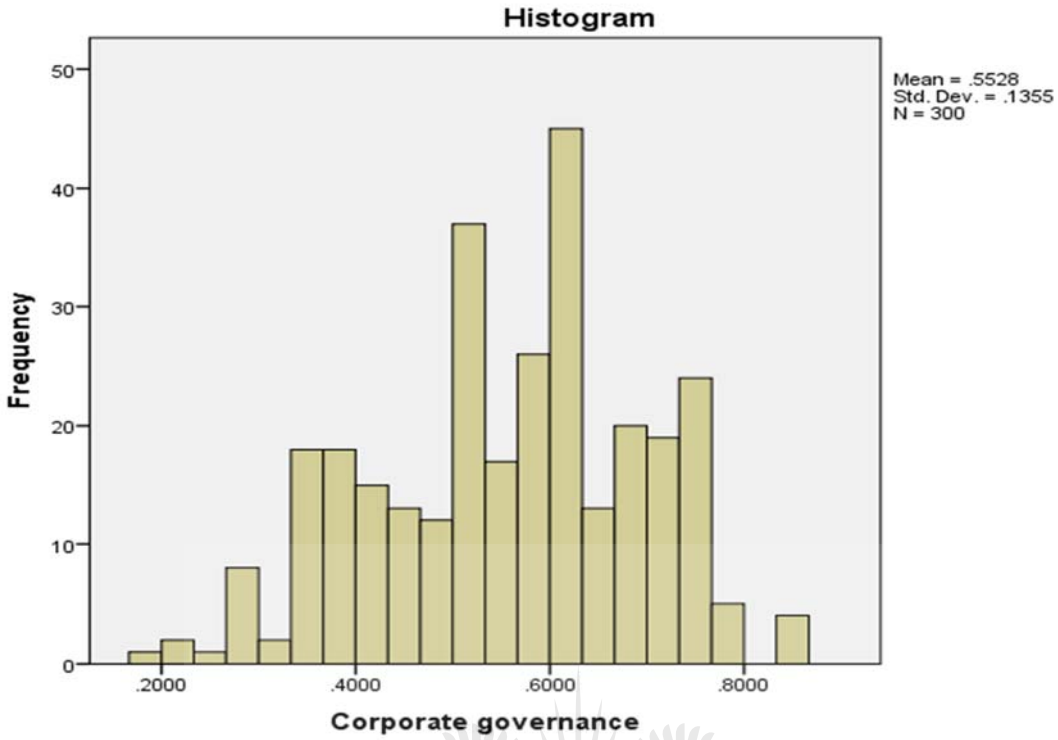

Figure 4.6 Corporate governance for the period 2004 – 2013

Source: Author's deductions

Figure 4.6 indicates that a larger proportion of the observed values were centred on the mean and there were few outliers and no outstanding skewness. This was confirmed by the normal Q-Q plot in Appendix 4.6 Normal Q-Q plot for corporate governance and the Shapiro-Wilk test in Appendix 4.7 Shapiro-Wilk test for normality. Therefore, corporate governance data was deemed normal and was not transformed.

Histograms and normal Q-Q plots are only visual techniques used to assess the nature of the distribution of data. Therefore, it was deemed necessary to verify the results. The Shapiro-Wilk test was used to confirm the normality of the dataset. The results are included in Appendix 4.7 Shapiro-Wilk test for normality. It was confirmed that only tangibility and corporate governance were normally distributed. The remaining variables market capitalisation, return on assets, risk and leverage all displayed skewness and kurtosis prior to being transformed.

4.3.2 Transformation of non-normal variables

Transformation is the process of changing the measurement scale of a variable using mathematical techniques (Gujarati, 2003:419). When analysing data using certain statistical procedures, the assumption is that the data follows a normal distribution. Where this is not the case, the data is transformed to ensure that it becomes suitable for statistical analysis.

In this study, the variables market capitalisation, return on assets, leverage and risk were not normally distributed and therefore it was necessary to transform these variables.

Log transformations were used for market capitalisation, return on assets and leverage. A log transformation exists where a data point is transformed by taking the logarithm of the data point as the transformed value. A square root transformation replaces a data point with its square root. The square root of the data point becomes the transformed value (Keller & Warrack, 1999:705).

For risk, the square root transformation was used as it yielded lower skewness and kurtosis.

Table 4.1 below portrays the descriptive statistics before and after the transformation of data.

Table 4.1 Descriptive statistics for transformed variables

	Market capitalisation	Market capitalisation log10 x	ROA percentage	ROA log10 x	Beta	Beta sqrt x	Leverage	Leverage log10 x
N Valid	320	320	317	307	320	302	316	311
Missing	0	0	3	13	0	18	4	9
Mean	68,1084253778	1,0661	34,087831	1,1094	,4115226837	,6293	1,304709	,0229
Median	9,6956671850	,9866	12,170000	1,0924	,3754492050	,6197	1,129900	,0569
Mode	1.71652578[a]	.23[a]	4.3700[a]	.64[a]	0,00000000	0,00	,6800	-,17
Std. Deviation	152,38876526748	,86909	144,5518957	,45267	,44829727048	,24749	1,3652916	,35884
Skewness	***3,480***	***-,133***	***4,390***	***1,496***	***2,670***	***,678***	***-1,539***	***-1,316***
Kurtosis	***13,376***	***1,019***	***27,534***	***6,551***	***42,105***	***5,834***	***42,022***	***3,748***
Minimum	,00176000	-2,75	-699,0000	-,42	-2,33946124	0,00	-12,5100	-1,40
Maximum	999,83525813	3,00	976,0000	2,99	5,10060915	2,26	11,1500	1,05

Source: Author's deductions

As illustrated in Table 4.1, once the variables were transformed, the skewness was reduced. Leverage was the only variable in which the transformation had a minimal impact to reduce the skewness. As a result, non-parametric techniques were employed to account for non-normal distributions.

4.3.3 Bivariate analysis

To determine the relationship between the independent variables above and the dependent variable ROA, a bivariate analysis was applied using scatterplot analysis, correlation analysis and regression analysis.

Bivariate analysis is the study of two variables to determine whether a relationship exists between the two variables (Keller & Warrack, 1999:200).

4.3.3.1 Scatterplot

A scatterplot is a graph that illustrates observed values for two variables on both the vertical and horizontal axes for a particular set of data (Keller & Warrack, 1999:57).

Scatterplots are useful in identifying the shape or tendency of a data set, potential associations between two variables and the strength of the correlation. They can also be used to confirm the results of a correlation analysis (Keller & Warrack, 1999:57).

For each of the independent variables market capitalisation, risk, leverage, tangibility and corporate governance, a scatterplot was generated to establish the nature and strength of the association between each of the independent variables and the dependent variable ROA. The full sample, (n=320), was used in the analysis. Figure 4.7 below presents the scatterplot for market capitalisation and ROA.

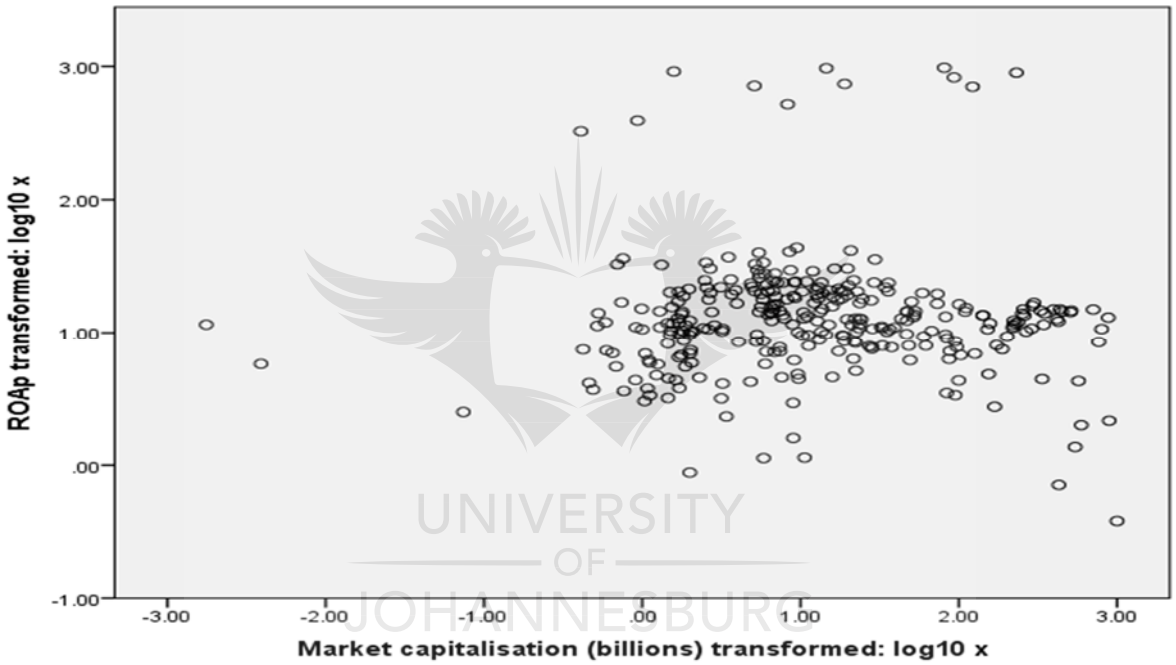

Figure 4.7 Scatterplot for market capitalisation and ROA

Source: Author's deductions

Where the shape of the observed values indicates a relationship, a line of best fit can be drawn onto the scatterplot to approximate the relationship between the two variables. How close the observed values are to the fitted line indicates the strength of the relationship between the two variables.

