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Anxious Vigilance – An investigation of the relationship between Optimal Managerial Ownership and Firm Value on the JSE

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A research report submitted to the Faculty of Commerce, Law, and Management, University of the Witwatersrand in partial fulfilment of the requirements for the degree of Master of Commerce (50%) in Finance.

Johannesburg, South Africa

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Anxious Vigilance – An investigation of the relationship between optimal managerial ownership and firm value on the JSE

Abstract

Managerial ownership has been advanced as a more effective corporate governance mechanism in minimising agency related costs by aligning the interests of managers with those of shareholders. This study examines the effects of equity ownership, using different ownership groups, on firm value of firms listed in the South African stock exchange to ascertain whether equity ownership results in well governed firms with higher firm value over the period of 2010 to 2020. The results are largely consistent with those in emerging markets, the results document that there is no statistically significant direct relationship between equity ownership and firm value. More so deviations from optimal equity ownership, both below and above optimal equity ownership, does not reduce firm value. The results also show that a portfolio of ownership firms (which refers to firms in which CEOs, the Executive Team, and Insiders (general employees) have equity ownership in the firm) outperforms a portfolio of non-ownership firms over the period 2015-2020, this aspect is more consistent to results reported in developed markets. Overall, managerial ownership does not appear to be an effective mechanism to aligning interest of shareholders and their managers in the South African landscape, other alternatives such as debt are proposed.

Declaration

I, Tiniso Willie Muhlarhi student number: 852085, declare that this research paper is my own work and that I have correctly acknowledged the work of others. It is submitted to fulfil the requirements for the degree of Master of Commerce in Finance at the University of the Witwatersrand, Johannesburg. I declare that this research paper has not been submitted for any other degree or examination in this or any other institution.



Tiniso Wille Muhlarhi

February 2022

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1. Introduction

1.1. Background and overview

Since the seminal work of Berle and Means (1932) it has become more accepted that the modern-day corporation's decision makers (managers) are separate from the owners (shareholders) of the corporation. This gives rise to the issue of "separation and control", well documented by Jensen and Meckling (1976), where managers of this modern-day corporation do not always act in the best interest of their shareholders. As Adam Smith correctly pointed out in the *Wealth of Nations,* given that managers are responsible for other people's (shareholders) capital rather than their own, they cannot be expected to safeguard this capital with the same "anxious vigilance" as the shareholders themselves (Smith, 1776). The question becomes, how then do shareholders of the modern-day corporation incentivise managers to look after their capital with the same "anxious vigilance"?

Scholars of corporate finance have been on a quest to answer this question since the seminal work of Berle and Means (1932) and Jensen and Meckling (1976). The latter scholars dubbed this issue of separation and control the principal-agency problem and proposed that to align the interest of the managers with those of the shareholders, managers would need to be sufficiently incetivised in the form of equity ownership - this led to the inception of the Incentive Alignment Hypothesis (IAH). The IAH of Jensen and Meckling (1976) has generated empirical support over the years, as there is evidence that firm value increases as managerial ownership increases (Morck, Shleifer and Vishny, 1988, McConnell and Servaes, 1995 and more recently, McConnel, McConnell and Lins, 2008, Ntim, 2013 and Lilienfeld-Toal and Ruenzi, 2014). The empirical support of this hypothesis has also brought about another concern with managerial ownership and firm value - the relationship between managerial ownership and firm value is not linear. Literature attributes this decline in firm value to managers being entrenched in the organisation and then proceeding to make suboptimal investment decisions for personal enrichment, this at the core of Stulz (1988) Entrenchment Hypothesis (EH). This causes an array of agency costs and corporate governance issues through extracting value from the rest of the shareholders, whilst being protected from markets of corporate control. The existence of the EH of Stulz (1988) alongside the IAH suggests that there exists some level of optimal managerial ownership that maximises firm value - there exists some amount of managerial equity ownership that incentives managers to act in the best

interest of shareholders without getting entranced and destroying firm value in the pursuit of self-enrichment. This optimal level of managerial ownership would also bring about considerations of the behavioral explanations to agency cost and the role of financial slack in creating an environment where managers are motivated (and somewhat, given the vested equity interest, obligated) to maximise firm value.

The concept of optimal managerial ownership is drawn from the observation of empirical evidence on optimal managerial ownership and firm value (Core and Lacker, 2002 and Zhenxu, 2008). This study is primarily focused on the evidence supporting IAH in the presence of the EH.

The evidence supporting the IAH shows that firm value increases as equity managerial ownership increases but this relationship is non-linear and as a result firm value decreases at a certain point. Vishny et al. (1988) finds that firm value increases when managerial ownership is between 0% to 5% and firm value then starts to decline as equity ownership increases beyond this range. The EH simply puts forward the idea that as managerial ownership increases, managers become more entrenched in the organisation and start to make value destroying decisions mainly motivated by the protection equity ownership grants them. At the center of these two hypotheses is the concept of optimal managerial ownership as shown in Figure 1 below, this is the primary focus of this study.

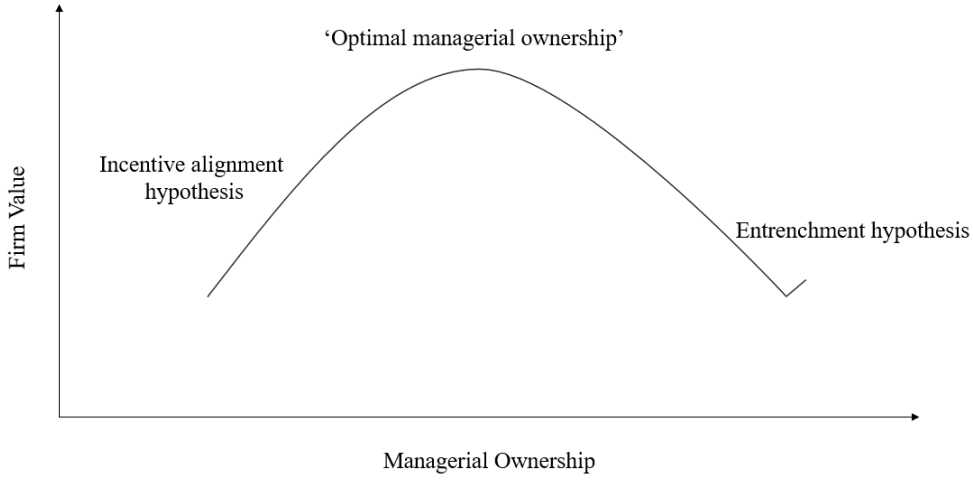


Figure 1 – Managerial Ownership and Firm Value

Optimal managerial ownership would then be cc or in the context of this study, the level of managerial ownership which is essential for managers to look after the interest of shareholders with the same 'anxious vigilance'.

To reconcile the IAH and EH, Zhenxu's (2008) approach is adopted and applied to South African publicly listed firms. Zhenxu (2008) uses Core and Larcker (2002)'s proposed transaction cost theory to reconcile the two schools of thought on managerial ownership and firm value. Transaction cost theory is an alternative approach to managing firm transactions to minimising the transaction costs, this theory originated with Williamson (1979). The view of an insignificant relationship between managerial ownership and firm value empirically is supported by Demsetz and Lehn (1985) and Himmelberg, Hubbard and Palia (1999); and the significant relationship between managerial ownership and firm value found by Mock, Shleifer and Vishny (1988) and McConnel and Servaes (1990). As cited by Zhenxu (2008), transaction cost theory predicts that deviations from optimal managerial ownership reduce firm value. Zhenxu (2008) empirically tests the transaction cost theory by studying the relationship between deviations from optimal managerial ownership and firm. Zhenxu (2008) finds that both deviations below and above the optimal managerial ownership level reduce firm value.

