Influence of the Performance of Black Economic Empowerment Shares on the Johannesburg Stock Exchange Top 40

By

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Dedication

This dissertation is dedicated to my parents Rose and Rob. Thank you for your support throughout this process and for always believing in me, even when I gave up on myself. I always appreciated your patience, understanding and love.

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Abstract

The study investigated the performance of Black Economic Empowerment (BEE) shares on the Johannesburg Stock Exchange (JSE). It employed data from 48 firms active on the JSE from 2003 to 2016. Unbalanced panel data was used as there were firms with no data for this period and they were omitted from the study when they were no longer part of the JSE Top 40. The fixed effects model results showed that BEE shares' influence on share returns is insignificant, but that they do have an impact on firm value. It was found that when a BEE share is issued, the firm's value increases by 0.522 when return on equity (ROE) is used and 0.45 when return on assets (ROA) is employed. A bootstrap technique was run on the fixed effects model in order to account for cross-sectional dependency. The bootstrap did not affect the outcome of the effect of BEE shares on share returns. However, the influence of BEE shares on the firm's value became significant. These results are consistent with the existing literature which states that firms issue BEE shares in order to reap other benefits. Although BEE shares have no influence on share returns and firm value, it is recommended that firms continue to issue such shares in order to receive a higher BEE rating.

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Chapter 1: Introduction

1.0. Introduction

This chapter provides a background on Black Economic Empowerment (BEE) policies in South Africa, with a focus on business ownership. It also presents the aim of the study and the problem statement, as well as the research objectives and questions that guided the study. The chapter concludes by discussing the study's significance, its limitations and the structure of the dissertation.

1.1. Background

Since taking office in 1994, the African National Congress (ANC) government has pursued policies and measures that seek to address the inequalities and injustices imposed by the apartheid regime. However, some of these have been met with enormous criticism from scholars and practitioners alike (Southall, 2006). In 2003, the government enacted the Broad-Based Black Economic Empowerment (BEE) Act to redress the inequality resulting from apartheid policies and advance black ownership and control of the economy. The apartheid regime's policy of separate development based on racial segregation led to vast socio-economic inequalities between the privileged white minority and the black majority (Waters, 2016). The Population Registration Act No. 30 of 1950 classified people according to their race and this determined where they could live as well as what work was available to them (Roberts, 1994). The Native Land Act No. 27 of 1913 prohibited black people from leasing or owning land outside of the areas assigned to them (reserves). The Natives' Trust and Land Act of 1936 added more land to the reserves available to black people and created a trust to manage this land (Wolpe, 1972). Deprivation of access to land dampened the entrepreneurial spirit among the black population.

To exacerbate the situation, the Bantu Education Act, Act No. 47 of 1953 created separate and unequal education systems for the different race groups. The education provided to black people aimed to train them to become unskilled labourers, once again hampering their ability to become entrepreneurs (Wolpe, 1972). As part of its efforts to redress past inequalities and to promote long-term economic sustainability, the democratic government that came to power in 1994 adopted the policy of BEE which focuses on employment, ownership, gender, skills development and empowerment. The key concern was ownership and substantial structural modification of the capitalist system (Gardee, 2014). The Department of Trade and Industry

(dti) (2003, p.12) defines BEE as a consolidated socio-economic procedure to transform the South African economy. It is expected to significantly increase the number of black people that manage, control and own enterprises and thus reduce income inequality.

The government adopted different strategies to achieve these objectives. The National Small Business Act that was promulgated in 1996 led to the creation of Khula and Ntsika, agencies created to support small, medium and micro-enterprises (SMMEs), including financial assistance (dti, 2003). The 1997 Green Paper on the reform of the public sector procurement system noted that the government is the main procurer of goods and services in the economy. It thus has a duty to ensure that it supports broad-based black economic empowerment as well as the development of small businesses. A main aim of the Competition Act of 1998 was to increase previously disadvantaged people's ownership portion in the economy. The National Empowerment Fund was founded in the same year to hold equity in both state-owned and private enterprises on behalf of the previously disadvantaged (dti, 2003). However, the effectiveness of these initiatives in empowering the previously disadvantaged and in redressing inequality remains opaque, as scholars have shied away from such evaluations.

Finally, the South African government introduced a 'balanced scorecard' in 2003 which is used to measure progress in achieving BEE. It creates a benchmark for BEE in different sectors and measures three core essentials, namely, direct empowerment resulting from ownership and control of firms; human resources development and equality of employment; and indirect empowerment through favoured procurement and firm development. When the government engages in economic activities, the scorecard is applied to determine the BEE status (dti, 2003). The balanced scorecard thus provides a level playing field for all economic actors in order to redress past inequalities.

These initiatives notwithstanding, progress in relation to BEE was slow and by 2005, 30% of the firms on the JSE were owned by foreigners, two-thirds by whites and only 4% by black people. While a black middle class was emerging, 60% of black people were considered poor (Esser & Dekker, 2008). In 2003, the government promulgated the Broad Based Black Economic Empowerment (BBBEE) Act 53 of 2003 which encouraged firms to accomplish what BEE set out to achieve. BBBEE was built on the equality clause in the country's Constitution that states that everyone is equal before the law and has the right to equal benefit and protection of the law. The BBBEE strategy aims to address the exclusion of most South

Africans from full participation in the economy. The Act is designed so that there will be a knock-on effect through firms' supply chain. Any private concern that conducts business with the public sector must have a BBBEE rating. The Act also provided for the establishment of a BEE Advisory Council and for the development of Codes of Good Practice and Transformation Charters (Esser & Dekker, 2008). Its promulgation led to growing interest in BEE as, according to Bose, Haque and Osborn (2007), the public sector remains one of the largest economic players in emerging economies.

The JSE BEE segment enables firms to list their BEE shares provided they meet certain requirements. These include that the standard listing requirements must be adhered to and that all the transactions need to be completed by a BEE compliant person (JSE, 2017). The firm also needs to ensure that the JSE is notified if BEE shares are traded and information on the verification agent must be provided.

The BEE share ownership scheme was introduced to enable previously disadvantaged people to own shares and benefit from companies' growth (Iheduru, 2004; JSE, 2013). However, given that the scheme targets previously disadvantaged people, a substantial amount of debt had to be used to finance these shares (Anyetei, 2011; Gardee, 2014). The use of debt in financing investment is referred to as leverage (Firer et al., 2012). Lang, Ofek and Stulz (1994) state that current leverage and the growth that the company is expected to experience in the future has a negative affiliation, but leverage does not affect companies that are recognised as offering good investment opportunities. However, companies that have opportunities to grow which are not recognised by capital markets or firms whose potential growth is not high enough to cope with the additional debt will be negatively affected (Lang et al., 1994). Thus, leverage is likely to impact on the returns of BEE share ownership beneficiaries as most schemes are debt financed. However, the relationship between the return on investment of BEE shares and leverage is yet to be established. In addition, it is crucial to establish whether the performance of BEE shares has any influence on share returns and firm value or vice-versa.

Companies that compete for BEE contracts have a better chance of success if they have a high BEE rating. Small firms that are BEE rated also benefit as large companies are encouraged to partner with such firms. A positive BEE rating is also a useful marketing tool as it signals to customers that the firm cares about the community and is committed to change (Cenfed, 2016). This could positively impact sales and firm growth.

While there are many different BEE share schemes, they have a similar structure. For example, MTN's BEE shares called Zakhele Futhi can only be bought by a black person who is a citizen by birth, descent or naturalisation. A black company can also own these shares. In order to be regarded as a black company, black people must own at least 51% of the shares, have majority voting rights and must also participate in over 50% of the company's economic interests. These shares are offered at a discounted price compared to the firm's underlying shares. Their re-issue was funded through the prospectus which comes from new investors, re-investment of previous shares, third party bank financing and Notional Vendor Financing (NVF) from MTN (MTN, 2016). NVF involves the transfer of shares, at market price, to the BEE partner as the firm needs a BEE rating. The MTN BEE initiative is a classic case of empowerment and encouraging the previously disadvantaged population to participate in capital markets.

Another classic and widely publicised BEE initiative is that of Sasol. Sasol restructured their BEE shares, to form Sasol Khanyisa with the goal of achieving 25% BBBEE ownership. These shares are available to employees that meet certain criteria, existing BEE shareholders and existing ordinary share shareholders that trade in the empowerment segment on the JSE. Sasol hopes that this restructuring will help to grow and develop the firm on a global scale. The main difference is that the dividends would be used to pay back the funding used to purchase these shares. Shareholders also have the option to purchase BEE ordinary shares listed on the JSE empowerment section after the funding has been repaid (Sasol, 2018).

These share schemes are just two of the many issued by South African firms. It is against this background that this study employed data from JSE Top 40 firms for the period 2003 to 2016 to investigate whether the performance of BEE shares has any influence on share returns and firm value. After exclusions, data from 48 firms that are on and off the JSE Top 40 were used, 39 of which have issued BEE shares. The exclusions are discussed later in this chapter.

1.2. Aim of the Study

The study aimed to establish the performance of BEE shares on the JSE for the period 2003 to 2016.

1.3. Problem Statement

BEE shares were introduced in order to enable previously disadvantaged people to own shares and benefit from firms' growth. However, it remains unclear whether these shares have lived up to expectations. Of concern is that at the time of the issue of these shares, beneficiaries had to use leverage in order to purchase them. Consequently, the cost of borrowing could affect the firm's growth as well as the performance of the BEE shares. BEE shares are only issued in South Africa; thus, there is limited literature on this phenomenon. There is also limited knowledge on BEE shares' impact on the performance of firms that issue such shares. The paucity of studies in this area leaves policy direction in the area of empowerment razor thin. Anyetei's (2011) study on BEE shares focused on the funding side, while Ward and Muller (2010) focused on the long-term share price reaction to the announcement of BEE shares. Ward and Muller's study used a Cumulative Abnormal Approach (CARs) which is not suited to determining whether the performance of BEE shares influences share returns and firm value. Thus, this study sought to determine how the performance of BEE shares impacts the performance and value of JSE listed firms.

1.4. Research Objectives

This study aimed to achieve the following research objectives:

(i) To ascertain whether the performance of BEE shares drives stock returns on the JSE.

(ii) To determine how BEE shareholding affects firm value and the profitability of firms listed on the JSE.

1.5. Research Questions

The study addressed the following research questions:

(i) Do BEE shares drive stock returns on the JSE?

(ii) How does BEE shareholding affect firm value and profitability?

1.6. Focus of the Study

The study focused on the effect that the issue of BEE shares has on the performance of the firm's underlying shares. It aimed to determine whether BEE shares improve the performance of the underlying shares of the firm and firm value. This was achieved by examining stock returns and the effect on the value of the firm and profitability.

The focal point of this study was JSE Top 40 shares for the period 2003 to 2016. The JSE Top 40 firms were selected as these are the 40 biggest firms in South Africa and the data is readily available. Financial firms were removed from the data as high leverage is normal for these firms, but has a different meaning for other firms. In some instances, complete data was not available for certain firms and they were excluded from the study.

1.7. Significance of the Study

Determining whether issuing BEE shares is beneficial to the underlying firm and its shares will inform investment behaviour as if this is not beneficial, some firms might decide that BEE shares are no longer worth issuing. Although firms are not legally required to issue BEE shares, the dti (2003) notes that the BEE scorecard enables the government and public entities to ensure that their practices are in line with policy. Esser and Dekker (2008) observe that the BBBEE Act will have a domino effect which encourages firms to implement sound corporate governance. Furthermore, firms that wish to compete for government contracts require a certain level of BEE compliance (dti, 2003). This study thus aimed to establish whether firms issue BEE shares because they influence share returns or firm value, or because other benefits accrue from a BEE rating. Other benefits of issuing BEE shares include access to government business and improved public relations. The study thus aimed to broaden knowledge of BEE shares and to determine whether they create any value for the firm.

1.8. Limitations of the Study

The study's main limitation is that the BEE scheme is exclusive to South Africa. There is thus very limited literature on this phenomenon; as such, the review of previous studies is very limited. Anyetei's (2011) study employed a case study method rather than regressions. Given this gap, the study relied on previous research on phenomena with similar characteristics such as employee share ownership schemes. One of its limitations is that it focuses on JSE Top 40 companies rather than all listed firms. The results may vary if the total population of JSE firms is analysed. However, since the JSE Top 40 controls approximately 85% of the bourse, the findings of this study should be material to generalise to the entire market.

1.9. Structure of the Dissertation

This first chapter presented a brief outline and background of the topic, as well as the study's aim, objectives and research questions. Chapter two presents a review of the literature relevant to this study and its theoretical framework.

Chapter three discusses the methodology employed to conduct the study, while the fourth chapter presents and critically analyses the study's results. Finally, chapter five provides a summary, conclusion and recommendations as well as the study's limitations.

1.10. Chapter Summary

Black Economic Empowerment was introduced in order to redress the inequality that is a legacy of apartheid. The scorecard created following the promulgation of the BBBEE Act focuses on ownership. This study aimed to determine whether BEE shares have an impact on firm performance by analysing whether BEE shares drive share returns as well as influence the value of a firm. This topic is not well researched and research on phenomena with similar characteristics such as employee share ownership schemes was consulted.

The following chapter reviews the literature relevant to this study and discusses its theoretical framework.

Chapter 2: Literature Review

2.0. Introduction

This chapter reviews the literature relevant to this study and discusses the theoretical framework on which it was based. The empirical literature that was used to determine the method to be used in this study is also reviewed. Finally, the research gap that the study sought to fill is discussed.

2.1. Theoretical Framework

A plethora of theories relating to investment and empowerment has been formulated since the turn of the twentieth century. Neoclassical economists' fundamental assumption about the value or price of a product or service is that it is determined by the utility that the consumer derives from it. This assumption is central to economic empowerment initiatives as BEE beneficiaries seek to obtain utility from the value of investments. Such utility may be derived from the positive return on investment. Milton Friedman's free enterprise theories argue that economic empowerment of communities is an important contributor to the economy (Cole, 2007). According to Zimmerman (2000:43), "Empowerment is both a value orientation for working in the community and a theoretical model for understanding the process and consequences of efforts to exert control and influence over decisions that affect one's life, organizational functioning, and the quality of community life". It is thus, clear that empowerment in whatever form is important in extending freedom to the community.

Other theories have been developed to explain investment decisions. For instance, the investment theory provides an understanding of the investment decisions and choices made by the investing public. The pioneers of this theory, John M. Keynes and Irving Fisher, stated that investments are made up to a point where the present value of future cash flow streams equals the firm's opportunity cost of capital (Eklund, 2013). This theory has implications for how the cost of capital influences the performance of investments.

Keynes and Fisher posited that investments are made until the net present value is equivalent to zero (Eklund, 2013). Mathematically expressed, the relationship between cash flows and the cost of capital is as follows:

$$Net\ Present\ Value = 0 = \sum_{i}^{n} \frac{CF_i}{r} - Initial\ Investment$$

Where: CF_i represents cash flows in each period, n the number of periods, and *r* the cost of capital. While Fisher (1930) referred to the cost of capital that yields at net present value of zero as the internal rate of return, Keynes labelled this rate as the marginal efficiency of capital (Baddeley, 2003).