From Figure 4.7, it is evident that there was no clear pattern between the two variables market capitalisation and ROA. As there was no clear indication of a linear

or non-linear relationship between market capitalisation and ROA, a line of best fit was not transposed on to the scatterplot.

The scatterplot in Figure 4.7 shows evidence of outliers. The presence of outliers can affect the nature of the relationship between two variables and as a result, further analysis is necessary to see if the results of the scatterplot are different once outliers have been accounted for.

Figure 4.8 below illustrates the scatterplot for market capitalisation and ROA once outliers had been removed.

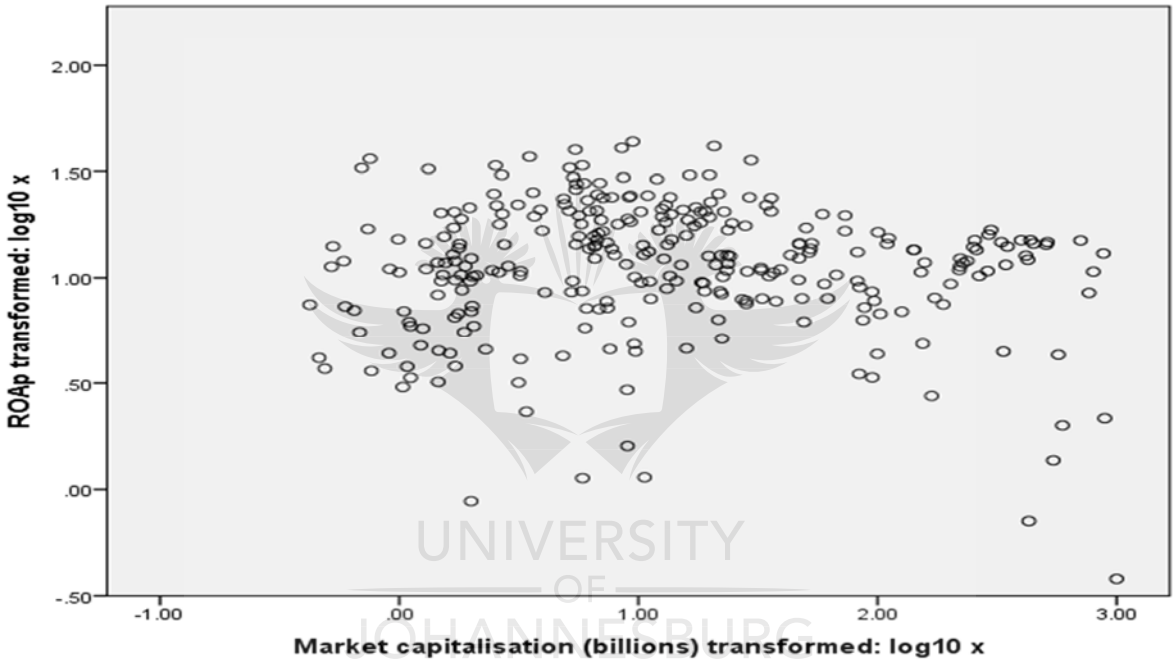

Figure 4.8 Scatterplot for market capitalisation and ROA without outliers

Source: Author's deductions

As illustrated in Figure 4.8, there was no change in the results once the outliers had been accounted for. The scatterplot illustrated a more pronounced random pattern which confirms that there was no relationship between market capitalisation and ROA.

To complement the scatterplot analysis, a yearly trend analysis of the independent variables market capitalisation, risk, leverage, tangibility and corporate governance with the dependent variable ROA was plotted on a graph using median values. The

objective was to provide a visual illustration of any apparent trends between the variables.

Figure 4.9 below illustrates the trend analysis.

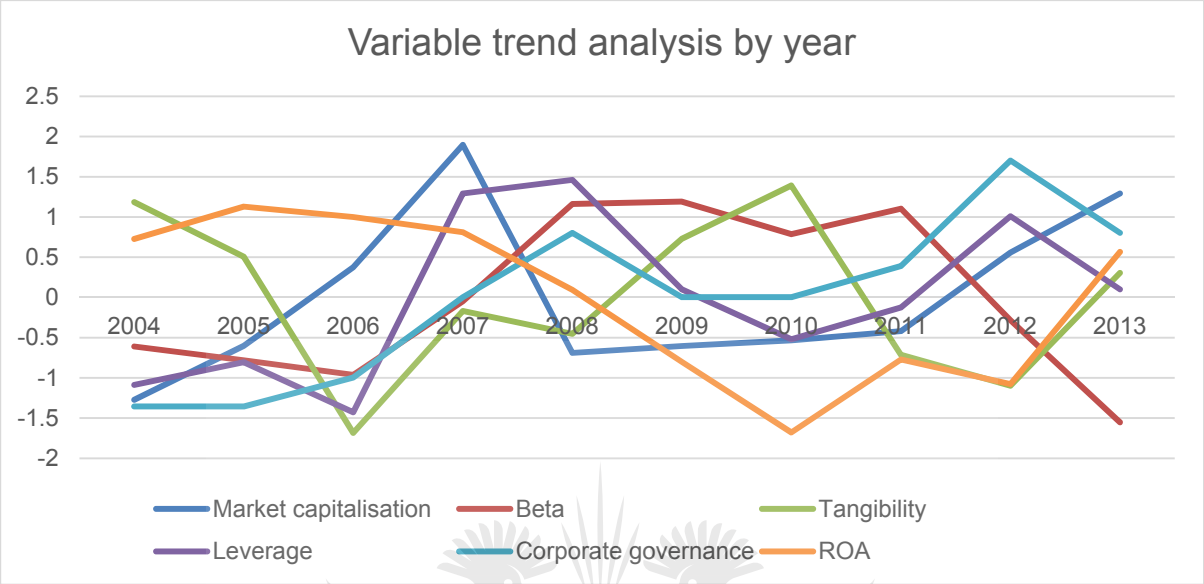

Figure 4.9 Trend analysis of the dependent and independent variables for the period 2004 – 2013

Source: Author's deductions

The trend analysis illustrates that the majority of the independent variables did not show a clear pattern with the dependent variable ROA. Only leverage exhibited a trend with ROA from 2007 to the following year 2008 as a lagging variable

The scatterplots for ROA with other independent variables, risk, tangibility and corporate governance had similar results where there was no clear relationship between each variable and ROA. This result was also similar for scatterplots where outliers had been excluded. Only the scatterplot for leverage illustrated a weak negative association with ROA; however this was only for the scatterplot where outliers had been removed.

The figures illustrating the scatterplots for ROA and the independent variables leverage, risk, tangibility and corporate governance are included in Appendices 4.8a – 4.11b Scatterplots for reference.

The results of the scatterplot indicated that none of the independent variables market capitalisation, risk, leverage, tangibility and corporate governance revealed a clear pattern or association with the dependent variable ROA.

Scatterplots are only a visual analysis and therefore these results need to be verified. A correlation analysis was conducted to determine the nature of the relationship between the variables.

4.3.3.2 Correlation analysis

The goal of the correlation analysis was to establish whether a relationship existed between the independent variables and the nature of the relationship between the dependent variable ROA and the independent variables market capitalisation, risk, tangibility, leverage and corporate governance. The following scale was used to interpret the strength of the relationship:

- Weak: r = 0.1 to 0.29
- Moderate: r = 0.3 to 0.49
- Strong: r = 0.5 to 1.0

(Cohen, 1988:79)

When two variables are perfectly correlated, the coefficient is either +1 or -1 and when the coefficient is 0, it indicates that no relationship exists (Keller & Warrack, 1999:128).

Two sets of correlation analysis were concluded for the period 2004 to 2013:

- Correlation analysis between the independent variables.
- Correlation analysis between the dependent variable and the independent variables.

4.3.3.2.1 Correlation analysis for independent variables

The first analysis considered the correlation between the independent variables market capitalisation, risk, tangibility, leverage and corporate governance. The analysis for independent variables was completed for the purpose of assessing the

nature of the relationship between the independent variables. The analysis made use of the Pearson correlation technique. The hypothesis was specified as:

- H_0: $r = 0$ where the Pearson's r coefficient is equal to zero
- H_1: $r \neq 0$ where the Pearson's r coefficient is not equal to zero

A 95 % confidence level was used for the hypothesis test.