This issue of the modern-day corporation (principal agency problem) is not isolated. Financial slack (which is the excess resources that managers have at their disposal mainly in the form of cash or unused debt capacity) presents an interesting dilemma to this issue of the modern-day corporation which has separated the control and ownership functions. Zona (2012) shows that during periods of economic downturn, financial slack is necessary for managers to make investments towards innovation. On the other hand, arguments are made that when resources under the control of managers are reduced, managers are less likely to misuse this financial slack (see Eastbrook, 1984 and Jensen, 1986). Although building financial slack is necessary for investments in innovation, especially during periods of economic downturns such as the 2008 global crisis (and more recently the Covid-19 global pandemic) where such investments are critical to the financial recovery plans of firms. Managers (more so those with equity ownership) are also prone to misuse excess resources by investing in sub-par projects and engaging in empire building activities, in essence financial slack is a double-edged sword. The role of financial slack is important in

understanding the agency conflict between managers and shareholders. Combined with an optimal managerial ownership, financial slack can create the necessary environment for firm value to be maximised and agency costs minimised (or ideally eliminated).

The evidence on managerial ownership and firm performance in South Africa and other emerging markets leans more towards a negative relationship between managerial ownership and firm value, Lins (2003) examines firm value of 1433 firms from 18 emerging markets based on managerial ownership and finds that firm value is lower in the presence of managerial equity holdings, these findings are consistent with Morck, Shleifer, and Vishny (1988) on US firms. Selarka (2005) on the other hand studies the Indian corporate sector and finds that Insiders ownership relationship to firm value is non-linear. Firm value is negatively related to Insiders ownership and only starts having a positive effect at higher levels, specifically when equity ownership reaches 45 and 63 percent – this presents an interesting case study in the South African context given the employee share schemes of many publicly listed firms. South African studies document results consistent with those of other emerging markets. Ntim (2013) studies the relationship of different groups of ownership and market values of South Africa firms and finds that different groups of Insiders ownership including chief executives are associated with lower firm market values and Mugobo, Mutize and Aspeling (2016) examine 80 South African firm's Insiders ownership and firm value and finds the same negative relationship from the studies above.

While the studies above core focus is on the direct relationship between managerial ownership and firm value, this study will extend the examination of the relationship between managerial ownership and firm value by testing optimal managerial ownership on firm value. Testing the existence of optimal managerial ownership and its impact on firm value enables a better understanding of the relationship between ownership and firm value.

1.2. Motivation of the study

While studies exist that test the relationship of managerial ownership and firm value there is a lack of evidence (particularly in emerging markets) on whether optimal managerial ownership exists, the effects of moving away from that optimal managerial ownership level as well as possible

explanations of the effects of these deviations on firm value. This study will examine whether there exists some level of optimal managerial ownership in the South African listed firms landscape that positively (or negatively) impacts firm value providing a guidance to shareholders on how to best minimise agency costs and maximise firm value through aligning their interests with those of their stewards.

1.3. Problem statement

The principal-agency problem has been a core issue for the modern-day corporation, the interests of managers and shareholders are not always aligned. The misalignment of interests results in managers of corporations executing value destroying decisions as can be observed in the infamous Enron Scandal where the board of directors and corporate officers pursued their interests at the expense of shareholders.

The body of research on managerial ownership and firm performance has mainly been focused on the direct relation between ownership and firm value or performance. There is a lack of studies in both developed and emerging markets (more so the latter) that focus on optimal managerial ownership as well as the (behavioral) explanations of the concave relationship between these two factors (ownership and firm value).

This study addresses this research knowledge gap and contributes to the literature in this area of corporate finance.

1.4. Research objective and Hypothesis

In this study, transaction cost theory is used to examine whether South African listed firms whose Chief Executive Officers (CEOs), other C-level executives (Executive Team) and insiders (general employees of the firms who have equity ownership) have a certain level of equity ownership which incentivises them to align their interests with those of their shareholders, and ultimately pursue the value maximisation objective of the firm with the same “anxious vigilance” as the owners of the firm. To factor in the impact of the Covid-19 period, the sample is separated into period including and excluding the Covid-19 period, this will assist in examining whether the results remain consistent.

Using a simple buy and hold strategy this study will also examine whether ownership portfolios outperform non-ownership portfolios.

The study will therefore examine the following hypotheses:

Ho: There is no statistically significant relationship between managerial ownership and firm value.

H_1: There is a statistically significant relationship between managerial ownership and firm value

H_2: Statistically significant deviations below and above the optimal managerial ownership does not reduce firm value

H_3: statistically significant deviations below and above the optimal managerial ownership does reduces firm value

H_4: A buy and hold trading strategy based on managerial-owned firms does not statistically significantly outperforms non-managerial owned firms.

H_5: A buy and hold trading strategy based on managerial-owned firms statistically significantly outperform non-managerial owned firms

1.5. Potential benefits of the study

This study is not only important to build on academic research to advance the understanding of the nature of firms, how they can control agency costs using managerial ownership and other corporate governance tools, but also to corporate boards and founders of the firm who place their trust in managers to act in their best interest and increase their wealth through pursuing genuine value maximisation activities/projects. This study will also be beneficial given the recent failure in corporate governance in the world and in South Africa, from the infamous collapse of Enron as documented by Sauviat (2006) – and more recently the corporate scandals of WeWork, which saw a massive loss of value in its initial public offering mainly due to a lack of an effective corporate governance structure and in the South African context, Steinhoff which was in the top 10 largest

South African publicly listed firms with a board well renowned for its ethical standards in corporate South Africa prior to its collapse also mainly due to failures in corporate governance.

The remainder of this study is as follows: Section 2 will review literature on managerial ownership and firm value, financial slack, agency costs, behavioral agency costs explanations and corporate governance. Section 3 will then document the methodology used in this study. Section 4 documents the empirical results and findings of the study and their interpretation. Section 5 provides a summary of the study and concludes.

2. Literature review

The hypotheses of this study are driven by the predictions of agency theory, particularly the idea of the zero-agency cost firm – which is essentially a firm that is owned and managed by a single person, therefore eliminating the principal-agent problem. These predictions have implications on firm performance, managerial ownership, and corporate governance. The literature relating to all these areas of corporate finance will be discussed in this section and a review of the empirical evidence between ownership and firm value will also be discussed at the end of the section.

2.1. Agency theory

To develop an in-depth understanding of agency theory, one needs to become familiar with Berle and Means' (1932) analysis of the United States corporate law. They document how control and ownership have been separated for the modern-day United States corporation (the same can be inferred about corporations outside of the United States). Jensen and Meckling (1976) advance this analysis by defining and formalising the agency issues that are brought about by this separation of ownership and control. They argue that if the agents that are controlling the firm are different from those that own it and both these agents are rational utility maximisers, there is good reason to believe that the agents controlling the firm will not always act in the best interest of the owners of the firm – this gives rise to principal-agent problem which can potentially result in firm value being destroyed or not fully maximised. These agency problems and associated costs created by the separation of ownership and control can be managed or reduced (or ideally eliminated). Fama and Jensen (1983) show how organisations in which control is separated from ownership leads to a decision-making system that separates decision management from decision control in order to manage these agency issues and associated costs through monitoring the decisions and actions of managers. This is the common structure observable in many public firms where the executives are responsible for making firm-wide decisions and the board of directors are then tasked with monitoring these decisions on behalf of the shareholders.

Literature on agency costs (the cost associated with agency problems) proposes two avenues to manage or reduce these agency costs. The first is to reduce the excess cashflows under the manager's control (Easterbrook, 1984 and Jensen, 1986). The argument advanced is that managers are less likely to mismanage funds and engage in empire building activities if they do not have

excess funds at their disposal. The second avenue is towards managerial compensation and firm ownership of managers (Hemmer, 1993; Ang, Cole, and Wu Lin, 2000 and Belghitar and Clark, 2015). The main arguments in this line of literature is based on the Jensen and Meckling (1976) IAH which make predictions about the zero-agency cost firm. In a firm where the managers and owners are the same agents, shareholders and managers bear both the risk and rewards of the firm. Therefore, with some form of managerial ownership, there is an expectation that the agency cost of the firm will be reduced, and firm value will then be maximised. The U.S. studies on managerial ownership and firm performance support this prediction. Vishny *et al.*, (1998) study 371 Fortune 500 firms and find an increase in Tobin's Q (to a certain extent) as board ownership increases. More recently, Lilienfeld-Toal and Ruenzi (2014) show that an investment strategy based on CEO managerial ownership delivers abnormal stock market returns - a portfolio with firms that are run by CEOs who own stock in the firm outperformed those that do not or with lower CEO equity ownership.