The essential difference between their views is that Fisher stated that the investment was the method of adjustment to reach the optimal capital stock, while for the Keynesian theory of investment, the main issue is how investors create expectations and the optimal capital stock that underlies the investment. Modern investment theories that developed from these two theories include neoclassical theory, the accelerator principle and Tobin's Q theory of investment. According to Eklund (2013), all three assume behaviour of optimisation for the investor. One of the assumptions of neoclassical theory is that the capital adjusts instantly. The theory also explicitly assumes the value of the firm or profit maximisation. According to Hovenkamp (2009), the model also accepts separation of ownership and control. The accelerator theory is a special case of the neoclassical theory with the variables for price held constant, linking this theory to Keynesian postulations. It also assumes instantaneous adjustment of capital; however, a flexible accelerator allows for lags in capital (Eklund, 2013). Eklund (2013) identified two essential problems with the neoclassical and accelerator theories. The first is the assumption that the capital will adjust immediately, and the second is investors' expectations. Thus, Tobin's Q theory was created which states that an investment is continued until the asset's market value is equivalent to its replacement costs.

Drawing from the above theoretical underpinnings, the widely accepted portfolio theory that seeks to explain investment choices and decisions aims to minimise risk whilst maximising returns (Matuszak, 2017). The founder of this theory, Henry Markowitz (1991) stated that it arose due to the fact that people are concerned with expected value as well as risk. Risk is measured by calculating the variance of the portfolio. The normal approach for a student of economics is to choose a combination of the Pareto optimal expected returns and variance of the combinations of returns (Markowitz, 1991). This is recognised as the efficient frontier. According to Markowitz (1987), the standard way to select a portfolio is to include fractions of certain assets. A standard mean-variance portfolio model was created by Markowitz which rendered the portfolio selection problem a decision between the variance and mean of the portfolio (Elton & Gruber, 1998). Elton et al. (2011) state that the opportunity set which is used

to make the portfolio decision is determined from the mean of the portfolio and its standard deviation squared, which is equivalent to the portfolio's variance.

According to Elton and Gruber (1998), an important finding from the theory was that selection of a portfolio cannot only be based on the unique features of the assets, but must also include how the assets move together. Markowitz (1952) maintained that the process of selecting a portfolio can be separated into two steps. The first step uses experience as well as observation to predict future returns on certain assets. The second step starts with the prediction and includes observing how well the different assets work together. The large number law ensures that the actual portfolio yield is almost identical to the expected yield. However, Markowitz (1952) states that this law will not hold for returns on assets as they are intercorrelated. Diversification of a portfolio does not eradicate variance. Thus, the portfolio with the greatest expected return does not also have the lowest variance (Markowitz, 1952). Assets with smaller variance are therefore the best to include in a portfolio.

Finally, Fisher's separation theorem states that the sole focus of the firm is to maximise its profit, which allows shareholders to spend their profit as they wish (Hovenkamp, 2009). The theory emanates from the work of Adolf A. Berle and Gardiner C. Means in 'The Modern Corporation and Private Property' in 1932 where they presented a case for separation of control and ownership. Hovenkamp (2009) states that the theory of corporate finance does not consider shareholder preferences. The author adds that Fisher's separation theorem was the starting point for the general corporate finance theory by Modigliani and Miller. The focus on profit leads to shareholders' wishes becoming irrelevant.

However, if a firm offers a share at a discounted price, which is common in a BEE deal, in theory, its share return should drop due to the fact that adding more equity in the form of shares will dilute the value of each share which, in turn, reduces its value and return.

Against this background, this study is premised on the neoclassical theory primarily because BEE shares fall within the ambit of the assumption that the consumer's utility determines the price or value of the product. This is due to the fact that BEE shares will only be successful if consumers benefit from them. However, the theory makes several assumptions that could have implications for the study and the findings. The following section reviews the existing empirical literature.

2.2. Empirical Evidence

This section presents a critical review of empirical evidence from BEE related studies and how such schemes affect firm performance. It is divided into two sub-sections based on the study's objectives, namely, BEE shares and stock returns, and the effects of BEE shareholding on firm value and profitability. The study also explores the drivers of stock returns and financial performance in order to determine the relationships among the variables. It should, however, be noted that the literature on empowerment programmes such as BEE is very limited. The study thus expanded the definition of BEE to include employee share ownership schemes/trusts which the literature supports as economic empowerment initiatives.

Economic empowerment models in different countries

In a quest to identify alternative, well-tested economic empowerment models, Sartorius and Botha (2008) and the FW De Klerk Foundation (2005) examined the New Economic Plan (NEP) that was adopted in Malaysia in 1970. The aim of the NEP was to reduce poverty within a period of 20 years and to enable local citizens to manage and own a minimum of 30% of industrial and commercial activities. Ownership grew from 2.4% in 1970 to 27.2% in 1987 and the overall incidence of poverty declined from 49.3% to 22.4% (FW De Klerk Foundation, 2005.) Sartorius and Botha (2008) state that an important lesson from the NEP is that such initiatives should not only focus on redistributing assets, but should also develop skills.

From an African perspective, Verhoef (2004) examined the different routes that Nigeria and South Africa took in order to become economically independent as well as to transfer ownership to the indigenous population. Verhoef (2004) found that some African countries harness nationalism in order to regain economic independence while South Africa opted for a voluntary approach that encourages foreign investors to remain in the country. However, the study found that only the business elite in South Africa and the business and government elite in Nigeria benefitted from the ownership transfer. Given that BEE was privately financed, firms developed a base of debt rather than one of assets. Verhoef (2004) concluded that transfer of ownership was slow in the industrial sector and suggested that this could be due to the outlay of capital required to increase technological capacity.

Taibi's (1994) study of credit lending in the US found that banks were not extending credit to people of a certain race, and those living in certain neighbourhoods, mainly low- and middle-income communities. The Community Reinvestment Act (CRA) passed by Congress aimed to ensure that financial firms follow fair practices when granting credit. These include granting credit to individuals that meet the criteria for a loan without harming the operations of the bank. However, Taibai (1994) found that investment in low- and middle-income communities remained low and there were no visible adjustments to the lending process.

2.2.1 BEE shares and stock returns

Since not all firms invest in or offer BEE shares, it is important to establish how firms that issue such shares perform on the market. This section provides a critique of existing studies on the relationship between such share schemes and the returns that accrue to the underlying stocks listed on the bourse. Economic empowerment may also be achieved through employee share ownership schemes. There are different ways in which employees can acquire shares in the firm. In terms of the direct approach, employees buy shares, whereas in the indirect approach, a company forms a trust that holds the shares on behalf of employees and distributes them over time (Kaarsemaker, Pendleton and Poutsma, 2009). The direct approach carries a greater risk for employees as they use their own funds to acquire shares. On the other hand, the indirect approach is adopted for tax reasons. The trust can keep the shares permanently, creating collective ownership. The firm can either donate the shares to the trust or the trust will buy them using a loan from the company. According to Kaarsemaker et al. (2009), the dividends are paid to the trust to repay the loan and once the loan is paid, the shares are distributed to employees. Shares can also be obtained through share options that normally run for a period of three to ten years. When the period expires, the employee can decide whether they would want to take up the option to buy the shares, buy the shares and sell them immediately, or relinquish the option.

In the United Kingdom (UK), share incentive plans enable a firm to benefit from tax discounts and to match employees' contributions. Kaarsemaker et al. (2009) state that such schemes are more common in large firms due to the costs of administering them. It is also noted that employee share ownership schemes enhance employee commitment to the firm and promote retention of highly skilled employees. However, the tax benefits may encourage employees to hold "all their eggs in one basket." Kaarsemaker et al. (2009) maintain that the impact of employee share ownership schemes on performance is small and often insignificant. It is only

significant in firms with majority employee ownership where the workforce plays an active role in decision-making. This is important to overcome the free rider effect. It has been difficult to prove that firm performance improves as a result of the adoption of an employee share ownership scheme due to a range of methodological problems such as selection bias. Nonetheless, there is considerable evidence that, in certain situations, employee share ownership schemes positively affect employees' attitudes and behaviour and enhance firm performance (Kaarsemaker, et al., 2009). Kaarsemaker et al.'s conclusion that employee share ownership schemes have an insignificant effect on firm performance has implications for the primary reason why firms issue such shares. Similarly, Buck, Bruce, Main and Udueni's (2003) investigation of long-term incentive plans, using 287 non-financial companies in the UK found that the adoption of these plans resulted in an increase in the average total executive reward package in absolute value, but sensitivity of performance-pay at a lower level.

As discussed in Chapter one, most BEE transactions are leveraged due to the economic profile of the intended beneficiaries. This means that the level of interest rates plays an important role in servicing BEE debt. Anyetei (2011) conducted a study on an announced BEE equity transfer compared to an effective net interest BEE shareholding using a case study approach. It examined interest rates in order to determine whether the dividends could cover the interest that needed to be paid back. Interest rates in South Africa were also analysed as well as their impact on BEE transactions. The reasoning was that many BEE transactions are backed by debt. The market variables that affect the characteristics and repayment of debt will thus impact net equity ownership which has an element of debt. This method was employed to determine the amount of net equity interest that has been shifted to BEE contributors relative to the proclaimed equity transfer. The study calculated the net equity value of the BEE holdings, focusing on the debt side of BBE shares and whether the dividends were sufficient to repay the loan. Thus, the net equity value was calculated by considering the interest. It was assumed that the interest rate was the prime overdraft rate for the time period of the transaction and that the dividends would be used to repay the loan. Many shareholders could not afford to purchase these BEE shares; hence, debt was used to finance these purchases. Anyetei (2011) concluded that, of the 51 transactions analysed, only one firm had positive net equity interest that was greater than or equal to the transfer equity that was announced. Furthermore, 18 of the transactions created a decrease in value, which Anyeti (2011) ascribed to depreciation in the share price and reduced dividend payments. The change in dividends affects the repayment of the loan used to purchase these shares.

Bohl, Siklos and Werner (2007) analysed the relationship between movement in the price of the share and short-term interest rates from 1985 to 1998 at Bundesbank in Germany. Bohl et al. (2007) found that the daily data did not reveal any reaction of interest rates to share returns. However, the monthly data did demonstrate a response to the share market. In the latter case, the confidence intervals were wider, even though the coefficients were found to be statistically insignificant. Thus, the authors concluded that a central bank gathers data about share returns before altering interest rates.

In understanding the effects of BEE on firm performance, the nature of BEE funding is important. Burger, Munian and van Coeverden de Groot (2003) examined the structure of funding, and the nature and consequences of BEE transactions. Firms on BusinessMap's February 2003 list of empowered firms were selected and a desktop audit and interviews with financiers, the firm and the BEE partner were conducted to gather data. The study found that most of the BEE transactions were undertaken by institutional investors; thus, policy objectives such as growth and development were not achieved.

BEE announcements and stock returns are primarily analysed using a case or event study methodology. Stock returns accruing to shareholders are thus measured over either a short or long horizon prior to and post the announcement. Kothari and Warner (2011) state that there are limitations to a long horizon with an event window of a year or more as such studies have poor specification tests and a low ability to detect the effect of irregular performance which is what an event study aims to achieve. On the other hand, Snowberg, Wolfers and Zitzewitz (2011) examined the relationship between event studies and prediction market data, focusing on the political economy. Snowberg et al. (2011) concluded that event studies are affected by external events as well as the researcher's choices. The decisions that affect the outcome of the study are the event window, the probability that was allocated before the event and if another event takes place during the event window of the study. Snowberg et al. (2011) found that one way to alleviate these issues is to use a prediction market which is reliable on the efficient markets hypothesis. The prediction market allows the researcher to determine the correct probability to be allocated before the event and potentially helps to determine the correct event window.

Using the long horizon, Ward and Muller (2010) investigated the long-term reaction to BEE announcements on the JSE. An event study was used for JSE listed shares covering the period 1 January 2000 to 31 December 2008. The methodology used was the calculation of Cumulative Abnormal Returns (CARs) that required data from four years prior to the announcement as well as 250 days after. The benchmark was a 12 parameter 'style' model that covered 12 control portfolios which included shares portraying the cross-sectional factors of growth/value, size and resources/non-resources. The control portfolios were rebalanced quarterly to ensure that changes were closely tracked over time. For shares that were de-listed, the share return was given the value of zero for the rest of the quarter. The share was then removed for the following quarter and the new shares were included. Ward and Muller (2010) found that firms with market capitalisation of less than R3,5 billion had a strong, positive response to BEE deals in the long-term and that large firms had a marginally negative response. Thus, in the long-run, BEE deals are more beneficial to small firms than to large capitalisation firms on the bourse.

Similar to Ward and Muller (2010), Jackson, Alessandri and Black (2005) examined the stock market's response to BEE transactions announcements made by South African firms. The aim was to determine if investors are penalised or rewarded for BEE transactions. Jackson et al. (2005) formulated different hypotheses regarding what could be expected if a firm participates in a BEE transaction. The firm could be regarded in a positive light due to its support of the previously disadvantaged. This could improve its reputation within the black community and thus enhance its competitive advantage. It could also give rise to new opportunities as by participating in BEE transactions, it would be eligible to bid for government contracts.

BEE deals can also lead to opportunities in new markets. However, Jackson et al. (2005) also note that adverse consequences could arise from engaging in BEE deals. The market could react negatively to the BEE announcement if it is expected that the risk-adjusted cash flows of the firm will decrease. Customers could also react badly if they feel that the deal will only empower the 'elite' few. Investors might also fear that mismanagement could result as black managers lack experience. Finally, BEE shares are often sold at a discount and a significant portion of the firm is sold. This could have a negative influence on the price of the firm's equity.

Van der Merwe and Ferreira (2014) investigated the relationship between a firm's BEE components and short-term share returns. The study covered the period 2005 to 2011 and the sample comprised top empowerment firms listed by Empowerdex/Financial Mail. A regression was used to determine the relationship and it was concluded that there was a negative relationship between the share returns and the ownership component as well the preferential procurement component and share returns. This relationship was significant for both components. Van der Merwe and Ferreira (2014) found that there was a significant and positive relationship between the management control component and the share return.

In the same vein, Strydom, Christison and Matias (2009) used an event study method which employs the CAR and cumulative average abnormal return (CAAR) to analyse 254 BEE transactions for the period 1996 to 2006. The study tested multiple hypotheses, including whether the announcement of the BEE transaction has an effect on the shareholders' return for the whole sample over the entire event window or if there was an effect for certain transactions of the sample. The effect of the announcement on the day of the said announcement was also tested for the entire sample as well as for some of the transactions in the sample. The event window for this study was 11 days, five days before and five after the event. While there appeared to be an abnormal return when a BEE transaction was announced, the results were inconclusive as the study failed to determine the relationship between the BEE transactions and the specific risk of the firm as well as the features of the BEE transactions.

Despite the popularity of case study methods that use CARs, Ward and Mehta (2017) used bootstrapping based on the Monte Carlo randomised method to establish whether the BEE score of a firm has any value to shareholders. The study covered the period January 2009 to June 2015 and all shares that were part of the J203 JSE All Share Index were included. The authors examined the short-term and long-term effects of the BEE score. An event study was used for the short-term effects and a graph was created from the results which were bootstrapped using the Monte Carlo randomised method for the 5% and 95% confidence limits. The results showed that there were abnormal returns for firms in the short term and that there was a stronger effect for firms that were upgraded than those that were downgraded. The long-term effect study was conducted using a 'style' investment. It showed that firms with a BEE score of 5 and 6 performed better than those with higher BEE scores and that the abnormal returns were significant; however, these results revealed a negative relationship between these

variables. Ward and Mehta (2017) noted that the lack of historical data for BEE shares was a major limitation to their study.