Table 4.2 Correlation matrix for independent variables using Pearson's technique

		Market capitalisation log10 x	Beta sqrt x	Tangibility	Leverage log10x	Corporate governance
Market capitalisation log10 x	Pearson Correlation	1	,122	,014	,109	,060
	Sig. (2-tailed)		,033	,828	,050	,304
	N	320	302	232	316	300
Beta sqrt x	Pearson Correlation	,122	1	-,194	-,106	-,015
	Sig. (2-tailed)	,033		,004	,069	,799
	N	302	302	216	298	282
Tangibility	Pearson Correlation	,014	-,194	1	-,042	-,027
	Sig. (2-tailed)	,828	,004		,522	,681
	N	232	216	232	232	226
Leverage log10x	Pearson Correlation	,109	-,106	-,042	1	-,024
	Sig. (2-tailed)	,050	,069	,522		,678
	N	316	298	232	316	298
Corporate governance	Pearson Correlation	,060	-,015	-,027	-,024	1
	Sig. (2-tailed)	,304	,799	,681	,678	
	N	300	282	226	298	300

Source: Author's deductions

Table 4.2 illustrates the correlation between the independent variables and whether the correlation was statistically significant at the 5% significance level.

Only a few correlations were statistically significant and for those that were, none had a correlation coefficient above 0.5. This indicates that there were no strong correlations between the variables. Risk and market capitalisation had a weak positive correlation of 0.122 and a statistically significant p-value of 0.033. This indicates that an increase in market capitalisation is associated with an increase in risk as measured by beta.

It was also noted by other researchers that firms with a large market capitalisation tend to have higher betas (Bodie, Kane & Marcus, 1999:283).

A correlation of -0.194 was also observed between risk and tangibility. The association was negative and weak but statistically significant as the p-value of 0.004 was less than the significance level of 5%. It implies that as the level of fixed assets increases, the level of risk in the firm decreases. Fixed assets are often used as collateral to secure finance and financial institutions view firms that have higher levels of collateral as being less risky when compared to firms that have less fixed assets (Safarova, 2010:22).

The correlation between leverage and market capitalisation was 0.109. This is a weak positive association. This implies that a higher market capitalisation is associated with a higher leverage ratio. This result is consistent with the findings of Klapper et al. (2006), who noted that large firms were likely to have higher leverage ratios as they were able to access debt on favourable terms due to their size (Klapper et al., 2006:22).

4.3.3.2.2 Correlation analysis of independent variables by non-parametric techniques

Non-parametric techniques are used when the data distribution has been identified as non-normal (Keller & Warrack, 1999:659). Despite performing transformations of data, some variables still illustrated some form of skewness. As a result, Spearman's correlation technique was used. The hypothesis for the test was specified as:

- H_0: $\rho = 0$ where the Spearman's rho coefficient is equal to zero

- H_1: $\rho \neq 0$ where the Spearman's rho coefficient is not equal to zero

A 95 % confidence level was used for the hypothesis test.

Table 4.3 Correlation results for independent variables using Spearman's technique

			Market capitalisation log10 x	Beta sqrt x	Tangibility	Leverage log10 x	Corporate governance
	Market capitalisation log10 x	Correlation Coefficient	1,000	.167**	,071	.168**	,055
		Sig. (2-tailed)		,004	,279	,003	,340
		N	320	302	232	311	300
	Beta sqrt x	Correlation Coefficient	.167**	1,000	-.281**	-.252**	-,059
		Sig. (2-tailed)	,004		,000	,000	,323
		N	302	302	216	296	282
	Tangibility	Correlation Coefficient	,071	-.281**	1,000	-,096	,016
		Sig. (2-tailed)	,279	,000		,151	,811
		N	232	216	232	227	226
	Leverage log10 x	Correlation Coefficient	.168**	-.252**	-,096	1,000	-,063
		Sig. (2-tailed)	,003	,000	,151		,283
		N	311	296	227	311	294
	Corporate governance	Correlation Coefficient	,055	-,059	,016	-,063	1,000
		Sig. (2-tailed)	,340	,323	,811	,283	
		N	300	282	226	294	300

Source: Author's deductions

Table 4.3 above illustrates the results of the correlation analysis using Spearman's technique. The results confirm the initial findings of Pearson's correlation analysis where correlation was found between:

- Market capitalisation and risk
- Tangibility and risk
- Market capitalisation and leverage

Spearman's technique also resulted in a correlation coefficient of -0.252 for leverage and risk. When Pearson's correlation technique was conducted, leverage and risk illustrated a weak negative association which had a statistically insignificant p-value 0.069 (see Table 4.2). This was likely due to the fact that the observed values for the variable, leverage were not normal and hence required analysis using a non-parametric technique.

4.3.3.2.3 Correlation of independent variables and the dependent variables

A correlation analysis was conducted between the dependent variable ROA and the independent variables market capitalisation, risk, leverage, tangibility and corporate governance. The hypothesis for the applied Pearson correlation technique was specified as:

- H_0: $r = 0$ where the Pearson's r coefficient is equal to zero
- H_1: $r \neq 0$ where the Pearson's r coefficient is not equal to zero

A 95 % confidence level was used for the hypothesis test.

Table 4.4 Correlation of independent variables and the dependent variable using Pearson's technique

		ROA log10 x
Market capitalisation log10 x	Pearson Correlation	-,011
	Sig. (2-tailed)	,852
	N	307
Beta transformed: sqrt x	Pearson Correlation	-,123
	Sig. (2-tailed)	,036
	N	290
Tangibility	Pearson Correlation	,044
	Sig. (2-tailed)	,512
	N	226
Leverage log10 x	Pearson Correlation	,112
	Sig. (2-tailed)	,050
	N	303
Corporate governance	Pearson Correlation	-,030
	Sig. (2-tailed)	,605
	N	290

Source: Author's deductions

Table 4.4 above illustrates that there was no linear relationship between market capitalisation and ROA. The coefficient of -0.011 had a p-value 0.852 which was insignificant at the selected significance level and therefore the conclusion is that there was no association between the two variables.

The other two variables which also had statistically insignificant correlation coefficients with ROA were corporate governance and tangibility. Their correlation coefficients of -0.03 and 0.044 respectively were insignificant at the 5% significance level. The two variables were insignificant because their p-values of 0.512 for

tangibility and 0.605 for corporate governance were greater than the 5% significance level (see Table 4.4).

The correlation analysis also illustrated a negative association between the dependent variable ROA and risk. The coefficient of -0.123 illustrated a weak negative association which was statistically significant as the p-value of 0.036 was less than the significance level of 5%. This result is consistent with the views of Mueller 1990 (cited in Lee, 2001:191) who observes that higher levels of risk, as measured by beta, are associated with decreased firm performance for listed firms.

As indicated by Table 4.4, leverage had a weak positive correlation with ROA. The correlation coefficient of 0.112 indicates that higher levels of firm debt were associated with higher levels of performance. Though the association was weak, the coefficient was statistically significant with a p-value of 0.050.

The weak association of leverage and ROA is evidence of the differing views in literature regarding the nature of the association between leverage and firm performance. Damodaran (2002:247) notes that leverage which is used to measure a firm's indebtedness can have a positive impact on a firm's performance up to a point. Thereafter, over-indebtedness can contribute adversely to a firm's performance Damodaran (2002:247).

4.3.3.2.4 Correlation of independent variables and the dependent variable using Spearman's technique

Spearman's correlation analysis was applied as an alternative method to determine the association of variables where data was not normal.

When the test was applied, leverage illustrated a negative weak association with ROA. The correlation coefficient for leverage of -0.135 in Appendix 4.12 Correlation of independent variables and the dependent variable using Spearman's technique was statistically significant at the 5% significance level. This is similar to the view of Damodaran (2002:247) who notes that the relationship between leverage and firm performance can be positive or negative. This indicates that leverage is beneficial to the firm up to a point, after which a negative relationship comes about.

The correlation coefficient of -0.029 for tangibility in Appendix 4.12 Correlation of independent variables and the dependent variable using Spearman's technique was also different to the correlation coefficient of 0.044 for tangibility using Pearson's technique. However, both coefficients were statistically insignificant as their p-values of 0.512 for Pearson's technique in Table 4.4 and 0.661 for Spearman's technique in Appendix 4.12 Correlation of independent variables and the dependent variable using Spearman's technique were greater than the 5% significance level.

The overall correlation analysis based on Spearman's technique of ROA and the independent variables market capitalisation, risk, leverage, tangibility and corporate governance portrayed weak correlation coefficients. Only leverage was significant at the 5% significance level.

4.3.3.2.5 Correlation of the independent variables and the dependent variable by year

A correlation analysis by year of the dependent variable ROA and the independent variables market capitalisation, risk, leverage, tangibility and corporate governance for the period 2004 to 2013 was conducted. The goal of the analysis was to capture the nature of the association from one year to the next and to establish whether the relationship was consistent. Both Spearman's and Pearson's correlation techniques were used to conduct the analysis. A 5 % significance level was selected.

The results of these analyses are included in Appendix 4.13 as correlation of the independent variables and the dependent variable by year using Pearson's technique and Appendix 4.14 as correlation of the independent variables and the dependent variable by year using Spearman's technique.

The results of the yearly correlation between market capitalisation and ROA were consistent with those of the combined period. Both Pearson's and Spearman's correlation indicated that only the first year, 2004, illustrated a statistically significant positive association between market capitalisation and ROA. In all other periods, market capitalisation had a statistically insignificant relationship with ROA.

The yearly correlation analysis confirmed that none of the correlation coefficients for ROA and tangibility and ROA and corporate governance was statistically significant.