The empirical support of managerial ownership and positive firm performance (often referred to as the IAH) has an important caveat. Stulz (1988) shows that as the voting rights controlled by management increases to larger fractions, the value of the firm falls – a similar finding documented by Vishny *et al.*, (1998). This contradicts the IAH's and predictions of the zero-agency cost firm as one would expect firm value to continue to increase as managers' and shareholders' interest become more aligned at higher levels of managerial ownership. This phenomenon has since been termed the EH whereby managers lose the incentive to maximise the value of the firm as market discipline becomes less effective given the protection granted by equity ownership.

2.2. The role of financial slack

The evidence on firm value and equity ownership points to the existence of a non-linear relationship between firm value and managerial ownership (Morck, Shleifer and Vishny, 1988 and McConnel and Servaes, 1990) with evidence of this relationship being U-shaped. Financial slack (excess free cashflows) plays a role in incentivising managers to maximise firm value according to Jensen (1986). There is a behavioural element to this that is yet to be appropriately explored in corporate finance literature – managers are more likely to maximise firm value should their

behavior given the level of financial slack be predicted correctly, Jensen (1986) alludes to this idea by proposing debt as a control of financial slack.

The corporate policy of a firm can be used to control financial slack and therefore control the behavior of managers. This would incentivise these managers to pursue value adding initiatives, as illustrated from the work of Easterbrook (1984) and Jensen (1986). It is possible to control financial slack using a firm's dividend and debt policy, where the aim is to reduce the excess capital managers have at their disposal through redistributing the capital back to shareholders or committing, through a contractual obligation, to reserve the capital for mandatory payments at regular intervals in the short and long term. These types of measures can adequately control managerial behavior. The question now becomes: in the presence of optimal managerial ownership does financial slack matter?

In the presence of an optimal managerial ownership, the expectation/theoretical prediction is that external influences such as the stock market, will be the main driver of managerial behavior to align the value maximising interest of these managers and shareholders. One would not expect managers that have these external influences to misuse excess free cashflows. Financial slack should be irrelevant to the principal-agent problem in these instances, as a manager's personal wealth being tied to the success of the firm is a more effective control for the behavior of managers. These types of managers should be less likely to engage in empire building and taking on risky projects that are not in the best interest of the firm (and their personal wealth). Since equity ownership will be at an optimal level, the managerial entrenchment issue through large equity ownership should not be a factor. There is some empirical evidence to the prediction laid out above. Lilienfeld-Toal and Ruenzi (2014) find that firms with managerial equity ownership have reduced empire building activities and increased operational efficiency despite weak corporate governance.

2.3. Behavioral Agency Cost Explanations

The conflicting views between the EH and IAH point to a potential behavioral explanation about the relationship between shareholders and managers. A study on decision making under uncertainty by Kahneman and Tversky (1979) has made clearer the inconsistency of decision makers, through an experiment that shows that decision makers tend to make different decisions

when presented with the same information in different forms. This line of thinking can potentially explain the conflicting views between the EH and IAH and ultimately the relationship between managers and shareholders. Decision makers are not always rational and cannot be expected to simply maximise firm value as a result of large share ownership as can be observed through the reported declining firm value as equity ownership increases (Lins, 2003 and Morck, Shleifer, and Vishny, 1988). Consideration needs to be given to optimal ownership.

To understand the relationship between managers and shareholders and their inconsistent decision-making habits, is to first to be in agreement to the commonly raised point by behavioral finance scholars that managers and shareholders are not the rational agents assumed by traditional economic theory. They exhibit certain behavioral biases such as overconfidence and optimism that are inconsistent with economic literature. Literature on behavioral corporate finance has historically been more focused on investor biases, but there has been a shift to managerial biases as documented by Fairchild (2007). Studies have now shown that the same biases that investors exhibit are also common among managers of corporations. It is therefore worthwhile to look at some of these biases that are relevant in explaining the misalignment of interest between firm managers and shareholders.

One of the earliest types of evidence of managerial biases, particularly optimism, is from a study done by Statman and Tyebjee (1985) which shows that managers tend to overestimate sales and underestimate costs. This shows that managers do not have an objective decision framework when selecting and evaluating their own projects. A relatively recent study of the Fortune 500 CEOs by Malmendier and Tate (2005) show evidence of manager overconfidence in investment decisions. This study shows that a manager's investment policy is cashflow sensitive. Managers are more willing to invest when they have access to internal funds and tend to be more passive in their investment plans should they need to raise equity to carry out the investment. This shows that managers might be more casual with excess cashflows and make more well thought out decisions in the presence of equity – making Jensen's approach to reducing the resources under the control of managers an important tool to controlling and managing agency related costs.

The presence of managerial biases is evident and has empirical support (see Fairchild, 2007, for a more comprehensive literature review). The primary focus should be on how these biases impact firm value through an increase in agency costs. Statman and Caldwell (1987) show that managers become entrenched in projects and hold negative net present value (NPV) projects when they should be eliminating such projects based on the objective NPV rule that is taught in undergraduate finance classes – accept projects with positive NPVs and reject/discontinue those with negative NPV values.

2.4. Corporate governance and agency costs

Corporate governance is the main mechanism available for firms to use to control for agency costs (Shleifer and Vishny, 1986). It is meant to balance the interests of all the stakeholders of the firm through the structuring of boards to monitor, supervise and play an advisory role to managers and their actions. As has been documented (Stiles and Taylor, 1993, Jennings, 2003 and Kgobe, 2019) corporate governance often fails, prompting shareholders to consider external mechanisms of aligning their interests with managers. One such external measure is to use the market as a mechanism for corporate control (Holmstrom and Kaplan, 2001) as opposed to solely relying on firm's internal processes and systems.

South Africa has historically been known for its robust corporate governance standards following developments of the King Code (Rossouw, van der Watt and Rossouw 2002) but it has since lost its top place in the world over the past few years and is only recently regaining its rankings on corporate governance and audit quality (WEF – The Global Competitiveness Report, 2019). South Africa has been riddled by corporate governance scandals that have resulted in the loss of substantial firm value and trust in the country's corporate governance practices and independence of audit firms. The most recent scandals are that of Steinhoff and Tongaat Hulett, which saw both firms having to restate some of their previous years' financial performance as questions from the public, investors and auditors mounted about the reliability of their reported financial performance. It is prevalent that internal processes and controls are often not sufficient to protect shareholders against agency related costs.

Using U.S. publicly listed firms, Core, Holthausen and Larcker (1999) show that firms experience agency problems in the presence of weak corporate governance. CEOs extract higher compensation and have poor operating and stock market performance. CEO compensation however drops when the CEO has an ownership stake, suggesting that CEO ownership might be a more effective corporate governance mechanism as CEO's show an interest to extract less capital/resources from the firm in the presence of equity ownership.

2.5. Transaction cost theory and optimal managerial ownership

As illustrated in Figure 1, optimal managerial ownership is the reconciliation of the IAH and EH. To reconcile these two theories, Core and Lacker (2002) and Zhenxu (2008) use the transaction cost theory.

Core and Larcker (2002) examine the effects of managerial ownership by looking at a group of firms with mandatory CEO ownership increases and their subsequent firm performance. Their study provides a basis to test whether there exists some level of managerial ownership that is enough to incentivise managers to act in the best interest of shareholders without getting entrenched and as a result destroying firm value. The approach used in Core and Larcker (2002) study is however incomplete as it provides for a one-sided test of targeting optimal management ownership – the study only tests the effects of optimal managerial ownership when a firm moves away from the optimal level. Zhenxu (2008) on the other hand provides a more exhaustive two-way test by studying the effects of managerial ownership on firm value when a firm moves towards the optimal level of ownership and when they move away from optimal managerial ownership by empirically testing the transaction cost theory. As Zhenxu (2008) points out, testing the deviation of managerial ownership on both sides of optimal ownership allows for the transactional cost theory to be separated from the IAH and EH. The transaction cost theory provides a basis to which the optimal level of managerial ownership can be tested. A similar approach will be adopted in this study.