Using the BEE score as a measurement of BEE, Ferreira and de Villiers (2011) produced similar results The study covered the period 2005 to 2008 and the sample comprised the top 200 BEE firms listed in the Empowerdex Top Empowerment Companies Survey published in the Financial Mail. It focused on the relationship between a firm's BEE score and its share return. The scorecard is made up of different elements with different weightings; thus, the reaction of the market is not a true reflection of whether a higher BEE score has benefits for the firm. The study period was a year with the period ending four months after the BEE score was released. In order to cater for the fact that the BEE score changes regularly throughout the year, the Fama and French regression model was employed to determine the relationship. The study concluded that the BEE score had a negative relationship with a firm's share returns.

Moving beyond the effects of BEE shares on returns and performance, Sartorius and Botha (2008) examined the variables that influence BEE transactions. The authors also contributed to the development of a framework which can be used to structure equity ownership transactions as well as funding for these transactions. The framework will also help in choosing an appropriate BEE partner. A survey was conducted of firms that issued BEE shares from January 1999 to November 2005. The data was collected using JSE Stock Exchange News Service announcements and the study was limited to firms with BEE share schemes and South African multinationals that have created a BEE share scheme across all their local businesses. The study found that less than 25% of equity had been transferred in BEE share schemes. Sartorius and Botha (2008) also asked firms why they adopted such a scheme and the most common response was that this would enable South Africa to build strong economic and democratic structures. This contradicts Jackson et al.'s (2005) finding that firms issue BEE shares in order to be eligible for contracts with government.

Given that one of the objectives of BEE is to economically empower previously disadvantaged communities, Acemoglu, Gelb and Robinson (2007) examined BEE's effect on economic growth. The study aimed to determine BEE's effect on the behaviour of the firm as well as on political stability. It found that BEE has a very small effect on the behaviour of the firm and no effect on its investment, profitability or labour productivity. Acemoglu et al. (2007) add that positive effects that could result, such as political stability, are difficult to measure.

2.2.2 BEE shares and firm value

In terms of whether BEE shares influence the value of a firm, Van Heerden (2011) studied BEE's contribution to the financial performance of JSE listed firms during the economic recession. The study focused on two time periods. The first was 30 June 2007 to 30 June 2010 and the second period was split between 30 June 2005 to 30 June 2008 and 30 June 2008 to 30 June 2010. The second time period was included to test whether highly rated BEE firms were able to withstand recessionary market conditions. The study found that there was no correlation between the measures of financial performance of the firm and the BEE rating. The same results were obtained when running the recession data. Thus, the study does not confirm or disprove that BEE is an indicator of a firm's performance. However, Hovenkamp (2009) concludes that the ownership of the stock does not have any effect on the value of the firm.

Another interesting study is that of Wolmarans (2012) who set out to determine the medium-term financial performance of firms already engaged in BEE in a developing country before, during and after the 2008/2009 global financial crisis. The period covered was January 2007 to September 2009; however, firms had to have engaged in BEE transactions between January 2002 and July 2006. The All Shares Index (ALSI) was employed as a benchmark and the average performance of these firms was compared to the index. Wolmarans (2012) separated the time period into three sub-periods: 2 January 2002 to 22 May 2008 for before the crisis, 22 May 2008 to 20 November 2008 for during the crisis and 20 November 2008 to 30 September 2009 for after the crisis. Nonparametric testing was used to determine any differences between the averages. Wolmarans (2012) found that the firm size and the year in which the BEE transaction took place had no impact on the firm's performance for any of the three periods. The average medium-term performance was substantially lower than that of the market for both before and during the crisis; however, after the crisis there was no significant difference. Wolmarans (2012) stated that the small number of firms included in the sample was a limitation as well as the fact the industry that the firms belong to was not considered.

Similarly, Kruger and Kleynhans (2014) established a positive relationship between the BEE score of a firm and sales, investment and operating profit variables; however, some of the top firms that that reaped the greatest benefit from BEE did not rank among the top performers in terms of profitability and competitiveness. The study covered the period January 2009 to December 2011 and regression analysis was employed. The BEE score of the firm was used to

determine whether firms with higher profitability and greater competitiveness had a high score. Kruger's (2011) earlier study on the effect of BEE on a sample of firms among the top 500 in South Africa found that employees disputed the theory that BEE shares would have a positive impact on the performance of the firm. Kruger thus concluded that the South African government should revisit BEE as it does not have credibility or the support of firms' managers.

In considering the short-term horizon, Chipeta and Vokwana (2011) sought to determine whether the announcement of BEE transactions has any impact on the profitability of the firm and the wealth of the shareholders in the short term. The study employed the same method as that used by Ward and Muller (2010), but was limited to six control portfolios. It covered the period 1999 to 2009 and the sample was drawn from firms listed on the JSE. Chipeta and Vokwana (2011) found that, overall, shareholder wealth demonstrated a significant and negative response to a BEE transaction, suggesting that shareholders regard such transactions as costly to the firm and not essential. The study also found that the age of the firm as well as growth opportunities were important factors in determining a firm's profitability for the year after the BEE transaction was announced.

There is a paucity of literature on corporate social responsibility (CSR) and economic empowerment and most previous studies used a case study method. Mulyadi and Anwar (2012) sought to establish the influence of CSR on the profitability of a firm and its value using a double linear regression. Tobin's Q was employed to measure the value of a firm using various measures for profitability, including return on equity (ROE), return on assets (ROA) and net profit margin (NPM). The study found that CSR did not positively impact firm value or profitability. Given that issuing BEE shares is a form of CSR, it can be expected that such shares will not impact on firm value and profitability. However, growth rate, size and leverage all had a significant effect on ROA, while only leverage had a significant impact on ROE.

Using the BEE scorecard, Mathura (2009) investigated whether financial firms' BEE score affects their level of profit over time as well as their valuation. The study employed cluster analysis and the k-means algorithm selected as the compound annual growth rate was used to measure the change in the BEE score. While Mathura (2009) established that a high BEE score had a positive effect on a financial firm's value and profitability, no significant evidence was found that a lower BEE score had a negative impact on profitability and firm value in the long term. This finding contradicts that of Verhoef (2004) who established that Nigerian BEE firms

were more financially stable and performed better than other firms. These mixed findings point to the need for further research on BEE models in developing economies.

Drivers of stock returns and financial performance

The numerous studies conducted to establish the connection between stock returns and a company's financial performance have produced mixed findings. For instance, Ghafoorifard et al. (2014) examined the association between the size, age and financial performance of 96 firms listed on the Tehran Stock Exchange from 2008 to 2011. Firm financial performance was measured using Tobin's Q. The results show that there is a positive relationship between firm age and financial performance and between firm size and financial performance. The two relationships are both significant at a 1% significance level. These findings do not align with those of Dogan (2013), who used ROA to quantify a company's financial performance. The study was completed on 200 companies listed on the Istanbul Stock Exchange from 2008 to 2011. It found that the connection among age of the firm and its financial performance was significant and negative.

Since firms use dividends to repay and service debt, it is important to discuss the relationship between dividends and stock returns. In their study, Khan et al. (2011) researched the relationship between dividend policy and price of shares. This study examined 55 firms listed on the Karachi Stock Exchange (KSE) 100 Index from 2001 to 2010. A fixed effects model was used and the relationship between dividend yield and share price was determined to be positive and deemed significant. In the same light, Ma and Wohar's (2014) conducted a study to determine the contribution of expected return and expected growth of dividends to movements in the price-dividend ratio in the UK. The study used a various state-space model specification and a Vector Autoregression (VAR) model to determine the expected share returns and dividend growth for UK share data for the period 1901 to 2007. For the state-space model specification, both expected share returns were insignificant; however, they are significant for the VAR method.

Other factors also impact the performance of stock prices and some of these factors have implications for BEE models. For example, as discussed earlier, interest rates impact on the BEE funding model and hence, its demise or success. Humpe and Macmillan (2009) investigated whether certain macroeconomic variables affected stock prices in Japan and the US from January 1965 to June 2005. The variables included inflation, long-term interest rates

and supply of money. The Vector Error Correction Model (VECM) was used to conduct the cointegration analysis. Inflation was measured using the Consumer Price Index (CPI) for both countries. The long-term interest rate was represented by a real 10-year US T-Bond yield for the US, and the real official discount or lending rate for Japan. The results for the US show that the association between stock price and inflation is negative and the same can be said for stock price and interest rates. On the other hand, the data for Japan shows that CPI and discount rate are insignificant. Humpe and MacMillan (2009) state that the results from the US data were expected based on existing theory.

Using a different methodology, Şentürk, Özkan and Akbaş (2014) sought to determine causality between economic growth and share returns on the Borsa Istanbul 100 Index and Turkey's Gross Domestic Product (GDP) from quarter 2 in 1998 to quarter 2 in 2014. The Bootstrapped Toda-Yamamoto causality test results showed no causality between the variables; however, the Frequency Domain causality test showed that there was a connection between the two variables. In the short term, stock returns were found to cause economic growth, while it was concluded that, in the medium term, economic growth causes stock returns.

In the same vein, Ibrahim and Agbaje (2013) examined the relationship between inflation and share returns during the period January 1997 to 2010. The study used the Autoregressive Distributed Lag (ARDL) bound test and established a positive and significant relationship between stock returns and inflation. However, as noted previously, Humpe and Macmillan (2009) found that there was a negative relationship between inflation and the share return of US firms from 2006 to 2011. Share return can be affected by many different variables, including the firm's dividend policy. According to Hunjra et al. (2014) the dividend policy is an important component of corporate financial management policies that reflects the strength and stability of a firm. Using an ordinary least square regression model, Hunjra et al. (2014) concluded that there was a negative relationship between stock price and dividend yield although there was a positive one between the pay-out ratio of the dividend and the stock price.

Recently, Kwenda (2017) investigated the relationship between a firm's value and working capital investment using data sourced for 92 JSE listed firms from 2006 to 2015. The firms operated in eight different economic sectors. Kwenda (2017) used Tobin's Q to represent the value of the firm and current assets to sales to measure working capital investment. A capital

investment measure (current assets to total assets) was included as well as three control variables, namely, size (total debt to total assets), size (natural logarithm of market capitalisation and natural logarithm of total assets) and market value of equity to book value of equity. It was expected that an increase in firm value could result from working capital investment. The study concluded that the association between working capital investment and firm value was non-linear as there were positive effects at lowers levels but a negative response at a higher level.

With regard to the connection between profitability and firm value, Rizqia and Sumiati (2013) analysed the impact of multiple variables on the value of a firm. The data was collected on manufacturing firms that went public and were listed on the Indonesian Stock Exchange from 2006-2011. Tobin's Q was used to quantify firm value, ROA as profitability and the ratio of capital expenditure to total assets for investment opportunity. Regression was run on this data using the Statistical Package for the Social Sciences (SPSS). Rizqia and Sumiati (2013) found that profitability has a positive and significant impact on the value of a firm. The study also determined that investment opportunities had a significant, positive impact on firm value.

Similar studies are reviewed here to understand the drivers of firm value and firm performance. Kodongo, Mokoaleli-Mokoteli and Maina (2014) investigated the relationship between a firm's capital structure and its profitability or firm value among firms listed on the Nairobi Securities Exchange for the period 2002 to 2011. The study used a panel empirical strategy and control variables such as the growth opportunities of the firm, firm size, the tangibility of assets ratio and the growth rate of sales. Kodongo et al. (2014) concluded that a company's capital structure had no effect on the value of the firm as the variables were found to be insignificant. However, the study determined that the company's capital structure negatively affected the profitability of the firm. A robustness check was conducted by completing separate regressions for small and large firms. These results confirmed a negative relationship between profitability and debt financing among both small and large firms. A firm's value was still not affected by its capital structure. While there was a positive and significant relationship between profitability and growth opportunities among smaller firms, this was not true for large firms, although this was found to be a weaker relationship. Kodongo et al. (2014) thus concluded that, among small firms, the size of the firm had a negative effect on firm value. Among large firms, none of the control variables had a significant on firm value. This study is significant in formulating methodologies that use leverage as one of the variables. The relationship between

leverage and other variables such as profitability plays an important role in modeling firm performance and a firm's shareholding structure.

Research and development (R&D) is one of the drivers of firm performance. Connolly and Hirschey (2005) investigated the relationship between R&D and firm value among US companies between 1997 and 2001 using ordinary least squares. The control variables included growth, the profitability of the firm, advertising intensity, and risk, all of which affect the value of a firm. The study concluded that R&D had a positive relationship with firm value. It also found that, in terms of Tobin's Q, larger firms benefitted more than smaller firms from one dollar spent on R&D and that manufacturing firms reaped the greatest benefits.

However, Loderer and Waelchli (2010) found that as a firm aged, R&D declined. Robust panel regressions were used to determine the effects of aging and the study covered the period 1978 to 2004. In contrast to other studies, the data included financial firms. The control variables included volatility, the size of the firm, its focus and its capital expenditure, minus depreciation, divided by the market value of the firm's assets. While the study established a negative relationship between a firm's age and its profitability, it noted that this relationship is convex as the effect of this negative connection declines over the years. The same relationship was found for a firm's age and Tobin's Q as well as for that between ROA and the age of the firm. Loderer and Waelchli (2010) included robustness tests to ensure that the results were accurate and even after multiple tests, the results revealed that profitability decreased over time.

Similarly, Warusawitharana (2015) investigated the impact of investment in R&D in order to innovate and grow profitability. The data was sourced from the Compustat database and the level of R&D was determined by the ratio of investment in R&D to sales. The results showed that R&D had a significant, positive impact on the value of a firm. R&D investments have implications on shareholding including BEE shareholding in that the profile of the shareholders may influence the level of R&D investment. The study employed multiple variables and their relationships to determine how a variable should react in the regressions.

2.3. Research Gap

There are many similarities among the studies reviewed above. Most adopted an event study method, and CAR was a popular choice. These studies produced mixed results, with some

pointing to the negative effects of issuing BEE shares while others, such as Strydom et al. (2009) and Ward and Mehta (2017) raised the need for further research due to the limited data on BEE shares. This study aimed to fill this gap by examining BEE shares using a method that has rarely been used.

There are three possible outcomes. The first is that firms with BEE shares outperform those that lack such shares. This would provide an incentive for firms to invest in BEE shares. In turn, it would enable previously disadvantaged individuals the opportunity to create wealth. The second possible outcome is that firms with BEE shares perform worse than firms without them. If this is the case, firms will be reluctant to offer new BEE shares. Finally, it is possible that firms with BEE shares perform as well as those that do not issue such shares. This could lead to some firms not offering BEE shares as it would not make any difference. However, they could still be motivated to do so in the interests of improving their public image.

2.4. Chapter Summary

The relevant studies that were reviewed in this chapter suggest that, if the introduction of BEE shares does have a positive effect, the effect is often slight or insignificant. While these studies used different methods, one found that the announcement of BEE shares had a negative effect on larger firms. It should be noted that very few studies have examined the relationship between BEE shares and firm performance in South Africa. Internationally, BEE equivalent models have been critiqued but the historical background varies significantly from that of South Africa. This chapter discussed the different drivers of firm performance and stock returns in order to provide an in-depth understanding of firm performance. It noted that studies on BEE shares and firm performance have produced mixed results.