For the yearly analysis for risk, only one year, 2010, confirmed this with the remaining years illustrating correlation coefficients that were statistically insignificant. The correlation coefficient for 2010 in Appendices 4.13 and 4.14 illustrated a significant negative association with ROA. This result was similar to that of the combined correlation analysis in Table 4.4.

For leverage, the combined results illustrated a positive association between leverage and ROA. However, the yearly analysis illustrated no linear association between the two variables. Only the year 2013 in Appendix 4.13 illustrated a positive association between ROA and leverage.

The yearly results were consistent with those of the combined analysis. However, there were instances where differences occurred. These differences highlight the changes in firm-specific factors from one year to another.

Having completed the correlation analysis, single variable regressions of the dependent variable, ROA with each of the independent variables market capitalisation, risk, leverage, tangibility and corporate governance were conducted.

4.3.3.3 Regression analysis

A single variable regression is a technique used to establish how the value of one variable (dependent variable) is influenced by changes in another variable (independent variable) (Keller & Warrack, 1999:625).

Regression analyses were conducted to determine whether the independent variables explained some of the variation observed in the dependent variable, ROA.

One of the key outputs in a regression analysis is the R-square and the adjusted R-square which indicates the goodness of fit of the regression model. The R-square value is denoted as a percentage. The percentage illustrates how much of the variation in the dependent variable is explained by the variation in the independent variable (Albright et al., 2006:593).

The adjusted R-square is used when the sample size is less than 100. Once the sample size has more than 100 observed values, the difference between the R-square and adjusted R-square is negligible (Albright et al., 2006:593).

Regression analysis can, however, be affected by autocorrelation. Regression assumptions require that the error terms be uncorrelated as correlation can affect the quality of results obtained (Keller & Warrack, 1999:668).

Autocorrelation is prevalent in economic and financial data, where time variables are widely used. Therefore it was necessary to establish whether there was autocorrelation and where necessary, account for it in the regression analysis (Keller & Warrack, 1999:668).

The Durbin-Watson test was used to test for autocorrelation. The test is defined by the test statistic *d,* where the range of values of *d* is $0 \leq d \leq 4$, where small values of *d* (*d*< 2) indicate positive first order correlation and large values of *d* (*d*> 2) indicate negative first order correlation (Keller & Warrack, 1999:715). Table 4.5 below indicates the Durbin-Watson statistic for each of the independent variables.

Table 4.5 Durbin-Watson autocorrelation statistic for independent variables

Variable	**Durbin-Watson (*d*)**
Market capitalisation log10x	1,670
Beta sqrt x	1,574
Tangibility	1,744
Leverage log10x	1,664
Corporate governance	1,746

Source: *Author's deductions*

Table 4.5 indicates that first order positive autocorrelation existed for all the independent variables as *d*< 2.

To account for this, the Cochrane-Orcutt estimation method of regression was used to account for autocorrelation. This method takes into account the time effect that causes autocorrelation (Gujarati, 2003:482)

The results of the Durbin-Watson statistic *d* using the Cochrane-Orcutt estimation regression method indicate that the issue of autocorrelation was addressed and the *d* statistics for the independent variables were now approximately equal to 2. These

results are included in Appendix 4.15 Durbin-Watson autocorrelation statistic for independent variables.

For the regression analysis the significance level was selected at 5% and the hypothesis was specified as:

- H_0: $\beta_1 = 0$ where the unstandardised β coefficient is equal to zero
- H_1: $\beta_1 \neq 0$ where the unstandardised β coefficient is not equal to zero

4.3.3.3.1 Regression analysis of ROA and market capitalisation

Table 4.6 below indicates the regression analysis of ROA and market capitalisation.

Table 4.6 Summary of regression results for ROA and market capitalisation

Rho (AR1)	,172	Std. Error	,055
Adjusted R Square	-,005	R Square	,002
Mean Square Regression	,115	Mean Square Residual	,239
Market capitalisation log10x	,025	Std. Error	,036
t	,695	P value	,488

Source: Author's deductions

Table 4.6 indicates ROA and market capitalisation had an R-square of 0.002. This indicates that the variation in ROA was not explained by market capitalisation.

The regression had a p-value of 0.488 which was greater than the selected significance level of 5%. The null hypothesis can therefore not be rejected and it can be concluded that during the period 2004 to 2013, changes in market capitalisation could not explain changes in ROA and therefore firm size had no significant influence on firm performance during this period.

4.3.3.3.2 Regression analysis of ROA and risk

Beta was used in the study as a measure of risk.

Table 4.7 below summarises the results of the regression analysis between ROA and risk.

Table 4.7 Summary of regression results for ROA and risk

Rho (AR1)	,180	Std. Error	,055
Adjusted R Square	,002	R Square	,008
Mean Square Regression	,603	Mean Square Residual	,237
Beta sqrt x	-,170	Std. Error	,107
t	-1,594	P value	,112

Source: Author's deductions

Table 4.7 indicates an R-square for the regression between ROA and risk of 0.8% and a p value of 0.112 which was greater than the significance level of 5%. Therefore the null hypothesis cannot be rejected and it can be concluded that risk does not explain the variation in firm performance between 2004 and 2013.

These results are consistent with those of Spearman's correlation analysis in Appendix 4.12 Correlation of independent variables and the dependent variable using Spearman's technique.

4.3.3.3.3 Regression analysis of ROA and tangibility

The variable tangibility measured the level of fixed assets in the firm.

Table 4.8 indicates the regression results for ROA and tangibility.

Table 4.8 Summary of regression results for ROA and tangibility

Rho (AR1)	,164	Std. Error	,055
Adjusted R Square	-,004	R Square	,002
Mean Square Regression	,149	Mean Square Residual	,239
Tangibility	,116	Std. Error	,148
t	,789	P value	,431

Source: Author's deductions

Table 4.8 indicates that ROA and tangibility had an R-square value of 0.2% and a p-value of 0.431. The null hypothesis at the 5% significance level cannot be rejected. It can be concluded that tangibility does not explain the variation in ROA for the period 2004 to 2013.

4.3.3.3.4 Regression analysis of ROA and leverage

The variable leverage measured the level of debt in a firm. As highlighted in the literature review section 2.6.2.4, opinions on the effect of leverage on firm performance are divided.

Table 4.9 illustrates the regression results for ROA and leverage.

Table 4.9 Summary of regression results for ROA and leverage

Rho (AR1)	,174	Std. Error	,055
Adjusted R Square	,012	R Square	,018
Mean Square Regression	1,368	Mean Square Residual	,235
Leverage log10x	,050	Std. Error	,021
t	2,412	P value	,016

Source: Author's deductions

Table 4.9 indicates that ROA and leverage had an R-square value of 0.018 and a p-value of 0.016. The null hypothesis can therefore be rejected and it can be concluded that firm leverage explains 1.8% of the variation observed in firm performance between 2004 and 2013.

The regression coefficient of 0.05 illustrates that for a unit increase in leverage, ROA increases by 0.05%. This illustrates a positive relationship between leverage and ROA. This result is consistent with the results of the correlation analysis where the two variables had a positive relationship.

4.3.3.3.5 Regression analysis of ROA and corporate governance

Table 4.10 below illustrates the ROA and corporate governance regression results.

Table 4.10 Summary of regression results for ROA and corporate governance

Rho (AR1)	,170	Std. Error	,055
Adjusted R Square	-,005	R Square	,001
Mean Square Regression	,067	Mean Square Residual	,239
Corporate governance	,088	Std. Error	,165
t	,531	P value	,596

Source: Author's deductions

Table 4.10 indicates that ROA and corporate governance realised an R-square value of 0.001 and a p-value of 0.596. The P value exceeded the selected significance level of 5%. The null hypothesis cannot therefore be rejected.

It can therefore be concluded that corporate governance does not explain the variation in ROA for the period 2004 to 2013.

This result was similar to the correlation analysis result where the correlation coefficient between the two variables was not statistically significant.

4.3.3.3.6 Summary of regression results

The single regression analyses indicate that only leverage had a statistically significant positive relationship with ROA for the period 2004 to 2013. However, the ability to describe changes in ROA was only 1.8%.

It was found that market capitalisation had no statistically significant relationship with ROA for the period 2004 to 2013. This indicates that firm size has no significant influence on firm performance.

4.3.4 Analysis of different firm sizes

The analysis carried out above included firms of different sizes. As noted in the descriptive statistics analysis in section 4.3.1, the sample consisted of a majority of small firms. Researchers observed that the performance of small firms may be different to that of large firms. Margaritis and Psillaki (2010:627) note that in small firms, higher debt levels can result in poor performance as they have fewer resources to meet debt obligations.

These considerations necessitated further analysis of the different firm sizes.

4.3.4.1 Correlation and regression results of small firms

A correlation analysis of the independent variables market capitalisation, risk, tangibility, leverage and corporate governance with the dependent variable ROA was completed using Spearman's non-parametric technique. The hypothesis for the test was specified as:

- H_0: ρ = 0 where the Spearman's rho coefficient is equal to zero
- H_1: $\rho \neq 0$ where the Spearman's rho coefficient is not equal to zero

A 95% confidence level was used for the hypothesis test.

Table 4.11 below illustrates the results of the analysis.