2.6. Methodology literature review

The proposed methodology for this study is adopted from Zhenxu (2008) who follows Himmelberg, Hubbard and Palia's (1999) Panel data approach and methodology. As it is widely accepted between economic and finance scholars panel data has benefits of modeling both the common and individual behaviors, panel data is also contains more information, variability and is more efficient than cross sectional-sectional and time series data, panel data also minimises the inherent biases from aggregating groups into single time series and lastly panel data can detect and measure the statistical effects where's time series and cross-sectional data cannot.

by using a firm fixed effects regression as a bench of managerial ownership. The residuals from the firm fixed effects are used to measure deviations from optimal managerial ownership. When positive, the residuals indicate an above-optimal deviation. The residual of the fixed effects can capture deviations from optimal managerial ownership since this value can either be positive or negative from the benchmark specified by the fixed effects regression. This approach and methodology is consistent with literature from Harford (1999) and Dittmar and Marhrt-Smith (2006). Both these studies use the firm fixed effects regression to benchmark for optimal cash holding and the firm fixed effects residuals to signal whether corporates hold excess cash, with residuals being positive indicative of excess cash holdings.

While a fixed effects method is used in the studies above, it has been documented that the fixed effects model produces biased and inconsistent estimation, the GMM addresses the shortcomings of the fixed effects model as it has the capability of factoring in nonlinear moment condition which add to the efficiency and robustness of GMM (Kripfganz, 2019). The GMM has additional moments which enables the estimator to produce more precise estimates (Wooldridge, 2001). For these reasons, the Generalised Method of Moments (GMM) will be used following guidance from Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998) and Wooldridge (2001).

The definition of managerial ownership varies across studies. Zhenxu (2008) defines managerial ownership as the percentage of outstanding shares held by the chief executive officer (CEO), while

Core and Larcker (2002) define managerial ownership as ownership by the CEO and other top executives. Other studies have defined managerial ownership as per below in Table 1:

Table 1 – Managerial Ownership definitions

Study	Managerial ownership definition
Morck, Shleifer and Vishny (1988)	Percentage of outstanding shares held by board members
McConnel and Servaes (1990)	Percentage of outstanding shares held by insiders
Hermalin and Weisbach (1991)	Percentage of outstanding shares held by the CEO

Central to the literature definition of managerial ownership is corporate officers that are influential to the decision-making bodies of the firm, in this study managerial ownership will be defined as the outstanding shares held by the Chief Executive (CEO), other C-level executives (Executive Team) who are part the firms highest decision-making bodies and insiders (General employees of the firm with equity ownership). These three groups of shareholders are exhaustive in terms of agents within the firm that can hold equity ownership, all three groups are examined in this study as per the empirical literature definitions.

2.7. Review of empirical evidence on managerial ownership and firm performance

The U.S. studies on managerial ownership and firm performance mainly support the predictions of the zero-agency cost firm. A study on S&P500 firms by Hayes, Mehran and Schaefer (2004) shows that firm performance is positively related to the shares owned by CEOs of the firm. Using a sample of large public listed firms, Fahlenbrach (2009) documents that founder-CEO firms earn an abnormal return of 10.7% annually. More so, these founder-CEOs have different investment behaviors to successor CEOs - they invest more in research and development, spend more in capital expenditure and make more value creating mergers and acquisitions – these CEOs clearly have lower agency related costs.

More recently, Lilienfeld-Toal and Ruenzi (2014) document similar findings. They find that an investment strategy based on publicly available managerial ownership information delivers abnormal returns of 4% to 10% annually. This shows the superior stock market performance of firms that are managed by CEOs with managerial ownership. They also further document that this

relationship is much more pronounced for firms with weak corporate governance. These findings further strengthen the arguments that managerial ownership can be used as a more effective mechanism to controlling for agency costs than corporate governance.

Research on this topic in emerging markets document results contrary to those observed in more developed markets. Studies show that managerial ownership results in lower firm performance. Selarka (2005) examined the interaction between firm value and ownership structure of 1 397 Indian manufacturing firms and found a curvilinear relationship between firm value and managerial ownership where firm performance declines until ownership is at high degree of managerial ownership. Lins (2003) studied the impact of managerial equity holdings and found that when managers own equity in the firm, the value of said firm tends to be lower. South African studies document similar findings. Ntim (2013), in contrast to U.S. studies, finds that JSE firms with CEOs that have equity ownership in the firm are associated with lower firm market values. These findings are supported by Mugobo, Mutize and Aspeling (2016) – they document that South African firms with managerial ownership have a lower return on assets (ROA). Managerial ownership in the South African context does not seem to benefit corporates in reducing agency related problems and associated costs. The only caveat with the above studies is that they have tested for CEO ownership directly and have not considered the possibility of an optimal managerial ownership. This study will seek to address the caveats of the above.

2.8. Literature Review Summary

The corporate finance literature on ownership and firm value has evolved from the theoretical understanding of the nature of firms by Merle and Means (1932) and Jensen and Meckling (1976) to the empirical testing of not only the direct relationship between ownership and firm value but also the optimal ownership and firm value. While significant progress has been made in both emerging and developed markets in understanding this relationship and how it relates to the principal-agent problem, the empirical evidence in these markets continue to differ.

The conflicting empirical results between emerging and developed markets studies present a research gap that should be explored further. While there is literature in emerging markets on the direct relationship between managerial ownership and firm value, the literature review shows that

the relationship between optimal managerial ownership and firm value is yet to be sufficiently explored.

3. Description of data and research methodology

The methodology used in this study is mainly adopted from Zhenxu (2008). Using a firm fixed effects regression Zhenxu (2008) tests the transaction cost theory by examining the deviation from optimal managerial ownership and the relationship these deviations have with firm value. The author further examines the stock market performance of firms with managerial ownership based on a buy and hold strategy.

A fixed effects regression is used to determine managerial ownership deviations from optimality, whereas in this study a Generalised Method of Moments (GMM) approach is used due to its ability to produce more consistent and unbiased estimates over the fixed effects regression. These deviations obtained from the fixed effects regression are then interacted with firm value to test the first two hypothesis of the study. The stock market performance measures are used to determine whether these firms outperform similar firms without managerial ownership during the sample period of the study. Both these approaches are brought together to give an understanding of managerial performance and firm value in the South African landscape.

3.1. Data

Data on managerial ownership and firm performance has been collected from Bloomberg. This study has used the JALSH index as a proxy for all firms that are listed on the Johannesburg Stock Exchange (JSE) with managers that hold shares in the firm during the period 2010 to 2020. Bi-annual reported financial data has been considered in this study. Firms that delist during the sample period will be included in the study to avoid survivorship bias; these firms will be included up to their latest reporting data available before the delisting.

The ownership data has been collected for three ownership groups which are influential to firm performance, namely CEO's, Executive Team and Insiders. The ownership data assist in examining the impact these groups have on firm performance and supported by previous literature

and results of this study explain the possible explanation of the misalignment of interest between the custodians of the firm and its owners

Total return in the stock market is a function of price appreciation over time and dividends paid. As the Firms Act of South Africa requires firms to publish annual financial statements within six months after their financial year ends, a six-month lag has been included in the regressions to control for the lag between reporting and announcements.

3.2. Detailed hypothesis and theoretical framework

The hypothesis of this study, consistent with Zhenxu (2008) and Lilienfeld-Toal and Ruenzi (2014), are as follows:

Ho: There is no statistically significant relationship between managerial ownership and firm value.

H_1: There is a statistically significant relationship between managerial ownership and firm value

H_2: Statistically significant deviations below and above the optimal managerial ownership does not reduce firm value

H_3: statistically significant deviations below and above the optimal managerial ownership does reduces firm value

H_4: A buy and hold trading strategy based on managerial-owned firms does not statistically significantly outperforms non-managerial owned firms.