The following chapter presents the research methodology employed to conduct this study.

Chapter 3: Methodology

3.0. Introduction

This chapter presents the research methodology employed to conduct this study on the impact of BEE shares on firm performance. It discusses the data sources, the sampling of firms that were included and the reasons for omitting financial firms. The variables are discussed as well as how they were measured. Panel data were used to achieve study's objectives. The expected outcome for each objective is discussed and the specification tests used to determine the robustness of the study are also highlighted.

3.1. Data and Data Sources

The firms included in this study were selected from the JSE Top 40 which includes the 40 largest, JSE listed companies. These firms are ranked based on their market capitalisation and cover a range of different industries. The Top 40 is a fair representation of the South African market even though it only includes 40 of the 400 JSE listed companies. The Top 40 shares accounted for more than 80% of the total value of the market in 2013 (Marx and Mohammadali-Haji, 2014). Furthermore, JSE Top 40 shares are traded on a regular basis, which means that these shares are liquid, ensuring that the market is efficient (Holman, Shev & Zheng, 2010). The selection of the Top 40 index firms is in line with recent studies by Enslin, Bruwer and Viljoen (2015) and Viljoen, Bruwer and Enslin (2016). These firms are more likely to have issued BEE shares for the purpose of improving their rating, which creates growth opportunities as they are able to bid for government contracts and because new markets could open up as a result of their more positive public image (Jackson et al., 2005).

Data was sourced on the JSE Top 40 companies for each year since 2003. McCullough, Murray and Strydom (2018) support 2003 as the starting date for analysis primarily because the JSE Top 40 Index changed to the FTSE/JSE Top 40 Index in June 2002. In addition, BBBEE was implemented in January 2003. Firms were omitted from the study when they were no longer part of the JSE Top 40. Companies that provided financial services were excluded as well as firms for which insufficient financial information was available, in line with the study by Viljoen, Bruwer and Enslin (2016). The financial firms were omitted as it is normal for these firms to have high leverage; this is not the case for firms that operate in other sectors, where high leverage is a sign of distress (Fama & French, 1992; Mathuva, 2010). The firms were separated into two groups, those with BEE schemes and firms without such schemes using a

dummy variable. The two groups were created in order to determine whether the existence of BEE shares in the firm created any value for the firm or had an impact on the share return.

The study period was from January 2003 to December 2016 as annual data was used. The sample consisted of 79 firms before exclusions. After the exclusions, 48 firms remained and there were 375 observations in total. Thirty-nine of the firms had BEE shares during this period while the other nine did not. The period covered also enabled recent years to be studied which allowed for determination of how the shares affected the firms recently.

3.2. Method of Analysis

A panel data methodology was used to analyse the data. Panel data is defined by Hilmer and Hilmer (2014) as a mixture of time series and cross-section data which allows for multiple variables over multiple periods of time. There are two main methods for panel data, namely, the random effects model and fixed effects model (FEM). An FEM removes the time-invariant factor of error term in panel data. The random effects model is similar to the FEM but it allows the time-invariant factor of the error term to be controlled without erasing the term entirely (Hilmer & Hilmer, 2014). While Gujarati and Porter (2009) state that an FEM is time-invariant, a simplified definition is that each cross-section variable is permitted to have its own dummy variable (intercept). Gujarati and Porter (2009) and Wooldridge (2010) note that the random effects model allows the cross-sectional data to have its own fixed intercept value which is randomly drawn from a larger population of data. Bell and Jones (2015) tested fixed effects modelling as the default method for dealing with panel data. In order to complete the methods, certain assumptions need to first be met. The random effects method assumes that there is exogeneity. Bell and Jones (2015) state that one of the reasons that this model is not more popular is the bias that is created as a result of certain variables being excluded. This means that there is variance which is not included and this forms part of the error terms. The error terms become correlated to the covariate which violates the assumptions of the random effects model. Clark and Linzer's (2012) comparison of the FEM and random effects concluded that the FEM creates coefficient estimates that are unbiased but are susceptible to high levels of change when different samples are used. Clark and Linzer (2012) add that random effects creates a coefficient estimate with bias; however, the model estimates variance which leads to the estimates being nearer to the true value. A Hausman test is run to determine which of these models is appropriate for the panel data. The null hypothesis is that the estimators of the FEM

and random effects have no substantial difference. If the null hypothesis is rejected, the FEM is more applicable (Gujarati & Porter, 2009). Yu et al. (2016) also conducted a Hausman test to determine which of the models should be used. The random effects model was deemed appropriate for the current study as the JSE Top 40 selected for this model is a sample of the population. The random effects model also allows for more accurate estimators which makes it the preferable model. In order to determine the order of integration of these variables, a test was conducted to verify if there was a unit root in the variable. The Fisher type test was chosen as it allows for the data to be unbalanced and for there to be gaps between the panels (Stata.com, 2019). No lags were included in the test as some of the firms were only in the Top 40 for a single year during the period of analysis. These test results are discussed in the following chapter.

The study's first objective was to determine whether BEE shares drive stock returns on the JSE and the share return was used as it is a variable that is included in stock decomposition (Balke & Wohar, 2006; Ma & Wohar, 2014). The share return also states the value as a percentage. The formula used to create the share return is:

$$Share\ Return = \left(\frac{P_t - P_{t-1}}{P_{t-1}}\right) \times 100 \qquad \textit{(Eq.1)}$$

Where P_t is the share price. The dividend yield was also required in order to calculate the firm's total return (Firer et al.,2012). Dividend yield is calculated using:

$$Dividend\ Yield = \frac{Dividend\ per\ share}{Price\ per\ share} \qquad \textit{(Eq.2)}$$

According to Balke and Wohar (2006) and Ma and Wohar (2014), future real dividend growth should also be taken into account. However, for this study the dividend yield was used for this value. The dividend yield was taken from the McGregor database to ensure consistency of the calculation and is reported as a percentage. The cost of borrowing was included as a variable because most people used debt to finance the purchase of BEE shares (Anyetei, 2011). As noted previously, leverage affects a firm's future growth (Lang et al., 1994) and according to Balke and Wohar (2006), this variable is included in stock decomposition. The repurchase (repo) rate was used to measure the cost of borrowing and it is reported as a percentage. The South African Reserve Bank (SARB, 2019) defines the repo rate as the rate at which the SARB lends money

to the private sector. Ludi and Ground (2006) state that the repo rate is the main instrument used by the SARB to control the country's monetary policy and that South African loans are driven by consumer demand. Thus, an increase in the repo rate would lead to a decrease in loans and deposits at the bank. This also decreases individual investment and expenditure, impacting a person's ability to invest in shares if the funding comes from a loan. Another variable was economic growth and GDP per capita was used in this regard (Levine, 1997). GDP per capita was calculated using the following formula:

$$GDP\ per\ capita = \frac{GDP(USD)}{Population}. \quad \textit{(Eq.3)}$$

The GDP for South Africa was sourced from The World Bank (2018) and the calculation was completed on Excel. Levine and Zervos (1998) state that economic growth and stock markets are related, while Şentürk, et al. (2014) maintain that there is a relationship between these two variables if a Frequency Domain causality test is used. However, returns were used in order to calculate stock market development. The final variable required for objective one was inflation. According to Balke and Wohar (2006) and Geetha et al. (2011), the growth of the CPI is used to calculate the inflation rate. This was collected from StatsSA (2017) and is shown as a percentage.

The study's second objective was to determine how BEE shareholding affects firm value and profitability. This called for the examination of multiple variables. The value of a firm can be measured in multiple ways. Berger and Ofek (1995) used the industry multiplier; however, this approach is more appropriate when seeking to determine the effect of diversification. The most common method in the existing literature is Tobin's Q (see, for example, Villalonga & Amit, 2006 and Mulyadi & Anwar, 2012). Thus, Tobin's Q is used in this study to measure firm value. Kwenda (2017) employed the following formula to calculate the variable:

$$Tobin's\ Q\ = \frac{Market\ value\ of\ equity + Book\ value\ of\ debt}{Replacement\ cost\ of\ assets}. \quad \textit{(Eq.4)}$$

Moen (1999) used annual turnover and the number of employees to determine the size of a firm. However, these measurements were used to create groups and would thus not work in a regression. Therefore, the natural logarithm of the firm's assets was used to represent the firm's size (Kwenda & Holden, 2014) and the formula to calculate this variable is:

$$Firm\ size = \ln(firm's\ assests) \quad \textit{(Eq.5)}$$

Yasuda (2005) states that a firm's age affects its growth and it is normally negative. The age used was calculated based on the date when the firm was established. There are many different formulae to calculate a firm's profitability, Mulyadi and Anwar (2012) used three different methods to measure profitability, namely, ROE, ROA and NPM. For this study, performance was measured using ROE and another regression was run using ROA. ROE and ROA are well known variables for measuring profitability and using both return variables enables the different measurements to be compared. According to Firer (2012), ROE shows how well shareholders did during the month, while ROA is the amount of profit made per rand invested in the firm. The regression was run twice to establish the impact of profit on the growth of the firm. The formulae that Firer (2012) used to calculate these two profitability variables are:

$$ROE = \frac{Net\ Profit\ after\ tax}{Total\ Equity} \text{ and } ROA = \frac{Net\ Profit\ after\ tax}{Total\ Assets}. \quad \textit{(Eq. 6)}$$

The McGregor database was used for Tobin's Q, ROE and ROA in order to ensure consistency throughout the firms' data. Harvey, Lins and Roper (2004) state that Tobin's Q is often used as a measurement of growth opportunities in a firm; however, in this case, it is used to determine firm value. Thus, the ratio of capital expenditure and assets was employed as a proxy for growth opportunities (Harvey et al., 2004). Research and development was a required variable and was calculated using the following formula (Villalonga & Amit, 2006):

$$Research\ and\ development\ (R\&D) = \left(\frac{R\ \&D}{Sales}\right) \quad \textit{(Eq.7)}$$

3.2.1. To determine whether BEE shares drive stock returns on the JSE

For objective 1, the relationship between dividends and returns on ordinary shares needed to be computed as well as the cost of borrowing. Balke and Wohar (2006) used stock decomposition from Campbell and Shiller (1988a, 1988b), Campbell (1991) and Campbell and Ammer (1993). This means that stock prices are a function of real interest rates, real dividend growth and excess returns. Ma and Wohar (2014) also used stock decomposition to complete a Vector Autoregression return. Economic growth and inflation were included as control variables to ensure that the results were due to BEE shares. Although the stock decomposition

used real dividend growth as a variable, for this study dividend yield is used to determine the effects of dividends on share return. Hodrick (1992) determined that the dividend yield of a share does have an impact on the share return. The dividend yield informs the shareholder of the investment return for the dividend only, and the use of this variable allows for the effect of the dividend only on share return. Dividend yield is measured as a percentage of dividends paid to the price per share for the company and its use is recommended by Al-Najjar and Kilincarslan (2016) who argue that analysis of dividends should either use the dividend payout ratio or the dividend yield. The use of annual data resolves potential problems of excessive autocorrelation and spurious regressions when using dividend yield in regression models (Chan, Powell, Shi and Smith, 2018). According to Chan et al., spurious regressions and autocorrelations are commonly observed when conducting time series analysis involving dividend yield as a predictor. However, as recommended by Labhane and Mahakud (2016), dividend yield may be used in panel regression models. Thus, the variables for this regression were stock price returns, dividend yield and cost of borrowing.

The regression can be shown in an equation form as follows:

$$R_{it} = \alpha + \beta_1 DY_{it} + \beta_2 CB_t + + \beta_3 EG_t + \beta_4 INF_t + \beta_5 BEE_{it} + (\mu_i + \epsilon_i) \quad \textit{(Eq.8)}$$

Where R_{it} is the share returns of ordinary shares for firm *i* at time *t*; DY_{it} is the dividend yield for firm *i* at time *t*, CB_t is the cost of borrowing for time *t*, EG_t is economic growth at time t and INF_t is the inflation rate at time *t*. BEE_{it} is a dummy variable which takes on the value of 1 if the firm does have BEE shares and 0 if the firm does not have BEE shares. μ_i is the random effect that differs across firms and is unseen. ϵ_{it} is a distinctive error term. The data used to determine whether BEE shares drive stock returns on the JSE was in the form of panel data as there were both time series and cross-section data. This panel data was unbalanced as some firms had missing data for certain years.

When the regression has been completed, the significance of the coefficients is important. If the coefficient of the dividend yield is positive and significant, the dividend yield does affect share returns and it increases the value of the share returns. If the coefficient is negative and significant, dividend yields has a negative effect on share returns and it reduces the share returns. The final outcome for the dividend yield is, if the coefficient is insignificant, this means

that the dividend yield has no effect on the share returns. This is the same for the cost of borrowing variable and economic growth. If the BEE share is significant, it is shown that BEE shares do drive share returns.

The findings of the studies reviewed in chapter two led to the expectation that BEE shares would not have any impact on the firm's share returns. Most previous studies found the relationship between share returns and BEE to be insignificant and where there was a significant relationship, it seemed to be a negative one. It is expected that economic growth will have a positive impact on share returns, while inflation and interest rates both have a negative relationship with a firm's share return. The relationship between dividend yield and share returns is expected to be negative because, as shown in equation two, a higher share return would decrease the dividend yield, ceteris paribus.

3.2.2. To determine the relationship between firm value, profitability and BEE shareholding

A similar regression was run for the second objective. To ensure that the changes in the firm value are due to BEE shares, control variables were added to the regression. According to Harvey, Lins and Roper (2004), firm size is a variable that should be controlled as well as growth opportunities. The model created by Yasuda (2005) comprises of the firm's size and age. A dummy variable was also used for R&D expenditure. However, for this study the variable for R&D was the ratio of R&D/sales as used by Connolly and Hirschey (2005) as this method ensured that the value of R&D was not influenced by the size of the firm. Villalonga and Amit (2006) also supported the calculation of this variable. As noted previously, Mulyadi and Anwar (2012) found that a firm's age and size had an impact on the implementation of CSR and since BEE shares are a type of CSR, these variables were added as a control. The regression also included the variable ROA in order to quantify profitability (Villalonga & Amit, 2006). The regression can be made into a formula that can be written as follows:

$$FV_{it} = \alpha + \beta_1 FS_{it} + \beta_2 GO_{it} + \beta_3 FA_{it} + \beta_4 RD_{it} + \beta_5 BEE_{it} + \beta_6 P_{it} + (\mu_i + \epsilon_i) \qquad \textit{(Eq.9)}$$

Where FV_{it} is the firm value for firm *i* at time *t*; FS_{it} is the size of firm *i* for time *t*, FA_{it} is the firm age for firm *i* at time *t* and GO_{it} is the growth opportunities of firm *i* at time *t*. RD_{it} is the R&D/sales of firm *i* at time *t*. BEE_{it} is a dummy variable for whether firm *i* has a BEE investment scheme. The variable takes a value of 1 if the firm does have BEE shares and 0 if

it does not. μ_i is the random effect that differs across firms and is unseen. ϵ_{it} is a distinctive error term. P_{it} is the profitability for firm *i* at time t.