Table 4.11 Spearman's correlation analysis for small firms

Spearman's rho		ROA log10 x
Market capitalisation log10 x	Correlation Coefficient	.423**
	Sig. (2-tailed)	,000
	N	152
Beta sqrt x	Correlation Coefficient	-,123
	Sig. (2-tailed)	,152
	N	137
Tangibility	Correlation Coefficient	,118
	Sig. (2-tailed)	,224
	N	108
Leverage log10 x	Correlation Coefficient	-.217**
	Sig. (2-tailed)	,008
	N	149
Corporate governance	Correlation Coefficient	,051
	Sig. (2-tailed)	,548
	N	139

Source: Author's deductions

As highlighted in Table 4.11, market capitalisation had a moderate positive correlation of 0.423 with ROA. The correlation was statistically significant as the p-value of 0.000 was less than the selected significance level of 5%. This implies that in small firms, firm size has a moderate positive influence on firm performance.

Leverage had a weak negative correlation of -0.217 with ROA. Leverage was statistically significant with a p-value of 0.008. This is consistent with the views of Margaritis and Psillaki (2010:627) who highlight that high debt levels for small firms can result in poor performance as they have less resources to meet the obligations created by the debt.

Table 4.11 indicates that risk had a correlation of -0.123 with ROA. However, risk was statistically insignificant with a p-value of 0.152. This was in contrast to the correlation analysis for all firms where risk had a statistically significant correlation coefficient.

Tangibility and corporate governance also had correlation coefficients that were statistically insignificant, similarly to the correlation analysis of the combined firms.

A regression analysis was then conducted to confirm and quantify the results of the correlation analysis of small firms. A significance level of 5% was selected for this analysis. The hypothesis was specified as:

- H_0: $\beta_1 = 0$ where the unstandardised β coefficient is equal to zero
- H_1: $\beta_1 \neq 0$ where the unstandardised β coefficient is not equal to zero

Table 4.12 below summarises the regression analysis results of small firms for market capitalisation and ROA.

Table 4.12 Summary of regression results for ROA and market capitalisation for small firms

Rho (AR1)	,211	Std. Error	,078
Adjusted R Square	,037	R Square	,049
Mean Square Regression	1,737	Mean Square Residual	,215
Market capitalisation log10x	,211	Std. Error	,074
T	2,842	P value	,005

Source: Author's deductions

Table 4.12 indicates an R-square of 0.049. This implies that 4.9% of the variation in ROA was explained by changes in market capitalisation.

The other independent variables, risk, leverage, tangibility and corporate governance, had insignificant regression coefficients when individual regressions with ROA were conducted. These results are displayed in Appendices 4.16 – 4.19 for reference.

To strengthen the analysis, a multiple regression analysis between ROA and the independent variables market capitalisation, risk, leverage, tangibility and corporate governance was then conducted.

Table 4.13 below presents the results of this analysis.

Table 4.13 Summary of multiple regression results for small firms

Adjusted R Square		,059		R Square		,094	
Mean Square Regression	,667	Mean Square Residual	,211	Rho (AR1)	,198	Std. Error	,079
Market capitalisation log10x	,233	Std. Error	,075	t	3,119	P value	,002
Beta sqrt x	-,164	Std. Error	,122	t	-1,341	P value	,182
Tangibility	-,085	Std. Error	,197	t	-,434	P value	,665
Leverage log10x	,032	Std. Error	,023	t	1,366	P value	,174
Corporate governance	,372	Std. Error	,201	t	1,849	P value	,066

Source: Author's deductions

The multiple regression model realised an R-square of 0.094. This implies that 9.4% of the variation in ROA was explained by the independent variables market capitalisation, risk, tangibility, leverage and corporate governance. The adjusted R-square, however, indicates that only 5.9% of the variation in ROA can be explained by the independent variables.

However, of the independent variables, only market capitalisation was statistically significant at the 5% significance level.

Therefore, although the R-square improved from 4.9% in the linear regression analysis to 9.4% in the multiple regressions, the model does not comprehensively account for variation in ROA for small firms by means of the independent variables.

4.3.4.2 Correlation results for large firms

Finally, a correlation analysis of large firms with a market capitalisation greater than R1 billion was conducted. This was conducted to determine whether the independent variables influence the dependent variable in large firms.

Spearman's technique was applied. The hypothesis was specified as:

- H_0: ρ = 0 where the Spearman's rho coefficient is equal to zero
- H_1: $\rho \neq 0$ where the Spearman's rho coefficient is not equal to zero

A 95% confidence level was selected for the hypothesis test.

The results are displayed in Table 4.14 below.

Table 4.14 Spearman's correlation results for large firms

Spearman's rho		ROA log10 x
Market capitalisation log10 x	Correlation Coefficient	-,128
	Sig. (2-tailed)	,113
	N	155
Beta sqrt x	Correlation Coefficient	-,071
	Sig. (2-tailed)	,386
	N	153
Tangibility	Correlation Coefficient	-.262**
	Sig. (2-tailed)	,004
	N	118
Leverage log10 x	Correlation Coefficient	-,080
	Sig. (2-tailed)	,325
	N	154
Corporate governance	Correlation Coefficient	-.211**
	Sig. (2-tailed)	,009
	N	151

Source: Author's deductions

Table 4.14 indicates a correlation coefficient of -0.128 between market capitalisation and ROA. This implies a weak negative association between the two variables. The correlation coefficient is, however, statistically insignificant as the p-value of 0.113 is greater than the significance level of 5%. Therefore, the null hypothesis cannot be

rejected and it can be concluded that there is no association between market capitalisation and ROA of large firms.

Risk and leverage also recorded insignificant correlation coefficients. It can be concluded that there is no relationship between these two variables and ROA in large firms.

Tangibility and corporate governance were the only variables to record statistically significant correlation coefficients. Tangibility had a correlation coefficient of -0.262 and corporate governance had a correlation coefficient of -0.211. Both these coefficients imply that there is a weak negative association between the two independent variables and ROA. Increase in corporate governance and tangibility is associated with a decrease in ROA.

In the case of tangibility, the result is inconsistent with the findings of Safarova (2010:22) where an increase in the level of fixed assets is associated with an increase in firm performance (Safarova, 2010:22).

For corporate governance, the results of this study confirm the findings of O'Connell and Cramer (2010) who note that there is a negative association between board size and firm performance for large firms (O'Connell & Cramer, 2010:395).

The yearly correlation analysis in Appendix 4.20 confirms the result that there is no substantial relationship between large firms' performance and market capitalisation.

4.4 Limitations

Although the results of this study are acceptable due to the methodology applied, certain limitations must be pointed out.

The focus of this study was only to establish the nature of the relationship between firm size and firm performance of firms listed under the Industrial Goods and Services sector of the Johannesburg Stock Exchange Limited.

Results of this study may not necessarily be generalisable to firms that are not listed on the JSE Ltd. Listing has numerous requirements which implies that listed and non-listed firms can be fundamentally different.

The study did not set out to prove any causal relationship by means of the research methodology employed. The goal of the study was to establish whether there is an association between firm size and firm performance.

The study spanned the period 2004 to 2013. During this time, a number of firms either delisted before 2013 or listed after 2004. The consequence of this is that some firms under the Industrial Goods and Services sector were not included in the sample.

It is also important to note that the performance of a firm is a function of numerous variables. The analysis conducted in this study only considered variables related to firm size and performance. Variables such as culture, key behavioural differences, employee skill sets and internal training processes were not considered.

4.5 Reliability and validity

To ensure the validity of the study's research findings, variables that were used in prior studies were selected as variables that influence the relationship between firm size and firm performance.

The sample of the study was representative of the firms within the Industrial Goods and Services sector of the Johannesburg Stock Exchange Limited.

The different techniques used in this study are all consistent with the existing theoretical base of other similar studies. The results of this study are therefore regarded as reliable.

4.6 Summary

In this chapter the relationship between the dependent variable ROA and the independent variables representing firm size – market capitalisation, risk, leverage, tangibility and corporate governance – was analysed using different statistical techniques. The aim was to determine if there is a relationship between firm size and firm performance.

Scatterplots, correlation and regression analyses were employed. The scatterplots provided a visual analysis of the data set, identifying the shape, tendency and association of the independent variables with the dependent variable, ROA. It was evident that none of the scatterplots indicated an association between ROA and the independent variables. This was consistent even when outliers were removed.

The correlation analysis for all the firms also demonstrated a weak association between ROA and the independent variables. The correlation between firm size and firm performance was statistically insignificant. Risk and leverage were the only variables that had a statistically significant relationship with ROA. However, these correlations displayed a weak association.

The first set of regression analyses conducted assessed the relationship between ROA and each of the independent variables. Unlike the correlation analysis, only leverage had a statistically significant outcome. The independent variable explained only a small portion of the variation in ROA. The remaining variables had statistically insignificant results which could not account for the variation in ROA. Therefore, it was concluded that when the combined firm sizes were considered, firm size had no influence on firm performance for the period 2004 to 2013.

Half of the 32 firms in the sample were considered small. Therefore, the sample was split into two categories, with one sample constituting small firms and the other sample constituting medium and large firms.

Correlation and regression analyses were conducted on the two sample sets. The results indicated that there was a moderate positive association between firm size and firm performance for small firms.