H_5: A buy and hold trading strategy based on managerial-owned firms statistically significantly outperform non-managerial owned firms

3.2.1. The fixed effects regression from Zhenxu (2008)

Before the first two hypothesis can be tested, Zhenxu (2008) needed a benchmark specification for optimal managerial ownership. The following firm fixed effects regression is used to benchmark managerial ownership:

$$CEO\ Ownership_{it} = a_i + c_1(Size_{it}) + c_2(Size\ square_{it}) + c_3(Cash\ flow_{it}) + c_4(Cash\ flow\ square_{it}) + c_5(Sales\ growth_{it}) + c_6(Plant, property\ and\ equipment_{it}) + c_7(Research\ and\ Development\ \&\ Advertising_{it}) + c_8(Earnings\ Volatility_{it}) + c_9(Sales\ Volatility_{it}) + c_{10}(Leverage_{it}) + \varepsilon_{it}$$

Where;

$$Deviation_{it} = |\varepsilon_{it}| \quad \ldots\ldots\ldots\

$$Firm\ value = a_i + b_2(Deviation_{it}) + b_3((Deviation * Above\ optimal\ dummy)_{it}) + c_1(Size_{it}) + c_2(Size\ square_{it}) + c_3(Cash\ flow_{it}) + c_4(Cash\ flow\ square_{it}) + c_5(Sales\ growth_{it}) + c_6(Plant, property\ and\ equipment_{it}) + c_7(Research\ and\ Development\ \&\ Advertising_{it}) + c_8(Earnings\ Volatility_{it}) + c_9(Sales\ Volatility_{it}) + c_{10}(Leverage_{it}) + \omega_{it} \quad \ldots\ldots (3)$$

Should hypothesis 2 (deviations on both sides of optimal managerial ownership reduce firm value) be true then b_2 will be less than 1 ($b_2 < 1$) and $b_2 + b_3$ will also be less than one ($b_2 + b_3 < 1$). The approach detailed above will be adopted in this study to determine the relationship deviations from managerial ownership has with firm value. Zhenxu (2008) uses only Tobin's Q to proxy for firm value. This measure is consistent with literature in capturing some effects of corporate governance and will also be used in this study. This study will however also be using Return on Assets (ROA) and Return on Equity (ROE) as proxies for firm value – for reasons to be elaborated on in Section 3.3. The control variables adopted from Zhenxu (2008) are used as instrumental variables in the GMM estimation model.

3.2.2. Generalised Method of Moments Estimation (GMM) Application

The application of GMM in this study is applied following guidance from Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998) and Wooldridge (2001). As documented in Wooldridge (2001) when some serial correlation is present (which is the case with some of the datasets and variables used in this study) the GMM estimator can produce more efficient estimations than the Fixed Effects. Since the GMM can be used to improve estimations when the assumptions of certain estimations/models do not hold up, such as the 'strict exogeneity assumption' for Fixed Effects, it is the preferred estimation for this study to ensure robust and consistent outputs.

The test of independence of (Brock, Dechert, & Scheinkman) or as commonly referred to as the BDS test, is used to test the non-linearity. The BDS test has the capability to detect non linearity while not being affected by linear dependencies in the data.

3.2.3. Stock market performance Test

To test the relationship between equity ownership and stock market performance, a buy and hold investment strategy based on ownership firms (defined as firms with CEOs, Executives and Insiders owning equity in the firms they associate with) portfolios will be considered.

The ownership portfolios will be constructed solely based on publicly available information about equity ownership of CEOs, Executive Teams, and Insiders and the portfolios will be rebalanced every six months this period frequency is adopted from Lilienfeld-Toal and Ruenzi (2014), who conduct a similar study using US firms. The portfolios will be overlapping and be both equally and value weighted, and equity ownership will be defined as the percentage of outstanding shares the ownership groups hold. The t-Test will be conducted to test whether there is a significant difference between the two portfolios.

3.3. Variables

Managerial ownership is calculated as a proposition of shares issues held by managers, to test hypothesis 4 and 5 the portfolio is held and rebalance over a period of 6 months while a 12-month period is applied to the rest of the hypothesis. The ownership is expressed as follows:

$$CEO\ Ownership = \frac{\#\ Shares\ Held\ by\ CEO\ /\ C\text{-}level\ executive}{\#\ Shares\ Outstanding} \quad \ldots\ldots (4)$$

To add robustness to the study, ROA and ROE will be added as the proxies of firm value over and above Tobin's Q. The former is used to capture the return on assets employed in the presence of managerial ownership to provide a more direct test of the impact of agency costs and ROE to capture the return of the general constituency of shareholders when managerial ownership is present, testing the concept of the zero-agency cost firm. Firm value (Tobin's Q, ROA and ROE) will be calculated as follows:

$$Tobin's\ Q = \frac{Market\ value\ of\ equity - Book\ Value\ of\ equity + Book\ vakue\ of\ assets}{Book\ value\ of\ assets} \quad \ldots\ldots (5)$$

$$ROA = \frac{Net\ Profit}{Average\ Total\ Assets} \quad \text{(6)}$$

$$ROE = \frac{Net\ Profit}{Average\ Shareholders\ Equity} \quad \text{(7)}$$

There are factors such as corporate governance (proxied by board structure) and managers being founders of the firm which they run and control over firm resources which have empirically been proven to affect managerial ownership (see Core, Holthausen and Larcker, 1999, Hall and Liebman, 1998 and Cheng, Nagar and Rajan, 2004 for a more detailed discussion). However, since these variables are stable over time they will be captured by firm-specific intercepts as per Zhenxu (2008). The instrumental variables used in this study are detailed in the table below:

Table 2 - Variables definitions

Variable	Definition
Market Value of Equity	Shares outstanding multiplied by the current share price
Book Value of Equity	Residual value of assets and liabilities in the firm's statement of financial position (SFP)
Book Value of Assets	Value of assets as reported in the SFP
Net Profit	After tax profit as reported in the income statement
Total Assets	Book value of total assets as reported in the SFP
Shareholders Equity	Value of shareholders equity as reported in the SFP

3.3.1. Instrumental Variables and Limitations

The authors use control/instrumental variables to proxy for the exogeneous effects in the firm's contracting environment and a fixed effects model to control for unobserved characteristics. The authors follow Himmelberg, Hubbard and Palia (1999)'s approach and use variables detailed in the table below (these variables will also be used in this study):

Table 3 - Variables definitions adopted from Himmelberg, Hubbard and Palia (1999)

Instrumental Variable	Definition
Firm Size	The natural logarithm of assets as a proxy
Growth Opportunities	The growth rate of sales

Soft Capital	The ratio of research and development expenses to total expenses and ratio of advertising expenses to total expenses as proxies
Capital Intensity	Proxied by Property, Plant and Equipment to assets.
Cash Flow	Ratio of income before extraordinary items to assets as a proxy
Volatility in the operating environment	Measured by the standard deviation of the ratio of income before extraordinary items to assets in the past three years and the standard deviation of the natural logarithm of sales in the previous three years
Additional control variables	Square of size and the square of cash flow
Leverage	The ratio of total debt to total assets

Zhenxu (2008) follows the definitions of Palia (2001) and Aggrawal and Samwick (2003) to calculate CEO ownership as the percentage of shares outstanding held by the CEO plus the options held multiplied by a hedge ratio. This study will not be considering options as they are not influential to the behavior of CEOs as they are, by definition, non-obligatory. Should a chief executive have the option but not obligation to tie his wealth into the performance of the firm and align his interests with those of the shareholders, he cannot reasonably be expected to do so should this adversely affect his wealth. The optimal managerial ownership variable will also be used in this study to examine whether deviations from below and above the optimal ownership reduce firm value. Optimal ownership is defined as the required level of equity ownership to maximise the value of the firm.

3.4. Methodology Summary

The methodology used in this study extensively examines the impact of managerial ownership on firm value by first looking at the fundamental performance of managerial ownership through the study of deviations of ownership against accounting-based measures, namely ROA and ROE and market based measure Tobin's Q. The study then looks at the stock market performance of ownership portfolios through the construction of a simple buy and hold strategy based on ownership firms. Managerial ownership in the context of this study refers to equity ownership by CEOs, Executive Teams, and Insiders.

This type of approach is important as executives of firms are normally assessed through book measures such as the bottom-line profit in the reported financial statements as well as the stock market performance of the firm. The approach adopted in this study will provide results that can be used to determine the best ways to ensure that managers and insiders/employees of the firm have their interest aligned with those of shareholders in the South African context.