The data used to determine the relationship between firm value, profitability and BEE shareholding was in the form of panel data as there were both time series and cross-section data. The panel data was unbalanced as some firms were missing data for certain years. Once the regression is run, the variable that will be important is the BEE variable. The significance of this variable is important; if it is significant, BEE shares influence the value of the firm. If it is positive significance, the presence of BEE shares increases the value of the firm compared to firms without BEE shares. However, if there is negative significance, this means that the presence of BEE shares decreases the firm's value. Should the variable be insignificant, this shows that the fact that the firm has BEE shares has no influence on its value. This could result in firms no longer offering these shares, thereby defeating the purpose of the BBBEE Act.

The literature reviewed in chapter two also created the expectation that BEE shares do not have any influence on the value of a firm. Most of the current studies found no connection between these two variables. A positive connection is expected between a firm's profitability and value. It is expected that there will also be a positive relationship between the value of the firm and R&D as most studies found a positive connection. Previous studies have reported that firm size has a negative impact, positive effect and no impact at all on the value of a firm. The same is true for the age of a firm. It was thus difficult to determine what to expect from the relationship between firm age and value as well as that between firm size and firm value. It is expected that growth opportunities will have a positive relationship with the value of the firm.

The panel data models were completed using version 13 of StataIC.

3.3. Specifications Tests

In examining panel data, there is always a risk of cross-sectional dependency. The Pesaran's (2004) Cross-section Dependence (CD) test was conducted in order to determine whether there was cross-sectional dependency. However, the data used did not allow for completion of this test. When the test was attempted, Stata produced an error message that stated that there were not enough observations to complete the test. A decision was made to use the bootstrap method

as according to Mehmet, Ekrem and Gokeen (2014), this method should correct the standard errors for serial correlation and cross-sectional dependence. Dixon (2001) shows that more than 1000 bootstraps are needed to calculate the confidence intervals. Thus, the bootstrapped regression was run from 1000 bootstraps until there was very little difference in the values. The increase of the number of bootstraps was carried out in 1000s. It was decided that 8000 bootstraps would be used as there was minimal difference between the results of the 1000 bootstraps and 8000 bootstraps (see Appendix D). The results of the bootstrapping are discussed in chapter four. According to Drukker (2003), when a model has serial correlation, the results are less efficient; thus, the Wooldridge test for autocorrelation was run. Ahmad, Adnan and Adnan (2006, p.115) state that Variance Inflation Factor (VIF) results show how many times the variances of corresponding parameter estimates have increased due to multicollinearity. Thus, a VIF test was run to determine whether there was multicollinearity.

3.4. Chapter Summary

Panel data was used in this study and thus a Hausman test was run to determine whether a random effects model or FEM should be used. The study covers the JSE Top 40 shares for the period 2003 to 2016 and employed annual data. A dummy variable was used to indicate whether or not a firm had BEE shares. Specification tests were undertaken in order to confirm that the variables used were accurate for the model. A VIF test was used and the regression was bootstrapped to correct for any cross-sectional dependency.

The following chapter presents and analyses the results from the regressions as well as the specification tests.

Chapter 4: Data Presentation and Analysis

4.0. Introduction

This chapter presents and analyses the study's results. The Hausman test, Unit Root Test, regressions, bootstrapped regression, VIF tests and Wooldridge test were employed to determine whether BEE shares impact a firm's stock returns and value.

4.1. To Determine whether BEE Shares Drive Stock Returns on the JSE

4.1.1. Hausman Test

Yaffee (2003, p.10) notes that the main question is whether there is significant correlation between the unit of observation and the regressor. Hausman (1978) states that the null hypothesis is that there is no misspecification. Greene (2003) states that the null hypothesis of the Hausman test implies that the random effects model is preferred. The table below shows that the Prob>chi2 value is zero; thus, the null hypothesis that estimators of the FEM and ECM have no substantial difference can be rejected. The fixed effects method is used for objective one.

Table 1: Hausman Test Results for objective one

	Coefficients			
	(b)	(B)	(b-B)	Sqrt(diag(V_b-V_B))
	Fixed	random	difference	S.E
BEE Share	2.224601	-5.216918	7.441519	5.672854
Dividend Yield	-8.614014	-4.580088	-4.033926	0.6676931
Cost of Borrowing	4.151727	0.9725922	3.179135	0.7865511
Economic Growth	0.0007609	-0.0000379	0.0007988	0.0001432
Inflation	-5.835423	-5.085448	-0.7499749	0.502764

b= consistent under H_o and H_a; obtained from xtreg

B= inconsistent under H_a, efficient under H_o; obtained from xtreg

Test: H_0: difference in coefficients not systematic

Chi2(4) = (b-B)[(V_b – V_B)^ (-1)](b-B)

=53.46

Prob>chi2 = 0.0000

(V_b – V_B is not positive definite)

4.1.2. Unit Root Test

Table 2: Unit Root Test Results for objective one

Variable	Prob>chi2
Share Return	0.0000
Dividend Yield	0.0000
Cost of borrowing	0.0000
Economic Growth	0.0012
Inflation	0.0000

The null hypothesis (H_0) for the Fisher test is that there is a unit root, while the alternate hypothesis (H_1) is that the variable does not have a unit root. The table above shows that all of the variables do not have a unit root as the null hypothesis can be rejected at a 1% significance level. Thus, it can be stated that the variables are I(0) and it can be concluded that all the variables are integrated at the same level.

4.1.3. Regression Analysis to determine whether BEE shares drive stock returns on the JSE

The fixed effects model has 48 different firms over the period 2003-2016. There are 375 observations in total with each group having an average of 7.8 observations. This model is statistically significant as the regression produces a Prob > F = 0.000. This means that the dependent variable can be predicted by this model.

Table 3: Panel data regression for objective one using Fixed Effects Model

ShareReturn	Coef.	Std. Err.	T	P>|t|	[95% Conf.	Interval]
BEEShare	2.224601	7.24966	0.31	0.759	-12.03808	16.48728
DividendYield	-8.614014	1.088288	-7.92	0.000	-10.75507	-6.472963
CostofBorrowing	4.151727	1.879353	2.21	0.028	0.45436653	7.849088
EconomicGrowth	0.0007609	0.0027884	0.27	0.785	-0.0047249	0.0062267
Inflation	-5.835423	1.338351	-4.36	0.000	-8.46844	-3.202406
_cons	31.57492	24.7709	1.27	0.203	-17.15834	80.30817
Sigma_u	22.557103					
Sigma_e	33.151403					
Rho	0.31646394	(fraction of variance due to u_i)				

The model shows that the relationship between share return and cost of borrowing is positive at a 5% significance level. Thus, when the cost of borrowing increases by 1%, share return increases by 4.15. The relationship between share return and dividend yield, as well as that between share return and inflation, is negative. When inflation increases by 1%, share return decreases by 5.84 and when dividend yield rises by 1%, share return declines by 8.61. These relationships are both significant at a 1% significance level. However, BEE shares and economic growth have statistically insignificant relationships with share return.

Table 4: Panel data regression for objective one with 8000 bootstraps

ShareReturn	Observed Coef.	Bootstrap Std. Err.	Z	P>|z|	Normal- based [95% Conf. Interval]	
BEEShare	2.224601	6.412443	0.35	0.729	-10.34356	14.79276
DividendYield	-8.614014	2.006242	-4.29	0.000	-12.54618	-4.681851
CostofBorrowing	4.151727	2.146502	1.93	0.053	-0.0553401	8.358794
EconomicGrowth	0.0007609	0.0029639	0.26	0.797	-0.0050483	0.0065701
Inflation	-5.835423	1.394428	-4.18	0.000	-8.568451	-3.102395
_cons	31.57492	27.66172	1.14	0.254	-22.64106	85.79089
Sigma_u	22.557103					
Sigma_e	33.151403					
Rho	0.31646394	(fraction of variance due to u_i)				

The same variables are significant as mentioned above. The same significance levels stand for each variable. However, the results show that the standard errors of each variable have increased. The standard error for BEE share has increased, meaning that there is greater variance in the data.

The results from the FEM show that BEE shares were insignificant. This agrees with the findings of studies such as Kaarsemaker et al. (2009). Similarly, after the bootstrap was run for objective one, it was determined that the dummy variable for BEE share is insignificant This agrees with Kaarsemaker et al.'s (2009) conclusion that if the impact on a firm's performance is positive, it is either small or insignificant. Although shareholders do not gain any benefit from BEE shares in terms of share returns, the firm will still issue the shares because of the other benefits it gains due to the increase in its rating. This enables the firm to bid for deals which create opportunities for growth. The fact that a firm has BEE shares is also a good

marketing tool as it shows that the firm is involved in the community (Van der Zwan, 2013; Cenfed, 2016). Ward and Metha (2017) found that there were abnormal returns for firms in the short term; however, they noted that the lack of historical data was a major limitation and due to this, it was determined that BEE shares have no impact on share return.

The outcome from both the FEM and the bootstrap reflect that the relationship between dividend yield and share return is negative. This result differs from that of Khan et al. (2011) who established a positive relationship between dividend yield and share price. However, the negative connection was expected as equation 2 demonstrates that, a negative relationship can occur when the price of a share decreases while the dividend for the year stays the same. This will lead to a higher dividend yield, but a negative share return. A high dividend yield could potentially be from a firm that is paying more in dividends then it is retaining. This scenario could mean that the firm has poor growth prospects in the long term; thus, some investors would not purchase these shares, which could lead to a decline in the price of the share as well as the share return.

The association between inflation and share return is negative for both the FEM and the bootstrap. These results are both significant at 1% level. This is consistent with Humpe and MacMillan (2009) who found that the relationship between inflation and stock prices is negative and significant, and what is expected from the previous literature. The relationship between cost of borrowing and share return is not consistent with existing studies. The results from the regressions show that there is a positive relationship, which was not expected. This contrasts with Humpe and MacMillan (2009) who found that there is a negative relationship between stock price and long-term interest rate for US data, and that the stock price and discount rate for Japan's data is insignificant. The positive relationship between the cost of borrowing and share return could be due to the fact that, when interest rates increase, the return from a share increases, in order to convince people to invest in the share and not use their money elsewhere. Bohl et al. (2007) show that there is no relationship between the interest rate and share return. The relationship depicted by Humpe and Macmillan (2009) is the expected one as it is expected that when lending interest rates increase, items become more expensive and people do not invest, resulting in a decrease in prices.

The results for the relationship between economic growth and share return are insignificant for both the FEM and bootstrap model. These results partially agree with Şentürk et al. (2014) as

if the Bootstrapped Toda-Yamamoto causality test is used, there is no relationship between these variables. However, they contradict Acemoglu et al. (2007) who found economic growth to be insignificant. The study acknowledged that economic growth could have an impact, but noted that this is difficult to measure. The method used by Acemoglu et al. (2007) was the most similar to the one employed in this study.

4.2. To Determine the Relationship between Firm Value, Profitability and BEE Shareholding

4.2.1. Hausman Test

As noted in section 4.1.2, the null hypothesis is that the preferred method is the random effects model (Greene, 2003). The tables below show that the Prob>chi2 has a value of 0 for objective two with ROE and objective two with ROA. The null hypothesis that estimators of the FEM and ECM have no substantial difference can be rejected. The fixed effects method is used for objective two.

Table 5: Hausman Test Results for objective two with ROE

	Coefficients			
	(b) fixed	(B) random	(b-B) difference	Sqrt(diag(V_b-V_B)) S.E
BEE Share	0.5221521	-0.1196784	0.6418305	0.1417989
Firm Size	0.1968023	-0.2539036	0.4507059	0.1435402
Growth Opportunities	-2.002071	-2.595897	0.5938254	0.3706051
Research and Development/Sales	-305.4316	-220.2461	-85.18553	28.87178
ROE	0.0041196	0.0049507	-0.0008311	0.0005516
Firm Age	-0.1479798	0.0061546	-0.1541343	0.0302027

b= consistent under H_o and H_a; obtained from xtreg

B= inconsistent under H_a, efficient under H_o; obtained from xtreg

Test: H_0: difference in coefficients not systematic

Chi2(5) = (b-B)[(V_b – V_B)^ (-1)](b-B)

=30.72

Prob>chi2 = 0.0000

(V_b – V_B is not positive definite)

Table 6: Hausman Test Results for objective two with ROA

	Coefficients			
	(b) fixed	(B) random	(b-B) difference	Sqrt(diag(V_b-V_B)) S.E
BEE Share	0.4500428	-0.1935972	0.64364	0.1609249
Firm Size	0.2092916	-0.1536818	0.3629734	0.1500168
Growth Opportunities	-1.876239	-1.179887	-0.6963521	0.4678355
Research and Development/Sales	-303.3664	-187.9415	-115.4249	34.0911
ROA	0.0132651	0.0292126	-0.0159476	0.0024813
Firm Age	-0.1362944	0.0080574	-0.1443518	0.0308735

b= consistent under H_o and H_a; obtained from xtreg

B= inconsistent under H_a, efficient under H_o; obtained from xtreg

Test: H_0: difference in coefficients not systematic

Chi2(5) = (b-B)[(V_b – V_B)^ (-1)](b-B)

=30.89

Prob>chi2 = 0.0000

(V_b – V_B is not positive definite)

4.2.2. Unit Root Test

Table 7: Unit Root Test results for objective two

Variable	Prob>chi2
Tobin's Q	0.0000
Firm Size	0.0019
Growth Opportunities	0.0136
Research and Development	0.0000
ROE	0.0001
ROA	0.6000
Firm age	1.0000

The table above shows that, based on the results for Tobin's Q, firm size and ROE, the null hypothesis that the variable has a unit root can be rejected at a 1% significance level, while in terms of growth opportunity, the null hypothesis can be rejected at a 5% significance level. This means that these variables are I(0). However, ROA and firm age fail to reject the null hypothesis.

Smith (2000) states that using pooled data (which includes both time-series and cross-section series), the spurious regression allows for a consistent estimate of the parameter's true value. Thus, when using the fixed effects model with pooled data such as the panel data for this study, a spurious regression is prevented. Mitze, Alecke and Untiedt (2009) state that the FEM model's standard estimator has good properties when it is empirically examined for long-run regressions. The fixed effects model is used to determine the relationship between firm value, profitability and BEE shareholding.

4.2.3. Regression Analysis to determine the relationship between firm value, profitability and BEE shareholding

The fixed effects model for both versions of objective two has 48 different firms over the 2003-2016 period. There are 375 observations in total with each group having an average of 7.8 observations. This model is statistically significant as the regression produces a Prob > F = 0.000. This means that the dependent variable can be predicted by the model.