The analyses of large firms indicated that there was no association or relationship between firm size and firm performance. Only tangibility and corporate governance had a small negative association with ROA. Therefore, it was concluded that for large firms, market capitalisation had no influence on firm performance.

Chapter 5

Findings, conclusion and recommendation

5.1 Introduction

In the previous chapter the data analysis was concluded. The analysis included an assessment of the data by means of descriptive statistics and bivariate analysis using scatterplot, correlation and regression techniques.

This chapter concludes the study and illustrates how the initial objectives outlined in Chapter 1 have been addressed. In particular, this chapter addresses the reasons for the study, provides a summary of the findings and indicates how the study has contributed to the knowledge base. The chapter also notes the limitations encountered and makes recommendations for further research.

5.2 Reason for undertaking the research

The goal of this study was to establish whether there is an association between firm size and firm performance and to determine the nature of this relationship.

Asafo-Adjei (2007:3) highlights that successful large firms attract foreign direct investment which is a key driver of economic growth. Pagano and Schivardi (2003:264) also assert that larger firms perform better than small firms due to economies of scale. Larger firms also have the ability to access credit on more favourable terms compared to smaller firms. This allows larger firms to allocate more funds to activities such as research and development which improve performance in the long run (Policy Board for Financial Services and Regulation, 2001:57).

Researchers such as Klapper et al. (2006:30), however, indicate that the backbone of a growing economy is an industry made up of thriving micro-enterprises. James

(1999:43) also notes that the degree of separation between owners and management is less in small firms. In small firms owners are more involved in the day to day management of their businesses and this lead to better performance.

Small firms also tend to perform better due to their ability to produce goods and services suited to the needs of their clients (Porter, 1998:42).

The differing views on the performance of large and small businesses necessitated an investigation in the South African context of the relationship between firm size and firm performance.

5.2.1 The goal of this study

To contextualise the findings of this study, the goal and research questions are briefly restated.

The goal of this study was to establish whether there is an association between firm size and firm performance and to describe the nature of this relationship.

Amato and Amato (2004:182) note that firm size is influenced by other factors such as corporate governance, leverage, risk and tangibility of assets. Therefore, their influence on ROA was included as control variables when considering the relationship between firm size and firm performance.

5.2.1.1 Research questions

This study posed the research question: is there a relationship between firm size and performance?

To provide an answer to this research question, sub-research questions were formulated as follows:

What is the association between return on assets and market capitalisation?

Is there a relationship between corporate governance and return on assets?

Is there a relationship between debt level and return on assets?

Is there a relationship between risk and return on assets?

Is there a relationship between tangibility and return on assets?

The sample of this study constituted listed firms that have been on the Johannesburg Stock Exchange Limited (JSE Ltd) within the Industrial Goods and Services sector since 2004 and were a going concern as at the end of 2013.

5.3 Summary of findings

The data analysis was conducted for the period 2004 to 2013. The analysis included descriptive statistics and bivariate analysis using scatterplot, correlation and regression techniques. The results were evaluated and interpreted taking into account evidence outlined in the literature review.

5.3.1 Descriptive analysis

The descriptive statistics employed histograms and normal quantile-quantile plots (Q-Q plots) to establish the distribution and nature of the data for ROA and the independent variables market capitalisation, risk, leverage, corporate governance and tangibility.

Tangibility and corporate governance were the only variables that had an approximately normal distribution. The observed values for the variables, market capitalisation, ROA, risk and leverage, illustrated some degree of skewness and kurtosis, indicating that the data was not normal. Skewness and kurtosis tend to occur when analysing financial data over a period of time, however, these can be addressed by transforming the observed values prior to further statistical analysis (Xiong & Idzorek, 2011:26). These variables were transformed using log and square root techniques and the transformed variables (except for leverage) illustrated reduced skewness and kurtosis. Hence, Spearman's techniques were conducted in the study to account for non-normality.

5.3.2 Scatterplot analysis

A scatterplot analysis was conducted to assess the shape and tendency of the observed data values. A scatterplot is useful in providing a visual assessment of whether there is an association between two variables. In this study, the assessment was between ROA and each of the independent variables, market capitalisation, beta, leverage, corporate governance and tangibility.

The results of the scatterplot illustrated a random pattern of the observed values. Outliers were also identified on the scatterplots and therefore a second set of scatterplots was generated without outliers as outliers can affect the quality of the results. The second set of scatterplots illustrated a more pronounced random pattern which confirmed the results of the first set of scatterplots. It was concluded that no relationship exists between ROA and the independent variables, market capitalisation, risk, leverage, corporate governance and tangibility.

5.3.3 Correlation analysis for the combined sample

A correlation analysis was performed to determine the nature of the association of the variables in the study and provide a quantitative analysis of the results of the scatterplot analysis.

Correlations were first performed on the combined sample between the independent variables, market capitalisation, beta, leverage, tangibility and corporate governance, as well as for ROA.

The correlation analysis using Pearson's technique in Table 4.2 for all the independent variables illustrated weak correlations of 0.122 for market capitalisation and beta, -0.194 for tangibility and beta and 0.109 for market capitalisation and leverage.

Though weak, the correlations highlighted that firm size is associated with higher levels of firm-specific risk and lower firm debt levels, while a higher tangibility was associated with lower firm-specific risk.

As noted in the descriptive analysis section, non-parametric techniques were used to account for leverage. The results from Spearman's correlation analysis illustrated that leverage and risk had weak negative association of -0.252 (see Table 4.3).

The correlation analysis for ROA with the independent variables (market capitalisation, risk, leverage, corporate governance and tangibility), indicated that only leverage and risk had weak associations with ROA of 0.112 and -0.123 that were statistically significant when applying Pearson's technique (see Table 4.4).

This indicates that higher levels of risk were associated with lower performance levels. This is consistent with the findings of Mueller 1990 (cited in Lee, 2001:191) who found that lower levels of firm performance were associated with higher risk levels for stock exchange listed firms.

Leverage illustrated a weak positive association with ROA where higher levels of debt were associated with higher performance levels. This finding is consistent with the views of Damodaran (2002:247) who asserts that leverage can have a positive influence on a firm's performance up to a point, after which a negative association is observed. The findings of the correlation analysis highlighted that there is no relationship between firm performance and firm size in the combined sample of firms.

5.3.4 Regression analysis for the combined sample

Single regression analyses were also conducted to determine whether the independent variables, market capitalisation, beta, leverage, tangibility and corporate governance, could explain the variation in firm performance as measured by ROA.

Leverage was the only variable whose regression analysis accounts for a small portion, 1.8%, of the variation in firm performance (see Table 4.9).

The remaining independent variables, market capitalisation, beta, tangibility and corporate governance, had no influence on ROA. This indicates that with the exception of leverage, these other variables were unable to predict the variation in ROA.

5.3.5 Correlation and regression analyses for different firm sizes

Of the 32 firms in the sample, 16 were small firms. Margaritis and Psillaki (2010) note that firm performance differs with firm size. The sample was therefore split into two groups, one consisting of small firms and the other consisting of medium and large firms. Correlation and regression analyses were then conducted on both datasets to determine the relationship between firm size and firm performance.

The results of the correlation analyses for small listed firms indicated that firm size had a moderate positive association with firm performance. The correlation coefficient of 0.423 in Table 4.11 was statistically significant.

Leverage also illustrated a statistically significant association with firm performance, but the correlation coefficient of -0.217 was weak and negative.

The remaining variables, risk, tangibility and corporate governance, had no association with firm performance. These results were confirmed by both the single and multiple regression analyses.

It was concluded that in small listed firms, firm size is statistically significant but only has a moderate positive influence on firm performance.

The relationship between firm size and firm performance was also determined for medium to large firms. The dependent variable, ROA, and the independent variables, market capitalisation, beta, leverage, tangibility and corporate governance, were considered in a correlation analysis. The analyses indicated that only tangibility and corporate governance had weak negative association with firm performance. Only the correlation coefficients of -0.262 for tangibility and -0.211 for corporate governance in Table 4.14 were statistically significant. It was concluded that in the medium to large firm group, it could not be proved that firm size significantly influences firm performance.

5.3.6 Conclusions

The study set out to answer the question: is there a relationship between firm size and firm performance?

It was concluded that:

- There is no significant relationship between firm size and firm performance for the combined sample of listed firms.
- There is a moderate positive association between firm size and firm performance for small listed firms.
- There is no significant relationship between firm size and firm performance for medium and large firms.

The control variables indicated that:

There was a weak negative 0.123 association between risk and return on assets for the combined sample. The correlation coefficient of -0.123 in Table 4.4 implies that higher levels of risk are associated with lower levels of performance.

There is a positive relationship between firm debt level and return on assets for the combined sample of firms. The relationship with firm performance for this variable was weak and the single regression analysis in Table 4.9 could only account for 1.8% of the variation in firm performance.

There is a negative association between corporate governance and return on assets for medium to large firms. The correlation coefficient of -0.211 in Table 4.14 was statistically significant. This result is similar to the findings of O'Connell and Cramer (2010) who observed a negative association between large board sizes and firm performance.

There is a negative association between tangibility and return on assets for medium to large firms. The results for large firms illustrated that a weak negative association existed between firm performance and tangibility. The correlation coefficient of -0.262 in Table 4.14 was statistically significant.