4. Empirical Results

The descriptive statistics of the study are highlighted in Table 4 below. During the sample period 2015 to 2020, 606 observations across 9 firm variables are studied with regards to CEO ownership. During this sample period, the average CEO ownership is 0.26%, which is significantly lower compared to Zhenxu (2008) who had a mean CEO ownership of 3.5% for US firms sampled in the study. The number of firms with CEOs holding outstanding shares in the firm has significantly decreased from 62 firms in 2015 to only 20 firms in 2020 for firms listed on the JSE. The C-level executives studied over the same period with the same variables has 581 observations, with the average share ownership for this group being 8.3%. Lastly, insiders ownership is studied over the sample period 2010 to 2020 with 1 429 observations. The average outstanding share ownership is 1.76%. The number of firms with insiders ownership is consistently over 120 throughout the sample period, significantly higher than both the CEOs and Executive Teams datasets.

Table 4 - Equity ownership descriptive statistics

Summary Statistics	CEO Ownership	Executive Ownership	Insiders Ownership
Minimum	0.0001%	0.0017%	0.0030%
Mean	0.3053%	8.3400%	1.7060%
Maximum	47.2407%	95.6670%	70.0830%
Number of Observations	606	304	1 067

The BDS test is used to test the non-linearity of the different ownership groups. The results below on tables 5, 6 and 7 using the 5% confidence interval show that the ownership groups are mainly linear at 5% confidence intervals and exhibit some non-linearity at higher confidence intervals. The results of this study do not significantly align with the empirical evidence which suggests that

that ownership data is mainly non-linear. Overall, the results fail to reject the null hypothesis that the ownership data is independently and identically distributed for the CEO and Insiders Ownership groups at the 5% confidence interval. Only the Executive Team ownership data consistently exhibits non-linearity at all multiple confidence intervals. The results remain consistent including or excluding the Covid-19 period.

Table 5 - BDS Test: CEO Ownership

BDS Test – CEO Ownership (including Covid-19 period)					BDS Test – CEO Ownership (Excluding Covid-19 period)				
Epsilon for close points = 1.0586; 2.1173; 3.1759; 4.2346 p-value =					Epsilon for close points = 1.1571; 2.3141; 3.4712; 4.6283 p-value =				
	1.0586	**2.1173**	**3.1759**	**4.2346**		**1.1571**	**2.3141**	**3.4712**	**4.6283**
2	0.4968	0.2253	0.2125	0.1413	**2**	0.4736	0.3142	0.1744	0.5863
3	0.1295	0.0956	0.0868	0.0373	**3**	0.3171	0.1643	0.0610	0.8149
4	0.1413	0.1234	0.1128	0.0458	**4**	0.4068	0.2112	0.0774	0.7613
5	0.2050	0.1824	0.1702	0.0709	**5**	0.5506	0.2994	0.1172	0.8163

Table 6 - BDS Test: Executive Team Ownership

BDS Test – Executive Team Ownership (including Covid-19 period)					BDS Test – Executive Team Ownership (Excluding Covid-19 period)				
Epsilon for close points = 8.0543; 16.1086; 24.1629; 32.2172 p-value =					Epsilon for close points = 8.5298; 17.0596; 25.5894; 34.1191 p-value =				
	8.0543	**16.1086**	**24.1629**	**32.2172**		**8.0543**	**16.1086**	**24.1629**	**32.2172**
2	0.0000	0.0000	0.0003	0.0329	**2**	0.0000	0.0008	0.0107	0.0330
3	0.0000	0.0000	0.0080	0.0748	**3**	0.0000	0.0307	0.0532	0.0684
4	0.0000	0.0000	0.0084	0.0896	**4**	0.0000	0.0044	0.0595	0.0757
5	0.0000	0.0000	0.0184	0.1610	**5**	0.0000	0.0052	0.1269	0.1373

BDS Test – Insiders Ownership (including Covid-19 period)					BDS Test – Insiders Ownership (Excluding Covid-19 period)				
Epsilon for close points = 2.9452; 5.8903; 8.8355; 11.7807 p-value =					Epsilon for close points = 3.0174; 6.0349; 9.0523; 12.0698 p-value =				
	2.9452	**5.8903**	**8.8355**	**11.7807**		**1.1571**	**2.3141**	**3.4712**	**4.6283**

2	0.1595	0.1321	0.8849	0.4691	**2**	0.2174	0.1168	0.9798	0.4371
3	0.1168	0.2146	0.8953	0.1719	**3**	0.1309	0.1670	0.7069	0.1474
4	0.1302	0.1550	0.6130	0.1550	**4**	0.1706	0.1353	0.5650	0.1669
5	0.0887	0.0308	0.1757	0.0183	**5**	0.1157	0.0253	0.1605	0.0285

Table 7 - BDS Test: Insiders Ownership

4.1. Ownership and Firm Value

The research output of this study is broken down into the period before the global Covid-19 pandemic and during the Covid-19 period, this is to examine the impact of the Covid-19 period on the results of the study. The research output in Table 5 and 6 below report the direct relationship between CEO ownership and firm value, therefore testing hypothesis 1 and 2. The GMM produces an estimate of 0.0031 when Tobin's Q is used as a proxy for firm value, the estimate changes to -0.0050 when the Covid-19 period is included. This indicates that CEO ownership is negatively related to firm value as measured by the firms' Tobin's Q - an increase in CEO equity ownership is expected to lead to a decrease in firm value when the Covid-19 period is included with the opposite being true pre-Covid. These results are however statistically insignificant.

These results when ROE and ROA are used as proxies for firm value are more consistent. The GMM estimation produces negative signs pre-Covid and including Covid-19 period, there results are also statistically insignificant. We therefore find no statistically significant direct relationship between CEO ownership and firm value. With these results, the hypothesis of a relationship between managerial ownership and firm value is rejected.

Table 8 - CEO Ownership and Firm Value (Excluding Covid-19 Period)

CEO Ownership and Firm Value (Excluding Covid-19 Period)			
	Tobin's Q	ROE	ROA
Shares Held by CEO	0.0031 (0.0130)	-0.0070 (0.0120)	-0.0003 (0.0040)
Number of Observations	244	244	244
Significance levels:	*p<0.1; **p<0.05; ***p<0.01		

Table 9 - CEO Ownership and Firm Value (Including Covid-19 Period)

CEO Ownership and Firm Value (Including Covid-19 Period)

	Tobin's Q	ROE	ROA
Shares Held by CEO	-0.0050 (0.0280)	-0.0170 (0.0180)	-0.0040 (0.0040)
Number of Observations	304	304	304
Significance levels:	*p<0.1; **p<0.05; ***p<0.01		

These results are consistent with Demsetz and Lehn (1985), Himmelberg, Hubbard and Palia (1999) and Zhenxu (2008) – who all report that there is no statistically significant relationship between CEO ownership and firm performance (using similar measures of firm value). Empirical studies typically conclude their analysis of the relationship between firm value and equity ownership at the Chief Executive Officer level. The approach adopted in this study is to extend the analysis to similar key stakeholders with influence on the value of the firm namely the Executive Team and Insiders – general employees of the firm.

Table 7, 8 and 9 below report the model tests for the GMM estimation on the direct relationship between CEO ownership and firm value, there are three tests that are reported the Sargan test, tests for autocorrelation and Wald test. The model test results overall appear to be robust. Rodman (2009) suggest that a p-value of less than 0.25 for the Sargan Test is generally acceptable. The Sargan Test p-value for the CEO ownership is 0.16 (0.20 pre Covid-19) when Tobin's Q is used as a measure of firm value, 0.15 (0.03 pre Covid-19) when ROE is used and 0.21 (0.14 pre Covid-19) for ROA. This indicates that the instrumental variables used in these models are valid and the models do not have an overidentification of restrictions issue with the only exception being the ROE model results pre Covid-19. The Sargan test reports a loss in the validity of the GMM estimation when ROE is used as a proxy for firm value before the Covid-19 period.

The autocorrelation of the variables is tested using an AR(1) and AR(2) specifications, following guidance from Andres and Valledo (2008). Some autocreation can be expected for AR(1) but a rejection of the AR(2) null hypothesis of no serial correlation would be concerning. The p-value for the AR(2) specification when Tobin's Q is used as a measure of firm value is 0.915 (0.356 pre Covid-19) , 0.451 (0.977 pre Covid-19) when ROE is used and 0.613 (0.501 pre Covid-19) when ROA is used as proxy for firm value. With these p-values, we fail to reject the null hypothesis of no serial correlation, there should be no concerns of serial correlation with GMM estimation on the direct relation between CEO ownership and firm value.