Table 8: Panel data regression for objective two with ROE using Fixed Effects Model

QRatio	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]	
BEEShare	0.5221521	0.2708859	1.93	0.055	-0.107838	1.055088
FirmSize	0.1968023	0.1842841	1.07	0.286	-0.1657548	0.5593594
GrowthOpportunites	-2.002071	2.235965	-0.90	0.371	-6.401068	2.396925
ResearchDevelopmentSales	-305.4316	64.03932	-4.77	0.000	-431.4214	-179.4418
ROE	0.0041196	0.0022243	1.85	0.065	-0.0002565	0.0084958
FirmAge	-0.1479798	0.0306291	-4.83	0.000	-0.2082389	-0.0877207
_cons	5.441615	3.661286	1.49	0.138	-1.761533	12.64476
Sigma_u	6.4521082					
Sigma_e	1.2658589					
Rho	0.96293498	(fraction of variance due to u_i)				

Table 9: Panel data regression for objective two with ROA using Fixed Effects Model

QRatio	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]	
BEEShare	0.4500428	0.2732217	1.65	0.101	-0.0874886	0.9875742
FirmSize	0.2092916	0.1844298	1.13	0.257	-0.01535522	0.5721355
GrowthOpportunites	-1.876239	2.240611	-0.84	0.403	-6.284377	2.531898
ResearchDevelopmentSales	-303.3664	64.01111	-4.74	0.000	-429.3007	-177.4321
ROA	0.0132651	0.006653	1.99	0.047	0.000176	0.0263541
FirmAge	-0.1362944	0.0311444	-4.38	0.000	-0.1975672	-0.0750216
_cons	4.397792	3.720017	1.18	0.238	-2.920902	11.71648
Sigma_u	6.0023298					
Sigma_e	1.2647965					
Rho	0.9574858	(fraction of variance due to u_i)				

In order to establish the relationship between firm value, profitability and BEE shareholdings, the regression was run twice, with profitability first being determined by ROE and ROA. When ROE is used, the BEE variable is significant at a 5% and 10% significance level. Thus, when the firm has BEE shares, its value increases by 0.522. When ROA is used, the dummy variable for BEE is significant at a 10% significance level. The p-value of 10.1% is borderline in terms of significance at the 10% level and the relationship between these variables is weak. When the firm has BEE shares, its value increases by 0.45. The connection with firm value and the proxy for R&D is negative for both versions of the regression which is significant at a 1% significance level for both regressions. When looking at the regression with ROE, as R&D increases by 1, firm value decreased by 305.43. while for the regression with ROA, when R&D increases by 1, firm value decreases by 303.37. ROE has a positive connection with firm value, and it is significant at a 10% significance level. As ROE increases by 1%, the value of the firm rises by 0.0041. At a 5% significance level, ROA has a positive connection with the value of the company. When ROA rises by 1%, firm value increases by 0.0133. Firm value and firm age have a negative relationship for both versions of the regression which are significant at a 1% significance level. For the regression using ROE as profitability, when firm age rises by one year, firm value decreases by 0.148. When looking at the ROA regression, if firm age grows by one year, firm value decreases by 0.136.

Table 10: Panel data regression for objective two with ROE and 8000 bootstraps

QRatio	Observed Coef.	Bootstrap Std. Err.	Z	P>|z|	Normal- based [95% Conf. Interval]	
BEEShare	0.5221521	0.3695266	1.41	0.158	-0.2021067	1.246411
FirmSize	0.1968023	0.3317988	0.59	0.553	-0.4535113	0.8471159
GrowthOpportunites	-2.002071	2.833724	-0.71	0.480	-7.556069	3.551926
ResearchDevelopmentSales	-305.4316	170.3945	-1.79	0.073	-639.3986	28.53538
ROEFactSheet	0.0041196	0.003863	1.07	0.286	-0.0034517	0.011691
FirmAge	-0.1479798	0.058724	-2.52	0.012	-0.2630767	-0.0328829
_cons	5.441615	7.055492	0.77	0.441	-8.386895	19.27012
Sigma_u	6.4521082					
Sigma_e	1.2658589					
Rho	0.96293498	(fraction of variance due to u_i)				

Table 11: Panel data regression for objective two with ROA and 8000 bootstraps

QRatio	Observed Coef.	Bootstrap Std. Err.	Z	P>|z|	Normal- based [95% Conf. Interval]	
BEEShare	0.4500428	0.3741108	1.20	0.229	-0.2832009	1.183287
FirmSize	0.2092916	0.3167785	0.66	0.509	-0.4115828	0.830166
GrowthOpportunites	-1.876239	2.653748	-0.71	0.480	-7.07749	3.325011
ResearchDevelopmentSales	-303.3664	180.8709	-1.68	0.093	-657.8668	51.1341
ROA	0.0132651	0.0103319	1.28	0.199	-0.006985	0.0335152
FirmAge	-0.1362944	0.0632157	-2.16	0.031	-0.260195	-0.0123938
_cons	4.397792	6.970699	0.63	0.528	-9.264528	18.06011
Sigma_u	6.0023298					
Sigma_e	1.2647965					
Rho	0.9574858	(fraction of variance due to u_i)				

According to the results from the bootstrapped regression, the proxy for BEE shares and ROE no longer has a relationship that is statistically significant with firm value for both versions of the regression. For the regression with ROE, the level of significance for the R&D proxy has changed from a 1% significance level to a 10% significance level. The significance level for firm age increased from a 1% to a 5% significance level. The standard error for each variable increased after running the bootstrap for both versions of the regression.

Ward and Muller (2010) stated that larger firms had a negative response to the announcement of BEE shares although this response was minimal. The results from objective two do not agree with this theory as the dummy variable for BEE shares had no significant impact on the company's value. Objective two produces the results that would be expected from Kaarsemaker et al.'s (2009) theory discussed under objective one. The results from this objective are also consistent with Van Heerden (2011) who concluded that the correlation between a firm's financial measures and the BBBEE score was insignificant. As noted previously, Mulyadi and Anwar (2012) found that CSR had no impact on the value of the firm. Ward and Muller (2010) used the event study method, CAR to determine the result while Mulyadi and Anwar (2012) completed their study using regression analysis. The outcome of the latter study was as expected as the method is similar to the one used in the current study. The result of no significant relationship is also supported by other studies.

The connection between the firm size and its value is insignificant in both the FEM and bootstrap models. The outcome was the same for the model with ROE as it was with ROA. This contradicts Ghafoorifard et al. (2014) and Dogan (2013) that found a positive, significant affiliation between these variables. As noted in the literature review, Mulyadi and Anwar (2012) agreed with this result while Kodongo et al. (2014) found that there was a negative relationship between a firm's value and the size of the firm, especially among what the study classified as small firms. While the outcome for the association between firm age and its value is significant, it is also found to be negative. This result is consistent with Dogan (2013) but differs from Ghafoorifard et al.'s (2014) findings. Loderer and Waelchli (2010) used panel regression analysis and also established a negative relationship. The method employed by Loderer and Waelchli (2010) is the most similar to that used in this study; thus, this outcome was expected. Tobin's Q uses the replacement cost of assets in the calculation. As a firm ages and develops, these replacement costs grow, leading to a smaller Tobin's Q. The negative relationship could be due to the fact that as a firm gets older, it reaches the maximum growth possible and thus, competitors that use improved methods overtake older firms, diminishing their market value. This leads to the firm's value declining as it ages.

The FEM model and the bootstrap model show that growth opportunity has an insignificant relationship with firm value for both versions of the model. This is in contrast to Rizqia and Sumiati's (2013) study that found that investment opportunities have a significant and positive

impact on firm value. The FEM results in profitability having a positive and significant effect on firm value which agrees with Rizqia and Sumiati (2013). The bootstrap results show that there is an insignificant relationship between profitability and firm value. This contradicts Kodongo et al. (2014) who established a positive association between company value and growth opportunities among small firms, while large firms had a negative relationship. However, the relationship for large firms was weaker. This is the type of firm that would be found in the JSE Top 40. This result is in agreement with Acegoglu et al. (2017) and Kruger (2011) that found that BEE shares do not impact on a firm's profitability.

The results from both the FEM and bootstrap show that R&D has a negative relationship with firm value which is significant. These results contrast with studies such as Warusawitharana (2015) which found that there was a significant and positive relationship between firm value and R&D and Connolly and Hirschey (2005) that determined that larger firms benefit more from investing in R&D. A possible explanation could be that investment in R&D does not yield beneficial results, thus devaluing the firm.

4.3. Specifications Tests

Ahmad, Adnan and Adnan (2006) and O'Brien (2007) state that VIF results show how many times the variances of corresponding parameter estimates have increased because multicollinearity was present. O'Brien (2007) notes that the increase is calculated assuming that every single independent variable is statistically insignificant.

The results from the VIF tests for each objective are presented below. A value of 10 or more for the coefficient was used as the rule of thumb for the VIF (O'Brien, 2007).

Table 12: VIF test for objective one

Variable	VIF	1/VIF
Cost of Borrowing	4.09	0.244292
Economic Growth	2.92	0.342725
Inflation	2.37	0.421251
BEE Share	1.28	0.782756
Dividend Yield	1.06	0.944270
Mean VIF	2.34	

The table above shows that all the VIF values are between 1.06 and 4.09. Hence, none of these variables break the rule of thumb. It can thus be stated that multicollinearity was not a major issue in the data used to determine whether BEE shares drive stock returns.

Table 13: VIF test for objective two with ROE

Variable	VIF	1/VIF
Growth Opportunities	1.17	0.855850
ROE	1.11	0.900870
BEE Share	1.10	0.911115
Firm Size	1.08	0.927182
Firm Age	1.08	0.927491
Research and Development/Sales	1.06	0.943484
Mean VIF	1.10	

Table 14: VIF test for objective two with ROA

Variable	VIF	1/VIF
Growth Opportunities	1.22	0.819067
ROA	1.17	0.855762
BEE Share	1.11	0.902135
Firm Size	1.08	0.925360
Firm Age	1.08	0.926754
Research and Development/Sales	1.07	0.937386
Mean VIF	1.12	

The two tables above show that the range of VIFs for objective two with ROE is from 1.08 to 1.17. The range for objective two with ROA is slightly higher as it runs from 1.07 to 1.22. Since none of the VIFs exceed the rule of thumb, it can be concluded that there is no multicollinearity in the data used to establish the relationship between the value of the firm, profitability and BEE shareholding.

The Wooldridge test for autocorrelation has a null hypothesis that there is no first order autocorrelation (Drukker, 2003). The results from the test can be found in appendix C. Figure 1 shows that, the test has a p-value of 68.99%. Thus, the null hypothesis cannot be rejected at any significance level and it can be stated that there is insufficient evidence to reject the null

hypothesis. In conclusion, the model for objective 1 does not contain any first order autocorrelation. For both the models used to determine objective 2, the tests have a p-value of 0%; thus, it can be stated that the null hypothesis is rejected for the model with ROE and the model with ROA. Therefore, the objective 2 models have first order autocorrelation. As noted in section 3.3, the bootstrap method was used as according to Mehmet, Ekrem and Gokeen (2014), it should correct the standard errors for serial correlation and cross-sectional dependence.

4.4. Chapter Summary

This chapter discussed the descriptive statistics of all the variables and the Hausman test confirmed that the FEM was the best fit. The outcomes of the FEM showed that BEE shares had no effect on share returns, but did influence firm value for both versions of this model. However, when the regression was run for 8000 bootstraps, the dummy variable for BEE share was not significant in both objectives. Thus, BEE has no effect on share returns or the firm value. The regression analysis showed that most of the variables reacted in the way that would be expected. The VIF results did not exceed the rule of thumb of 10 for all variables. Thus, it can be concluded that there is no multicollinearity in the data that was used for the study.

The following chapter summarises the study's findings and presents an overall conclusion. It also presents recommendations arising from the findings and suggestions for future research.

Chapter 5: Summary, Conclusion and Recommendations

5.0. Introduction

This chapter presents a summary of the study's findings and an overall conclusion on whether BEE shares have any impact on share returns and firm value. It also offers recommendations arising from the findings. The study's limitations are highlighted, and suggestions are made for further research.

5.1. Summary of the Findings

The results for both objectives seem to agree with Jackson, Alessandri and Black's (2005) theory that firms issue BEE shares in order to obtain ratings that enable them to obtain government contracts as well as to improve their public image. While this seems to the reason why most of the JSE Top 40 still have BEE shares, it is hard to verify as most firms do not publish separate financial results for BEE shares.

BEE shares were introduced to enable previously disadvantaged individuals to own shares and profit from the growth of firms. This study aimed to determine whether BEE shares have lived up to these expectations. Its objectives were to determine whether BEE shares drive stock returns and to establish how BEE shareholding influences the firm's value and profitability.

Given that there is a paucity of research on BEE shares, studies on employee share ownership schemes were reviewed. Kaarsemaker et al. (2009) state that these schemes take different forms and include employees buying shares outright, share options or a trust. The shares are either donated to the trust or a loan is used to purchase the shares. In South Africa, most BEE shares were initially bought using loans. This is of concern as the shares' dividends have to be large enough in order for the shareholder to repay the debt. The UK's Share Incentive Plan allows for a tax benefit which is similar to BEE shares as the firm receives a higher rating which can lead to government contracts. Kaarsemaker et al. (2009) state that such schemes positively influence firm performance; however, this impact is either small or insignificant.

Previous studies on BEE shares used different methods from those employed in this study. Anyetei (2011) examined the effect of the announcement of BEE shares on effective net interest. This study used a case study method to determine whether the dividends received were

sufficient to pay back the loans required to purchase them. The study measured the net equity value of the BEE shareholdings.

The literature tends to confirm that BEE shares do not have a significant impact on share returns or firm value. Ward and Muller (2010) used a slightly different method from the one employed in this study and found that smaller firms have a positive reaction. Given that the current study focused on JSE Top 40 firms, there should be no significance between BEE shares and share returns or firm value. Jackson, Alessandri and Black (2005) conducted a similar study to Ward and Miller (2010). While both studies use the CAR method, Jackson et al. (2005) note that there could be other reasons for a firm issuing BEE shares. These include using these shares as a marketing tool and that BEE shares improve a firm's BEE rating, which could enable it to obtain government contracts.

Panel data methodology was used to analyse the data. Regression was used for the first objective and included share return, a dummy variable for BEE shares, inflation, economic growth, dividend yield and cost of borrowing. After a Hausman's test was completed, it was determined that the fixed effects method should be used. The results showed that dividend yield, cost of borrowing and inflation were significant at a 1%, 5% and 1% significance level, respectively. Dividend yield had a negative association with share return. Cost of borrowing had a positive affiliation with share return while inflation had a negative connection with share return. Since the dummy variable for BEE shares was insignificant, it was determined that the existence of a BEE share does have any effect on the share return of a firm.

A regression using Tobin's Q was employed to determine the value of the firm, a dummy variable for BEE shares, firm size, growth opportunities, firm age, a proxy for R&D and profitability. The regression was completed twice in order to use ROE and ROA as the variable for profitability. A Hausman test determined that the FEM was required for both versions of the regression. The results from the regression with ROE, show that BEE shares, R&D, ROE and firm age are significant at a significance level of 5%, 1%, 10% and 1%, respectively. Firm age and R&D have a negative connection with the value of the company while ROE has a positive relationship with the value of the firm. Thus, BEE shares have a significant positive relationship with firm value.

The results from the regression with ROA quantifying profitability show that the same variables as in the regression with ROE have relationships with firm value which are significant. BEE shares, R&D, ROA and firm age are significant at a significance level of 10%, 1%, 5% and 1%, respectively. Research and development and firm age still have a negative connection with firm value while ROE has a positive relationship with the value of the firm. However, after the bootstrap, BEE shares, ROE and ROA were determined to be insignificant.

5.2. Conclusion

Given the limited literature on BEE shares, studies on similar schemes such as employee share ownership schemes were reviewed. The few studies conducted on BEE shares have not established a significant relationship between BEE shares and share returns or BEE shares and firm value. Both Kaarsemaker et al. (2009) and Jackson et al. (2005) state that firms continue to use employee share ownership schemes or BEE shares for other reasons, including securing government contracts (Jackson et al., 2005).