5.4 Contribution of the study

This study makes a contribution to literature by determining whether firm size influences firm performance in a selected South African sample.

The study finds that firm size does not significantly influence firm performance but indicates that this result should be considered in the light of different firm size groupings.

The study also provides insight into variables related to firm size that influence firm performance. Managers could benefit from the study by focusing management on the identified significant variables that influence firm performance

The results of the study could assist policy makers in creating policies that support improved return on assets.

5.5 Limitations

The study does not establish causality between firm size and firm performance or its direction. The findings of the study are also limited to the sample of firms listed on the Johannesburg Stock Exchange Limited. The results are therefore not necessarily applicable to unlisted or other groups of firms.

Due to its limited scope, the study did not consider all the control variables that may have a relationship with firm performance. Despite these challenges, the study has managed to contribute to the knowledge base on the subject matter.

5.6 Recommendations for further study

Further research could investigate causality in the relationship between firm size and firm performance and the dependent variables.

Further study can also be extended to considering the relationship between firm size and firm performance for firms that are not listed on stock exchanges.

Furthermore, future research efforts could be extended to industries other than the Industrial Goods and Services sector and incorporate other performance indicators that are reflective of the selected sector or industry.

5.7 Final remark

The main goal of this study was to determine whether firm size influences firm performance.

The researcher accomplished this goal and revealed that in the combined sample, during the study period, firm size did not significantly influence firm performance. It was also established that for the small firm size grouping, a moderate positive influence between firm size and firm performance was found.

Not all the variables that influence return on assets were considered, but significant variables related to firm size that influence firm performance were identified. Company management could benefit by focusing management efforts on these significant variables to improve return on assets.

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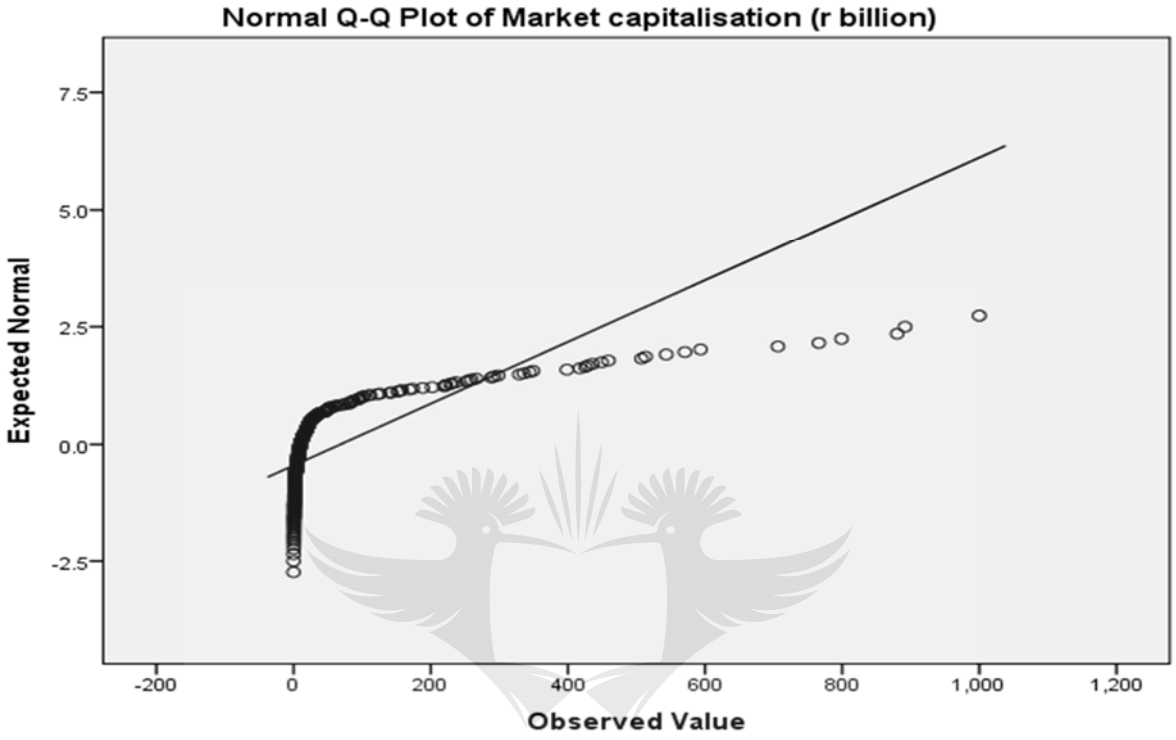
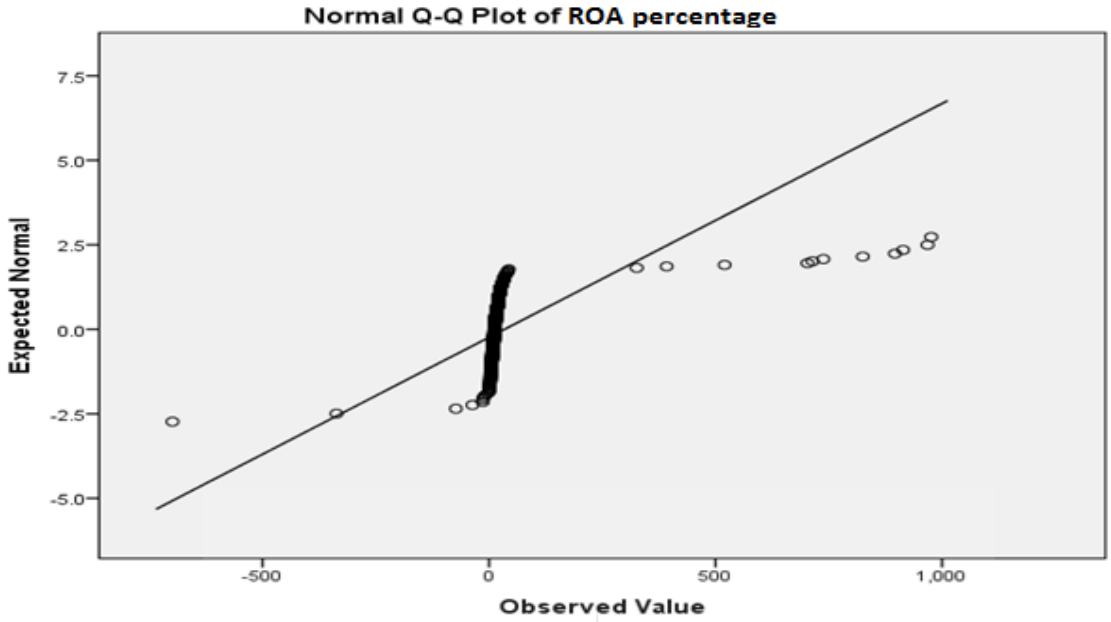
Appendices