Table 10 - CEO Ownership and Tobin's Q Robustness Tests

CEO Ownership and Tobin's Q Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	72.1477 (p-value = 0.2012)	54.2883 (p-value = 0.1616)
Autocorrelation test (1)	-1.7991 (p-value = 0.0720)	-2.4069 (p-value = 0.0161)
Autocorrelation test (2)	-0.9233 (p-value = 0.3559)	-0.1072 (p-value = 0.9146)

Table 11 - CEO Ownership and ROE Robustness Tests

CEO Ownership and ROE Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	45.4217 (p-value = 0.0353)	59.4074 (p-value = 0.1466)
Autocorrelation test (1)	0.5054 (p-value = 0.6133)	-0.1707 (p-value = 0.8645)
Autocorrelation test (2)	0.0285 (p-value = 0.9772)	0.7534 (p-value = 0.4512)

Table 12 - CEO Ownership and ROA Robustness Tests

CEO Ownership and ROA Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	40.4910 (p-value = 0.1440)	56.5060 (p-value = 0.2150)
Autocorrelation test (1)	-0.6012 (p-value = 0.5477)	-0.3867 (p-value = 0.6990)
Autocorrelation test (2)	-0.6725 (p-value = 0.5013)	-0.5061 (p-value = 0.6128)

The GMM estimation results are also reported for The Executive Team of the firm – which traditionally consists of the Chief Executive Officer, the Chief Financial Officer, the Chief Operations Officer, and other executives related to people and resources, and technology. The GMM output in Table 10 and 11 below report the results on the direct relationship between the Executive Team equity ownership and firm value.

In contract to CEO ownership, the GMM produces an estimate of 0.005 (0.003 pre Covid-19) when Tobin's Q is used a proxy for firm value. The results remain consistent when ROE and ROA are used as proxies. The results show that the executive team equity ownership is positively related to firm value - firm value is expected to increase as the equity ownership of the group of firm executives increases. The results are statistically significant at the 5% level when using Tobin's Q as a proxy for firm value. They are however insignificant for ROE and ROA. We therefore fail to reject the hypothesis that managerial ownership is related to firm value when Tobin's Q is used as measure of firm value.

Table 13 - Executive Team Ownership and firm value (Excluding Covid-19 Period)

Executive Team Ownership and Firm Value (Excluding Covid-19 Period)			
	Tobin's Q	ROE	ROA
Shares Held by Executive Team	0.0030** (0.001)	0.0004 (0.0050)	0.0011 (0.0010)
Number of Observations	506	506	506
Significance levels:	*p<0.1; **p<0.05; ***p<0.01		

Table 14 - Executive Team Ownership and firm value (Including Covid-19 Period)

Executive Team Ownership and Firm Value (Including Covid-19 Period)			
	Tobin's Q	ROE	ROA
Shares Held by Executive Team	0.0050** (0.002)	0.0010 (0.001)	0.00200 (0.002)
Number of Observations	606	606	606
Significance levels:	*p<0.1; **p<0.05; ***p<0.01		

The GMM estimation model test are reported on Tables 12, 13 and 14. The p-values for the Sargan test is less than the Rodman (2009) 0.25 level for Tobin's Q and ROE (for both pre Covid-19 and including the Covid-19 period). The results show a Sargan Test p-value of 0.18 (0.21 pre Covid-19) when Tobin's Q is used as a measure of firm value, 0.16 for ROE (0.10 pre Covid-19) and 0.051 (0.16 pre Covid-19) for ROA. While the results for ROA when the Covid-19 period is included are concerning, the other tests are relied upon to assess whether the test for these models can be reliably used to draw statical inferences.

The test for autocorrection shows no signs of autocorrelation across all the measures of firm performance. The p-values for Tobin's Q is 0.489 (0.179 pre Covid-19), 0.749 (0.783 pre Covid-19) for ROE, and 0.310 (0.557 pre Covid-19) for ROA. The last dataset examined relates to Insiders equity ownership.

Table 15 - Executive Team Ownership and Tobin's Q Model Robustness Tests

Executive Team Ownership and Tobin's Q Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	13.0957 (p-value = 0.2184)	17.4886 (p-value = 0.1779)
Autocorrelation test (1)	-1.3130 (p-value = 0.1892)	-1.6004 (p-value = 0.1095)
Autocorrelation test (2)	-1.3453 (p-value = 0.1785)	-0.6921 (p-value = 0.4889)

Table 16 - Executive Team Ownership and ROE Model Robustness Tests

Executive Team Ownership and ROE Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	36.5759 (p-value = 0.1033)	59.6776 (p-value = 0.16422)
Autocorrelation test (1)	0.4984 (p-value = 0.6182)	0.5231 (p-value = 0.60089)
Autocorrelation test (2)	-0.2750 (p-value = 0.7833)	0.3206 (p-value = 0.7485)

Table 17 - Executive Team Ownership and ROA Model Robustness Tests

Executive Team Ownership and ROA Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	44.0138 (p-value = 0.16864)	50.8127 (p-value = 0.0518)
Autocorrelation test (1)	0.6171 (p-value = 0.5372)	0.6254 (p-value = 0.5317)
Autocorrelation test (2)	-0.5870 (p-value = 0.5572)	-1.01464 (p-value = 0.3103)

The results on insiders ownership are based on a longer sample period. The GMM estimate produces a value of 0.003 (0.03 pre Covid-19) when Tobin's Q is used as a proxy for firm value. This is similar to the results on Executive Team ownership. The results show that insiders ownership is positively related to firm value using the Tobin's Q, ROE and ROA (with the exception of the results pre Covid-19 period for ROA) as measures of firm value. Consistent with results observed with CEO Ownership, these results are statistically insignificant for all firm value measures.

Table 18 – Insiders Ownership and Firm Value (Excluding Covid-19 period)

Insiders Ownership and Firm Value (Excluding Covid-19 Period)			
	Tobin's Q	ROE	ROA
Shares Held by Executive Team	0.003 (0.003)	0.0003 (0.001)	-0.0003 (0.001)
Number of Observations	944	944	944
Significance levels:	*p<0.1; **p<0.05; ***p<0.01		

Table 19 – Insiders Ownership and Firm Value (Including Covid-19 period)

Insiders Ownership and Firm Value (Including Covid-19 Period)			
	Tobin's Q	ROE	ROA
Shares Held by Executive Team	0.003 (0.003)	0.0003 (0.001)	0.0001 (0.001)
Number of Observations	1 067	1 067	1 067
Significance levels:	*p<0.1; **p<0.05; ***p<0.01		

Overall, the results on direct relationship between managerial ownership and firm value in the South African landscape largely appear to be statistically insignificant, with the exception of Executive Team ownership and Tobin's Q – which finds that there exist a positive relationship between Executive Team ownership and firm value. These results are somewhat consistent with empirical evidence from Demsetz and Lehn (1985), Himmelberg, Hubbard and Palia (1999), and more recently and directly comparable to South African firms Ntim (2013) and Mugobo, Mutize and Aspeling (2016). In the next section the results on optimal ownership and firm value are reported.

4.2. Optimal Ownership and Firm Value

In this section, the results on the core hypothesis of the study on optimal managerial ownership and firm value are reported. As outline in Chapter 3, the GMM approach is used to generate residuals which are used as a proxy for deviations from optimal managerial ownership while the predicted values are used as proxy for optimal managerial ownership. These variables are then regressed using the GMM estimations to determine the impact of their deviations on firm value. An interaction term is used to determine whether deviations above or below impacts firm value. The results, both the periods excluding and including the Covid-19 global pandemic, to examine the hypothesis below are reported in this section:

H2: Statistically significant deviations below and above the optimal managerial ownership reduce firm value

H3: Statistically significant deviations below and above the optimal managerial ownership does not reduce firm value

As highlighted in the methodology section and adopted from Zhenxu (2008), in order to fail to reject the null hypothesis that deviations below and above the optimal managerial ownership reduce firm value b_2 should be less than 1 ($b_2 < 1$) and $b_2 + b_3$ which means the GMM estimation deviation (b_2) from optimal managerial ownership should be negative and the sum of the estimate of deviations from optimal managerial ownership and the interaction term/dummy variable (b_2 and b_3) should also be negative.