In light of the results for objective one, it can be concluded that BEE shares do not drive stock returns at all. This is because BEE shares were insignificant in both the FEM and the bootstrap. The results on the relationship between firm value, profitability and BEE shareholding were significant for both versions of the model. However, once the bootstrap was implemented, the BEE shares were no longer significant.

The main finding of this study is thus that the performance of BEE shares does not have any influence on JSE Top 40 firms.

The implication of this finding could be that firms no longer issue BEE shares as this can be costly to the firm and existing shareholders do not support the issuance of such shares because it can result in dilution of the value of their shares. Thus, the population that was supposed to benefit from BEE shares will remain excluded and the objectives of the BEE Act will not be achieved.

5.3. Recommendations

Although the firm and its shareholders do not see any financial benefit from BEE shares in terms of share returns or firm value, it is recommended that firms should still issue BEE shares

as the BBBEE Act requires that they have a certain BEE rating in order to tender for certain contracts. BEE shares also create a positive image in the eyes of the public, which could also enhance a firm's business opportunities (Jackson et al., 2005).

It is also recommended that the government should revisit the current Act and modify it in order to enable firms to increase their value. One of the lessons learnt from the NEP in Malaysia is that skills development among previously disadvantaged individuals increases the chances of success. Furthermore, the NEP was implemented over 20 years and this study covered a period of 14 years. It is thus possible that the BEE Act could still have a positive effect in the future. The South African government could also pass legislation that compels firms to issue BEE shares; however, in other African countries, this led to the loss of foreign investments.

5.4. Limitations of the Study

Given that few studies have been conducted on BEE shares, there was little theory on which to base this study. Studies that investigated similar phenomena such as employee share ownership schemes were reviewed to address this limitation. Furthermore, there were insufficient observations to complete the Pesaran's CD test, which meant that additional testing had to be conducted to ensure that there was no cross-sectional dependency.

5.5. Suggestions for Further Research

It is recommended that future studies consider using a Moving Block Bootstrap (MBB) instead of the normal bootstrap. The MBB was the preferred method for this study; however, the steps required to complete this bootstrap were difficult to determine. Another suggestion is to include a variable that accounts for an increase in the BEE rating a firm receives after BEE shares have been issued.

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Appendices

APPENDIX A - ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

24 April 2018

Ms Megan Kate Hargreaves (213513569)
Scool of Accounting, Economics & Finance
Westville Campus

Dear Ms Hargreaves,

Protocol reference number: HSS/0325/018M
Project Title: Influence of the Performance of Black Economic Empowerment Shares on the Johannesburg Stock Exchange Top40

Approval Notification – No Risk / Exempt Application

In response to your application received 10 April 2018, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Professor Shenuka Singh (Chair)

/ms

Cc Supervisor: Dr Mabutho Sibanda
Cc Academic Leader Research: Professor Josue Mbonigaba
Cc School Administrator: Ms Seshni Naidoo

Humanities & Social Sciences Research Ethics Committee
Professor Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** ximbap@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
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Appendix B - Turnitin Report

Influence of the Performance of Black Economic Empowerment Shares on the Johannesburg Stock Exchange Top40

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Appendix C- Woodridge Test Results

```
. xtserial newShareReturn BEEShare DividendYeild CostofBorrowing EconomicGrowth Inflation, output

Linear regression                               Number of obs     =        320
                                                F(5, 42)          =      19.44
                                                Prob > F          =     0.0000
                                                R-squared         =     0.3051
                                                Root MSE          =      43.12

                                  (Std. Err. adjusted for 43 clusters in Firmnum)
------------------------------------------------------------------------------
             |               Robust
D.           |
 newShareRet |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   BEEShare  |
         D1. |  -21.36447   15.77993    -1.35   0.183    -53.20965    10.48071
             |
  DividendYe |
         D1. |  -11.46579   2.091127    -5.48   0.000    -15.68586   -7.245726
             |
CostofBorrow |
         D1. |  -6.767594   2.819095    -2.40   0.021    -12.45676   -1.078431
             |
 EconomicGro |
         D1. |   -.008791   .0043782    -2.01   0.051    -.0176265    .0000446
             |
   Inflation |
         D1. |   .6325486   2.382988     0.27   0.792    -4.176516    5.441613
------------------------------------------------------------------------------

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
       F(  1,      38) =      0.162
            Prob > F =      0.6899
```

Figure 1: Wooldridge Test results for objective 1

```
. xtserial QRatio BEEShare FirmSize GrowthOpportunites ResearchDevelopmentSales ROEFactsheet FirmAge, output

Linear regression                               Number of obs     =        320
                                                F(6, 42)          =       1.11
                                                Prob > F          =     0.3733
                                                R-squared         =     0.0262
                                                Root MSE          =     1.2093

                                  (Std. Err. adjusted for 43 clusters in Firmnum)
------------------------------------------------------------------------------
             |               Robust
    D.QRatio |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    BEEShare |
         D1. |   .0982276   .1766453     0.56   0.581    -.2582571    .4547123
             |
    FirmSize |
         D1. |  -.6596665   .4179755    -1.58   0.122    -1.503175    .1838422
             |
GrowthOpport |
         D1. |   .0749027   2.098709     0.04   0.972    -4.160463    4.310268
             |
ResearchDeve |
         D1. |  -59.60003   62.22138    -0.96   0.344    -185.1679    65.96779
             |
  ROEFactshe |
         D1. |   .0004626   .0012401     0.37   0.711    -.0020401    .0029653
             |
     FirmAge |
         D1. |  -.0297226   .0649978    -0.46   0.650    -.1608936    .1014483
------------------------------------------------------------------------------

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
       F(  1,      38) =     43.123
            Prob > F =      0.0000
```

Figure 2: Wooldridge Test results for objective 2 with ROE

```
. xtserial QRatio BEEShare FirmSize GrowthOpportunites ResearchDevelopmentSales ROA FirmAge, output

Linear regression                               Number of obs     =        320
                                                F(6, 42)          =       1.15
                                                Prob > F          =     0.3510
                                                R-squared         =     0.0260
                                                Root MSE          =     1.2094

                                      (Std. Err. adjusted for 43 clusters in Firmnum)
------------------------------------------------------------------------------
             |               Robust
    D.QRatio |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    BEEShare |
         D1. |   .1015176   .1764183     0.58   0.568    -.2545089    .4575441
             |
    FirmSize |
         D1. |  -.6638511    .418158    -1.59   0.120    -1.507728    .1800259
             |
GrowthOpportunites |
         D1. |   .0073791   2.097865     0.00   0.997    -4.226283    4.241041
             |
ResearchDevelopmentSales |
         D1. |  -60.26135   64.44441    -0.94   0.355    -190.3154    69.79274
             |
         ROA |
         D1. |   .0003836   .0050451     0.08   0.940    -.0097977     .010565
             |
     FirmAge |
         D1. |  -.0285929   .0653815    -0.44   0.664    -.1605382    .1033523
------------------------------------------------------------------------------

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,      38) =     43.727
          Prob > F =      0.0000
```

Figure 3: Wooldridge Test results for objective 2 with ROA

Appendix D - Bootstrap Results

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.2695                         Obs per group: min =         1
       between = 0.0272                                        avg =       7.8
       overall = 0.1604                                        max =        14

                                                Wald chi2(5)       =    181.23
corr(u_i, Xb)  = -0.3990                        Prob > chi2        =    0.0000

                                 (Replications based on 48 clusters in Firmnum)
```

newShareReturn	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	2.224601	6.341884	0.35	0.726	-10.20526	14.65447
DividendYeild	-8.614014	2.002319	-4.30	0.000	-12.53849	-4.689542
CostofBorrowing	4.151727	2.162389	1.92	0.055	-.0864784	8.389932
EconomicGrowth	.0007609	.0030261	0.25	0.801	-.0051702	.006692
Inflation	-5.835423	1.380961	-4.23	0.000	-8.542057	-3.128789
_cons	31.57492	28.8198	1.10	0.273	-24.91086	88.06069
sigma_u	22.557103					
sigma_e	33.151403					
rho	.31646395	(fraction of variance due to u_i)				

Figure 4: Panel data regression for objective one with 1000 bootstraps

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.2695                         Obs per group: min =         1
       between = 0.0272                                        avg =       7.8
       overall = 0.1604                                        max =        14

                                                Wald chi2(5)       =    177.04
corr(u_i, Xb)  = -0.3990                        Prob > chi2        =    0.0000

                                 (Replications based on 48 clusters in Firmnum)
```

newShareReturn	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	2.224601	6.495809	0.34	0.732	-10.50695	14.95615
DividendYeild	-8.614014	2.006254	-4.29	0.000	-12.5462	-4.68183
CostofBorrowing	4.151727	2.164029	1.92	0.055	-.0896912	8.393145
EconomicGrowth	.0007609	.0030002	0.25	0.800	-.0051194	.0066412
Inflation	-5.835423	1.410093	-4.14	0.000	-8.599154	-3.071691
_cons	31.57492	27.87231	1.13	0.257	-23.05381	86.20365
sigma_u	22.557103					
sigma_e	33.151403					
rho	.31646395	(fraction of variance due to u_i)				

Figure 5: Panel data regression for objective one with 2000 bootstraps

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.2695                         Obs per group: min =         1
       between = 0.0272                                        avg =       7.8
       overall = 0.1604                                        max =        14

                                                Wald chi2(5)       =    179.90
corr(u_i, Xb)  = -0.3990                        Prob > chi2        =    0.0000

                                    (Replications based on 48 clusters in Firmnum)
```

newShareReturn	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	2.224601	6.422513	0.35	0.729	-10.36329	14.8125
DividendYeild	-8.614014	2.034905	-4.23	0.000	-12.60236	-4.625673
CostofBorrowing	4.151727	2.165297	1.92	0.055	-.0921782	8.395632
EconomicGrowth	.0007609	.002948	0.26	0.796	-.005017	.0065388
Inflation	-5.835423	1.41178	-4.13	0.000	-8.602461	-3.068385
_cons	31.57492	27.4641	1.15	0.250	-22.25373	85.40357
sigma_u	22.557103					
sigma_e	33.151403					
rho	.31646395	(fraction of variance due to u_i)				

Figure 6: Panel data regression for objective one with 3000 bootstraps

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.2695                         Obs per group: min =         1
       between = 0.0272                                        avg =       7.8
       overall = 0.1604                                        max =        14

                                                Wald chi2(5)       =    185.42
corr(u_i, Xb)  = -0.3990                        Prob > chi2        =    0.0000

                                    (Replications based on 48 clusters in Firmnum)
```

newShareReturn	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	2.224601	6.407756	0.35	0.728	-10.33437	14.78357
DividendYeild	-8.614014	1.970048	-4.37	0.000	-12.47524	-4.752791
CostofBorrowing	4.151727	2.07065	2.01	0.045	.0933267	8.210127
EconomicGrowth	.0007609	.002948	0.26	0.796	-.0050171	.0065389
Inflation	-5.835423	1.355197	-4.31	0.000	-8.491561	-3.179285
_cons	31.57492	27.05359	1.17	0.243	-21.44915	84.59898
sigma_u	22.557103					
sigma_e	33.151403					
rho	.31646395	(fraction of variance due to u_i)				

Figure 7: Panel data regression for objective one with 4000 bootstraps

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.2695                         Obs per group: min =         1
       between = 0.0272                                        avg =       7.8
       overall = 0.1604                                        max =        14

                                                Wald chi2(5)       =    182.54
corr(u_i, Xb)  = -0.3990                        Prob > chi2        =    0.0000

                                  (Replications based on 48 clusters in Firmnum)
------------------------------------------------------------------------------
             |   Observed   Bootstrap                         Normal-based
newShareReturn|      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    BEEShare |   2.224601   6.433956     0.35   0.730    -10.38572    14.83492
  DividendYeild |  -8.614014   1.973296    -4.37   0.000    -12.4816   -4.746426
CostofBorrowing |   4.151727   2.104284     1.97   0.048     .0274061    8.276048
 EconomicGrowth |   .0007609   .0029522     0.26   0.797    -.0050253    .0065471
      Inflation |  -5.835423   1.385264    -4.21   0.000     -8.55049   -3.120356
          _cons |   31.57492   27.16914     1.16   0.245    -21.67561    84.82544
-------------+----------------------------------------------------------------
        sigma_u |  22.557103
        sigma_e |  33.151403
            rho |  .31646395   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Figure 8: Panel data regression for objective one with 5000 bootstraps

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.2695                         Obs per group: min =         1
       between = 0.0272                                        avg =       7.8
       overall = 0.1604                                        max =        14

                                                Wald chi2(5)       =    187.92
corr(u_i, Xb)  = -0.3990                        Prob > chi2        =    0.0000

                                  (Replications based on 48 clusters in Firmnum)
------------------------------------------------------------------------------
             |   Observed   Bootstrap                         Normal-based
newShareReturn|      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    BEEShare |   2.224601   6.411036     0.35   0.729    -10.3408     14.79
  DividendYeild |  -8.614014   2.008098    -4.29   0.000    -12.54981   -4.678215
CostofBorrowing |   4.151727   2.110596     1.97   0.049     .0150353    8.288418
 EconomicGrowth |   .0007609   .0029092     0.26   0.794    -.0049411    .0064629
      Inflation |  -5.835423   1.371317    -4.26   0.000    -8.523154   -3.147691
          _cons |   31.57492   27.18524     1.16   0.245    -21.70717    84.85701
-------------+----------------------------------------------------------------
        sigma_u |  22.557103
        sigma_e |  33.151403
            rho |  .31646395   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Figure 9: Panel data regression for objective one with 6000 bootstraps

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.2695                         Obs per group: min =         1
       between = 0.0272                                        avg =       7.8
       overall = 0.1604                                        max =        14

                                                Wald chi2(5)       =    186.32
corr(u_i, Xb)  = -0.3990                        Prob > chi2        =    0.0000

                                  (Replications based on 48 clusters in Firmnum)
```

newShareReturn	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	2.224601	6.379366	0.35	0.727	-10.27873	14.72793
DividendYeild	-8.614014	2.008514	-4.29	0.000	-12.55063	-4.677399
CostofBorrowing	4.151727	2.113104	1.96	0.049	.0101186	8.293335
EconomicGrowth	.0007609	.0029505	0.26	0.796	-.005022	.0065438
Inflation	-5.835423	1.390764	-4.20	0.000	-8.561271	-3.109575
_cons	31.57492	27.1803	1.16	0.245	-21.6975	84.84733
sigma_u	22.557103					
sigma_e	33.151403					
rho	.31646395	(fraction of variance due to u_i)				

Figure 10: Panel data regression for objective one with 7000 bootstraps

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.1505                         Obs per group: min =         1
       between = 0.0396                                        avg =       7.8
       overall = 0.0272                                        max =        14

                                                Wald chi2(6)       =     11.09
corr(u_i, Xb)  = -0.9777                        Prob > chi2        =    0.0855

                                  (Replications based on 48 clusters in Firmnum)
```