4.1 Normal Q-Q plot of market capitalisation



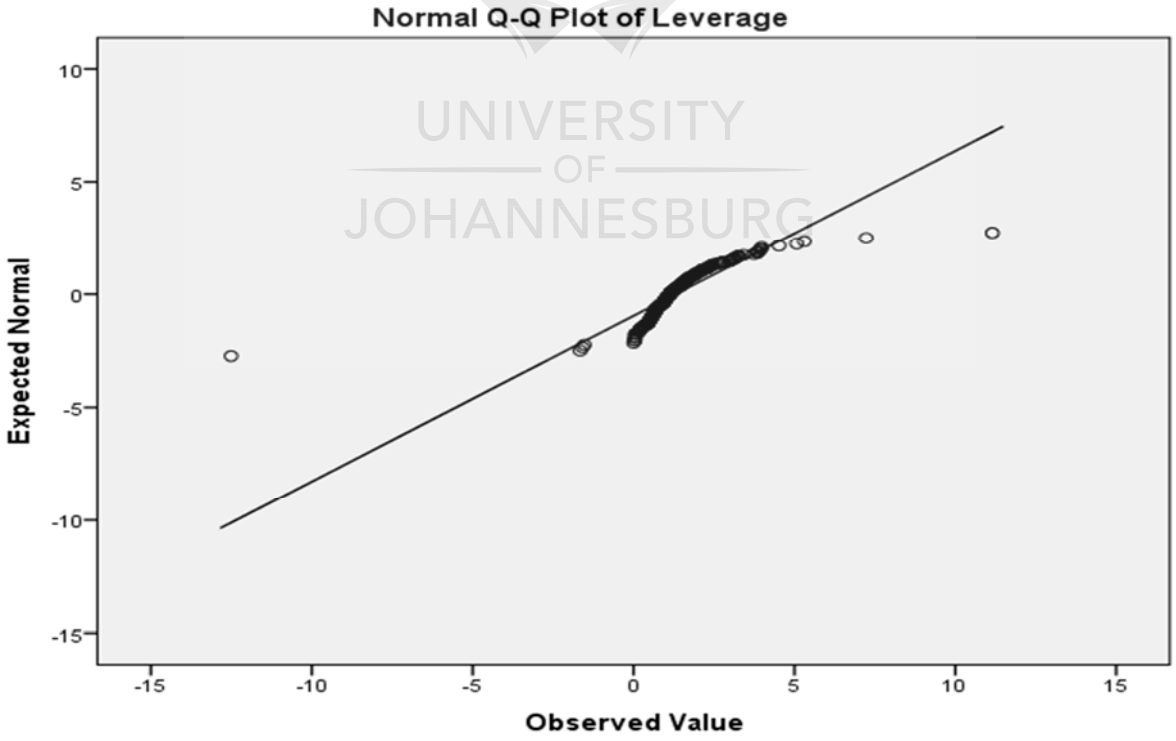
Source: Author's deductions

4.2 Normal Q-Q plot of ROA



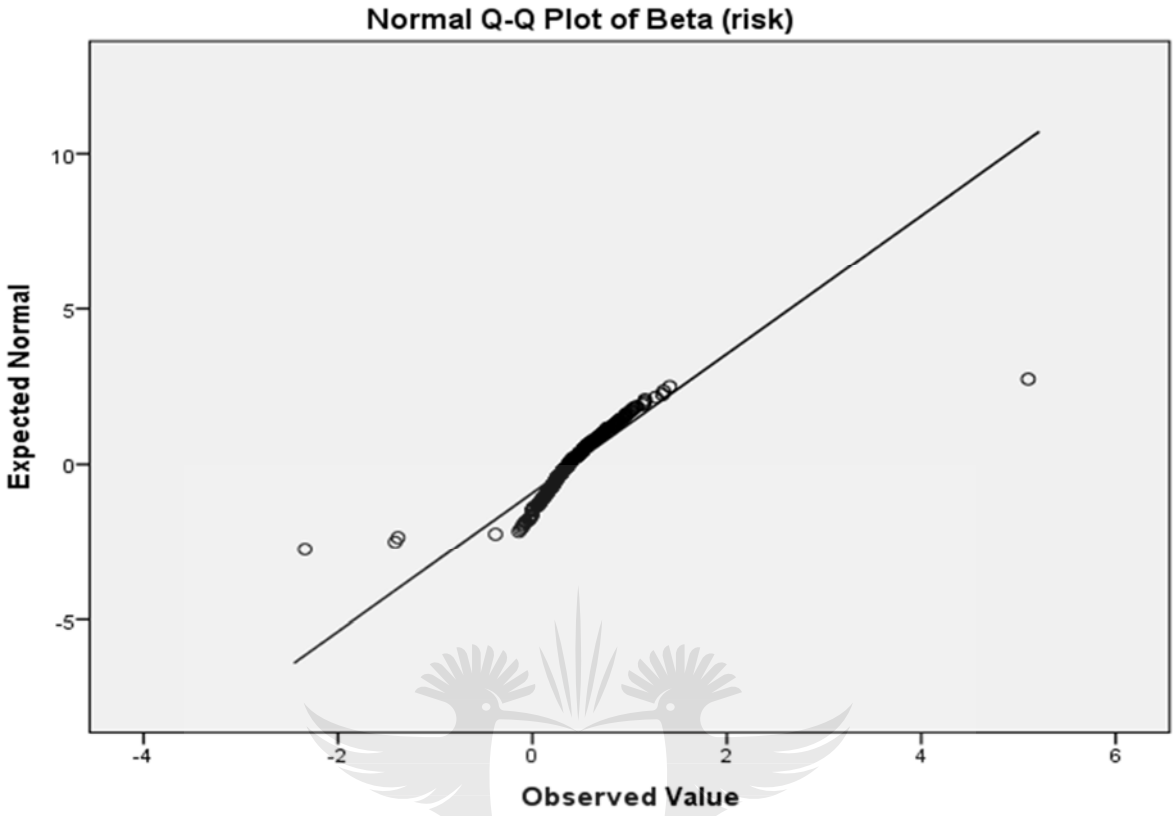
Source: Author's deductions

4.3 Normal Q-Q plot of leverage



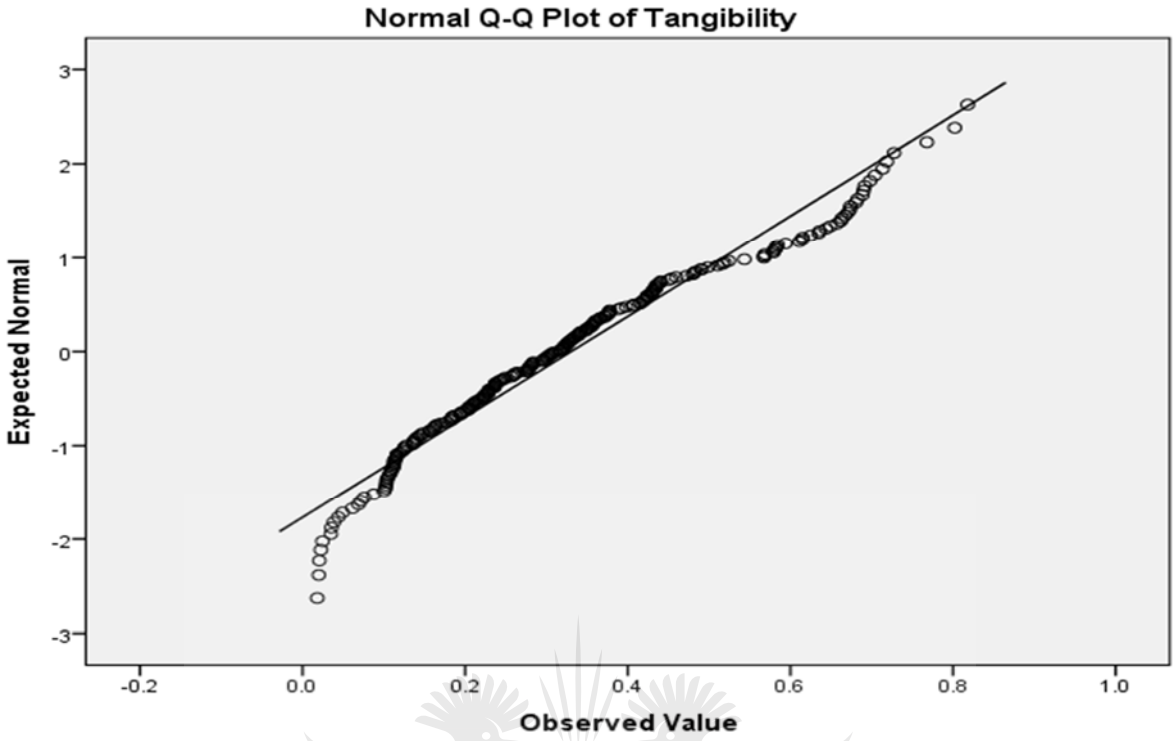
Source: Author's deductions

4.4 Normal Q-Q plot of beta



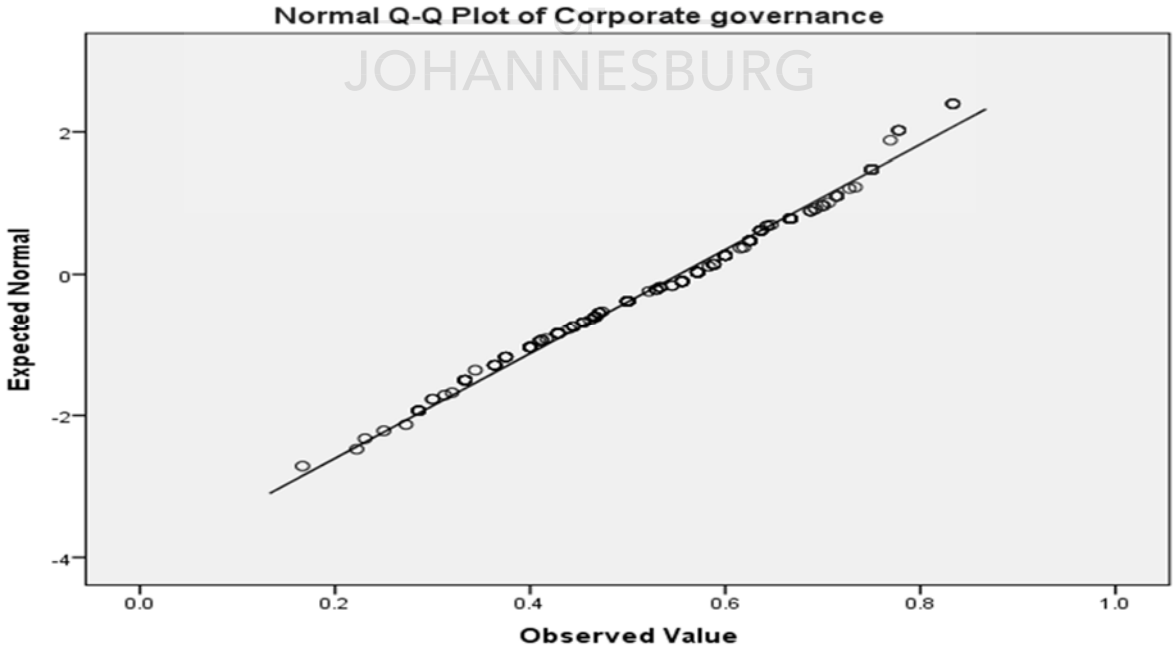
Source: Author's deductions

4.5 Normal Q-Q plot of tangibility



Source: Author's deductions

4.6 Normal Q-Q plot of corporate governance



Source: Author's deductions