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.5221521	.3653934	1.43	0.153	-.1940057	1.23831
FirmSize	.1968023	.3390012	0.58	0.562	-.4676277	.8612324
GrowthOpportunites	-2.002071	2.735487	-0.73	0.464	-7.363527	3.359384
ResearchDevelopmentSales	-305.4316	180.2386	-1.69	0.090	-658.6927	47.82952
ROEFactsheet	.0041196	.0041603	0.99	0.322	-.0040345	.0122738
FirmAge	-.1479798	.0606324	-2.44	0.015	-.2668171	-.0291425
_cons	5.441615	7.102719	0.77	0.444	-8.479458	19.36269
sigma_u	6.4521082					
sigma_e	1.2658589					
rho	.96293498	(fraction of variance due to u_i)				

Figure 11: Panel data regression for objective two with ROE and 1000 bootstraps

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1505 — Obs per group: min = 1
between = 0.0396 — avg = 7.8
overall = 0.0272 — max = 14

Wald chi2(6) = 11.88
corr(u_i, Xb) = -0.9777 — Prob > chi2 = 0.0648

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.5221521	.3682798	1.42	0.156	-.1996631	1.243967
FirmSize	.1968023	.3385131	0.58	0.561	-.4666712	.8602759
GrowthOpportunites	-2.002071	2.895628	-0.69	0.489	-7.677398	3.673255
ResearchDevelopmentSales	-305.4316	173.1029	-1.76	0.078	-644.707	33.84381
ROEFactsheet	.0041196	.0038691	1.06	0.287	-.0034637	.011703
FirmAge	-.1479798	.0577741	-2.56	0.010	-.261215	-.0347446
_cons	5.441615	7.12854	0.76	0.445	-8.530067	19.4133
sigma_u	6.4521082					
sigma_e	1.2658589					
rho	.96293498	(fraction of variance due to u_i)				

Figure 12: Panel data regression for objective two with ROE and 2000 bootstraps

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1505 — Obs per group: min = 1
between = 0.0396 — avg = 7.8
overall = 0.0272 — max = 14

Wald chi2(6) = 11.90
corr(u_i, Xb) = -0.9777 — Prob > chi2 = 0.0642

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.5221521	.3684949	1.42	0.156	-.2000847	1.244389
FirmSize	.1968023	.3353038	0.59	0.557	-.460381	.8539857
GrowthOpportunites	-2.002071	2.799223	-0.72	0.474	-7.488448	3.484305
ResearchDevelopmentSales	-305.4316	176.2454	-1.73	0.083	-650.8662	40.00296
ROEFactsheet	.0041196	.0039606	1.04	0.298	-.003643	.0118823
FirmAge	-.1479798	.0594491	-2.49	0.013	-.2644979	-.0314617
_cons	5.441615	7.058907	0.77	0.441	-8.393589	19.27682
sigma_u	6.4521082					
sigma_e	1.2658589					
rho	.96293498	(fraction of variance due to u_i)				

Figure 13: Panel data regression for objective two with ROE and 3000 bootstraps

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1505 — Obs per group: min = 1
between = 0.0396 — avg = 7.8
overall = 0.0272 — max = 14

Wald chi2(6) = 12.20
corr(u_i, Xb) = -0.9777 — Prob > chi2 = 0.0576

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.5221521	.3696727	1.41	0.158	-.2023931	1.246697
FirmSize	.1968023	.3382061	0.58	0.561	-.4660694	.8596741
GrowthOpportunites	-2.002071	2.805591	-0.71	0.475	-7.500929	3.496786
ResearchDevelopmentSales	-305.4316	175.7071	-1.74	0.082	-649.8111	38.94789
ROEFactsheet	.0041196	.0039129	1.05	0.292	-.0035496	.0117889
FirmAge	-.1479798	.0581946	-2.54	0.011	-.2620392	-.0339204
_cons	5.441615	7.099434	0.77	0.443	-8.47302	19.35625
sigma_u	6.4521082					
sigma_e	1.2658589					
rho	.96293498	(fraction of variance due to u_i)				

Figure 14: Panel data regression for objective two with ROE and 4000 bootstraps

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1505 — Obs per group: min = 1
between = 0.0396 — avg = 7.8
overall = 0.0272 — max = 14

Wald chi2(6) = 11.80
corr(u_i, Xb) = -0.9777 — Prob > chi2 = 0.0666

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.5221521	.3698023	1.41	0.158	-.2026472	1.246951
FirmSize	.1968023	.3307556	0.60	0.552	-.4514667	.8450714
GrowthOpportunites	-2.002071	2.728123	-0.73	0.463	-7.349094	3.344951
ResearchDevelopmentSales	-305.4316	173.454	-1.76	0.078	-645.3952	34.53194
ROEFactsheet	.0041196	.0039964	1.03	0.303	-.0037131	.0119524
FirmAge	-.1479798	.0586865	-2.52	0.012	-.2630033	-.0329563
_cons	5.441615	6.972292	0.78	0.435	-8.223826	19.10706
sigma_u	6.4521082					
sigma_e	1.2658589					
rho	.96293498	(fraction of variance due to u_i)				

Figure 15: Panel data regression for objective two with ROE and 5000 bootstraps

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.1505                         Obs per group: min =         1
       between = 0.0396                                        avg =       7.8
       overall = 0.0272                                        max =        14

                                                Wald chi2(6)       =     11.78
corr(u_i, Xb)  = -0.9777                        Prob > chi2        =    0.0670

                                    (Replications based on 48 clusters in Firmnum)
```

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.5221521	.3781081	1.38	0.167	-.2189262	1.26323
FirmSize	.1968023	.3341676	0.59	0.556	-.4581542	.8517589
GrowthOpportunites	-2.002071	2.834803	-0.71	0.480	-7.558184	3.554041
ResearchDevelopmentSales	-305.4316	175.6562	-1.74	0.082	-649.7115	38.84828
ROEFactsheet	.0041196	.0038508	1.07	0.285	-.0034278	.0116671
FirmAge	-.1479798	.0588802	-2.51	0.012	-.263383	-.0325766
_cons	5.441615	7.069376	0.77	0.441	-8.414108	19.29734
sigma_u	6.4521082					
sigma_e	1.2658589					
rho	.96293498	(fraction of variance due to u_i)				

Figure 16: Panel data regression for objective two with ROE and 6000 bootstraps

```
Fixed-effects (within) regression               Number of obs      =       375
Group variable: Firmnum                         Number of groups   =        48

R-sq:  within  = 0.1505                         Obs per group: min =         1
       between = 0.0396                                        avg =       7.8
       overall = 0.0272                                        max =        14

                                                Wald chi2(6)       =     11.91
corr(u_i, Xb)  = -0.9777                        Prob > chi2        =    0.0639

                                    (Replications based on 48 clusters in Firmnum)
```

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.5221521	.3742129	1.40	0.163	-.2112918	1.255596
FirmSize	.1968023	.3319011	0.59	0.553	-.4537118	.8473165
GrowthOpportunites	-2.002071	2.810504	-0.71	0.476	-7.510557	3.506414
ResearchDevelopmentSales	-305.4316	172.4264	-1.77	0.076	-643.3811	32.51785
ROEFactsheet	.0041196	.0039142	1.05	0.293	-.003552	.0117913
FirmAge	-.1479798	.058289	-2.54	0.011	-.2622241	-.0337354
_cons	5.441615	7.030939	0.77	0.439	-8.338773	19.222
sigma_u	6.4521082					
sigma_e	1.2658589					
rho	.96293498	(fraction of variance due to u_i)				

Figure 17: Panel data regression for objective two with ROE and 7000 bootstraps

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1520 — Obs per group: min = 1
between = 0.0353 — avg = 7.8
overall = 0.0244 — max = 14

Wald chi2(6) = 16.58
corr(u_i, Xb) = -0.9739 — Prob > chi2 = 0.0110

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.4500428	.3780662	1.19	0.234	-.2909533	1.191039
FirmSize	.2092916	.3116072	0.67	0.502	-.4014473	.8200306
GrowthOpportunites	-1.876239	2.619774	-0.72	0.474	-7.010901	3.258423
ResearchDevelopmentSales	-303.3664	182.7084	-1.66	0.097	-661.4682	54.73551
ROA	.0132651	.0101806	1.30	0.193	-.0066885	.0332187
FirmAge	-.1362944	.0637612	-2.14	0.033	-.2612641	-.0113247
_cons	4.397792	6.92308	0.64	0.525	-9.171196	17.96678
sigma_u	6.0023298					
sigma_e	1.2647965					
rho	.9574858	(fraction of variance due to u_i)				

Figure 18: *Panel data regression for objective two with ROA and 1000 bootstraps*

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1520 — Obs per group: min = 1
between = 0.0353 — avg = 7.8
overall = 0.0244 — max = 14

Wald chi2(6) = 17.82
corr(u_i, Xb) = -0.9739 — Prob > chi2 = 0.0067

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.4500428	.368753	1.22	0.222	-.2726997	1.172785
FirmSize	.2092916	.3194314	0.66	0.512	-.4167823	.8353656
GrowthOpportunites	-1.876239	2.643354	-0.71	0.478	-7.057118	3.304639
ResearchDevelopmentSales	-303.3664	181.4038	-1.67	0.094	-658.9114	52.17864
ROA	.0132651	.0103648	1.28	0.201	-.0070495	.0335796
FirmAge	-.1362944	.0617486	-2.21	0.027	-.2573195	-.0152693
_cons	4.397792	6.918578	0.64	0.525	-9.162372	17.95796
sigma_u	6.0023298					
sigma_e	1.2647965					
rho	.9574858	(fraction of variance due to u_i)				

Figure 19: *Panel data regression for objective two with ROA and 2000 bootstraps*

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1520 — Obs per group: min = 1
between = 0.0353 — avg = 7.8
overall = 0.0244 — max = 14

Wald chi2(6) = 16.94
corr(u_i, Xb) = -0.9739 — Prob > chi2 = 0.0095

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.4500428	.3758331	1.20	0.231	-.2865765	1.186662
FirmSize	.2092916	.3203311	0.65	0.514	-.4185458	.8371291
GrowthOpportunites	-1.876239	2.672558	-0.70	0.483	-7.114356	3.361877
ResearchDevelopmentSales	-303.3664	177.6789	-1.71	0.088	-651.6106	44.87788
ROA	.0132651	.0105766	1.25	0.210	-.0074647	.0339948
FirmAge	-.1362944	.063225	-2.16	0.031	-.2602132	-.0123756
_cons	4.397792	6.998107	0.63	0.530	-9.318247	18.11383
sigma_u	6.0023298					
sigma_e	1.2647965					
rho	.9574858	(fraction of variance due to u_i)				

Figure 20: Panel data regression for objective two with ROA and 3000 bootstraps

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1520 — Obs per group: min = 1
between = 0.0353 — avg = 7.8
overall = 0.0244 — max = 14

Wald chi2(6) = 17.35
corr(u_i, Xb) = -0.9739 — Prob > chi2 = 0.0081

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.4500428	.3720585	1.21	0.226	-.2791785	1.179264
FirmSize	.2092916	.3129886	0.67	0.504	-.4041548	.8227381
GrowthOpportunites	-1.876239	2.587521	-0.73	0.468	-6.947686	3.195208
ResearchDevelopmentSales	-303.3664	180.2988	-1.68	0.092	-656.7456	50.01282
ROA	.0132651	.0101361	1.31	0.191	-.0066014	.0331315
FirmAge	-.1362944	.0628642	-2.17	0.030	-.2595061	-.0130828
_cons	4.397792	6.885415	0.64	0.523	-9.097374	17.89296
sigma_u	6.0023298					
sigma_e	1.2647965					
rho	.9574858	(fraction of variance due to u_i)				

Figure 21: Panel data regression for objective two with ROA and 4000 bootstraps

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1520 — Obs per group: min = 1
between = 0.0353 — avg = 7.8
overall = 0.0244 — max = 14

Wald chi2(6) = 17.54
corr(u_i, Xb) = -0.9739 — Prob > chi2 = 0.0075

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.4500428	.3834765	1.17	0.241	-.3015573	1.201643
FirmSize	.2092916	.3164426	0.66	0.508	-.4109244	.8295077
GrowthOpportunites	-1.876239	2.651724	-0.71	0.479	-7.073523	3.321044
ResearchDevelopmentSales	-303.3664	183.6561	-1.65	0.099	-663.3256	56.59289
ROA	.0132651	.0105453	1.26	0.208	-.0074033	.0339334
FirmAge	-.1362944	.0632929	-2.15	0.031	-.2603463	-.0122425
_cons	4.397792	6.927712	0.63	0.526	-9.180274	17.97586
sigma_u	6.0023298					
sigma_e	1.2647965					
rho	.9574858	(fraction of variance due to u_i)				

Figure 22: Panel data regression for objective two with ROA and 5000 bootstraps

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1520 — Obs per group: min = 1
between = 0.0353 — avg = 7.8
overall = 0.0244 — max = 14

Wald chi2(6) = 17.31
corr(u_i, Xb) = -0.9739 — Prob > chi2 = 0.0082

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.4500428	.3745055	1.20	0.229	-.2839744	1.18406
FirmSize	.2092916	.321433	0.65	0.515	-.4207054	.8392887
GrowthOpportunites	-1.876239	2.587716	-0.73	0.468	-6.94807	3.195591
ResearchDevelopmentSales	-303.3664	180.8196	-1.68	0.093	-657.7662	51.03345
ROA	.0132651	.0102218	1.30	0.194	-.0067694	.0332995
FirmAge	-.1362944	.0639959	-2.13	0.033	-.2617241	-.0108647
_cons	4.397792	6.986974	0.63	0.529	-9.296425	18.09201
sigma_u	6.0023298					
sigma_e	1.2647965					
rho	.9574858	(fraction of variance due to u_i)				

Figure 23: Panel data regression for objective two with ROA and 6000 bootstraps

Fixed-effects (within) regression — Number of obs = 375
Group variable: Firmnum — Number of groups = 48

R-sq: within = 0.1520 — Obs per group: min = 1
between = 0.0353 — avg = 7.8
overall = 0.0244 — max = 14

Wald chi2(6) = 17.18
corr(u_i, Xb) = -0.9739 — Prob > chi2 = 0.0086

(Replications based on 48 clusters in Firmnum)

QRatio	Observed Coef.	Bootstrap Std. Err.	z	P>|z|	Normal-based [95% Conf.	Interval]
BEEShare	.4500428	.3774746	1.19	0.233	-.2897939	1.18988
FirmSize	.2092916	.3258161	0.64	0.521	-.4292962	.8478795
GrowthOpportunites	-1.876239	2.596552	-0.72	0.470	-6.965387	3.212908
ResearchDevelopmentSales	-303.3664	184.1177	-1.65	0.099	-664.2304	57.49763
ROA	.0132651	.0102928	1.29	0.197	-.0069085	.0334386
FirmAge	-.1362944	.064664	-2.11	0.035	-.2630336	-.0095552
_cons	4.397792	7.053505	0.62	0.533	-9.426824	18.22241
sigma_u	6.0023298					
sigma_e	1.2647965					
rho	.9574858	(fraction of variance due to u_i)				

Figure 24: Panel data regression for objective two with ROA and 7000 bootstraps

Appendix E - Editor's Letter

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This serves to confirm that I have edited the dissertation, "Influence of the Performance of Black Economic Empowerment Shares on the Johannesburg Stock Exchange Top 40", by Megan Hargreaves, student number 213513569.

DISCLAIMER: The editor cannot be held responsible for any errors introduced due to changes being made to the document after the editing is complete.

Yours sincerely,

D Collins

(Ms) Deanne Collins (MA)