4.2.1. Optimal CEO Ownership and Firm Value

The descriptive statistics for optimal CEO ownership and firm value are reported in tables 17 and 18. The tables show the descriptive statistics on predicted CEO equity ownership, which is used as a proxy for optimal CEO ownership, from the GMM estimation and its residuals. The results surprisingly show that mean optimal ownership is -0.04%, a negative optimal ownership is surprising as it would suggest that the Chief Executive should short the stock of the firm they manage, the optimal managerial ownership median is 0.00%. The 75th percentile is 0.18% and the 95th percentile is 0.05%. The predicted ownership values are significantly lower compared to actual ownership, should the results of this study be statistically significant it would suggest that the current equity ownership is not consistent with the optimal ownership from the GMM estimations to enable the maximisation of firm value. The magnitude of the residuals reported below are comparable to those found in Zhenxu (2008). The interpretation of a negative managerial ownership is unclear as it would not make rational and economic sense for the Chief Executives of JSE listed firms to hold a short position in the firm's they manage and there is little to no empirical guidance on the correct interpretation for a negative managerial ownership coefficient.

Table 20 - Predicted CEO Ownership and Residuals from GGM (Excluding Covid-19 Period)

Predicted CEO Ownership and Residuals from GGM (Excluding Covid-19 Period)				
Variable	Mean	Median	75th Percentile	95th Percentile
CEO Ownership	0.31132	0.0013	0.0524	0.6294
Predicted CEO Ownership	-0.0512	0.0000	0.0000	0.0597
Residuals	-0.0004	0.0000	0.0384	0.1378

Table 21 - Predicted CEO Ownership and Residuals from GGM (Including Covid-19 Period)

Predicted CEO Ownership and Residuals from GGM (Including Covid-19 Period)				
Variable	Mean	Median	75th Percentile	95th Percentile
CEO Ownership	0.3053	0.0012	0.0519	0.6147
Predicted CEO Ownership	-0.0373	0.0000	0.0180	0.0511
Residuals	-0.0003	0.0000	0.0304	0.1380

The model diagnostics test in table 19 below indicate that the GMM estimations used to generate optimal ownership has been correctly specified with sufficient instrumental and significant explanatory variables. The Sargan test is 0.22 (10.19 pre Covid-19 period) which less than the 0.25

Rodman recommended level. The AR(2) p-value is 0.581 (0.480 pre Covid-19 period) which indicates that there are no signs of serial autocorrelation in the GMM estimation.

Table 22 - Predicted CEO Ownership Model Robustness Tests

Predicted CEO Ownership Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	3.2971 (p-value = 0.1923)	4.3670 (p-value = 0.2244)
Autocorrelation test (1)	-1.4765 (p-value = 0.1398)	-1.5135 (p-value = 0.1301)
Autocorrelation test (2)	-0.7057 (p-value = 0.4804)	-0.55146 (p-value = 0.5813)

The results in tables 20 and 21 report the deviations from CEO ownership and firm value using the GMM estimations. The GGM estimation results produce a value of 0.063 (-0.016 pre Covid-19 period) using Tobin's Q as a proxy for firm value. These results indicate that, on average, deviations from CEO ownership increase firm value when the Covid-19 period is included - these results are statistically significant at the 10% level. The results however reflect the opposite when the Covid-19 period is excluded from the sample period – these results are statistically insignificant. The results including the Covid-19 period are in contrast to those reported in Zhenxu (2008), which document that deviations from CEO ownership reduces firm value. These results are consistent, although insignificant, when using ROA and ROE as a proxy for firm value.

The second set of results (GMM outputs (2), (4) and (6)) in tables 20 and 21 below produce GMM estimations to test whether deviations from below and above the optimal managerial ownership level reduce firm value. The results remain consistent with the estimations being positive across all the proxies for firm value when the Covid-19 period is included in the sample period – the results are statistically significant for ROE for both CEO deviations and the dummy variables at the 5% level. Only the CEO deviations is significant when using Tobin's Q at the 1% level and the dummy variable is significant at the 5% level for ROA. However, when the Covid-19 period is excluded the Tobin's Q estimation change to a negative sign and are statistically insignificant, the ROE results are consistent with a statistical significance at the 1% level and the ROA results have a change in sign a statistical significance at the 1% level. The results indicate that deviations from managerial ownership increase firm value in contrast to what is reported in Zhenxu (2008) when the Covid-19 period is included in the sample period.

Table 23 - Optimal CEO Ownership and Firm Value (Excluding Covid-19 Period)

Optimal CEO Ownership and Firm Value (Excluding Covid-19 Period)						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
CEO Deviations	-0.016 (0.015)	-0.020 (0.014)	-0.005 (0.019)	0.005 (0.008)	-0.004 (0.008)	-0.002 (0.002)
CEO Deviations and Dummy		-0.013 (0.016)		0.024*** (0.007)		0.009*** (0.002)
Number of Observations	506		506		506	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

Table 24 - Optimal CEO Ownership and Firm Value (Including Covid-19 Period)

Optimal CEO Ownership and Firm Value (Including Covid-19 Period)						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
CEO Deviations	0.063* (0.038)	0.075*** (0.026)	0.016	0.027** (0.014)	0.007 (0.008)	0.010 (0.006)
CEO Deviations and Dummy		0.056 (0.035)		0.050** (0.023)		0.014** (0.007)
Number of Observations	606		606		606	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

As outlined above, in order to fail to reject the null hypothesis that deviations from below and above the optimal ownership level reduce firm value, b_2 (CEO deviations) should be less than 1 ($b_2 < 1$) and $b_2 + b_3 < 1$ the sum of the CEO deviations and the dummy variable used to indicate deviations below and above optimal ownership level should also be negative. Overall, the results on optimal CEO managerial ownership reject the null hypothesis that deviations from below and above the optimal ownership level reduce firm value both when the Covid-19 period is included and excluded from the sample period. The results on deviations from optimal ownership are significant for Tobin's Q and ROE when the Covid-19 period is included, whereas the results on deviation from below and above the optimal ownership level are significant for Tobin's Q (only when the Covid 19 period is included, the ROA and ROE results are statistically significant for both the periods excluding and including the Covid-19 global pandemic.

The model tests show that the Sargan test is 0.13 for Tobin's Q, 0.21 for ROE and 0.13 for ROA. These values are all below the recommended 0.25 level. The AR(2) test for serial autocorrelation generates values of 0.470 for Tobin's Q, 0.662 for ROE and 0.197 for ROA showing that there are

no sings for autocorrelation. Lastly, with all measures of firm value the p-values for the Wald test is less 0.05 indicating that the explanatory variables are significant. Overall, the model appears to be correctly specified for all measures of firm performance.

Table 25 - Optimal CEO Ownership and Tobin's Q Model Robustness Tests

Optimal CEO Ownership and Tobin's Q Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	41.8157 (p-value = 0.1148)	55.9602 (p-value = 0.1267)
Autocorrelation test (1)	-1.5465 (p-value = 0.1220)	-2.2137 (p-value = 0.0268)
Autocorrelation test (2)	-0.9412 (p-value = 0.3466)	0.7229 (p-value = 0.4698)

Table 26 - Optimal CEO Ownership and ROE Model Robustness Tests

Optimal CEO Ownership and ROE Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	50.1573 (p-value = 0.0466)	56.8547 (p-value = 0.2058)
Autocorrelation test (1)	0.4823 (p-value = 0.6296)	0.0096 (p-value = 0.9923)
Autocorrelation test (2)	0.0360 (p-value = 0.9713)	0.4360 (p-value = 0.6628)

Table 27 - Optimal CEO Ownership and ROA Model Robustness Tests

Optimal CEO Ownership and ROA Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	37.9855 (p-value = 0.0781)	45.7504 (p-value = 0.1279)
Autocorrelation test (1)	0.5441 (p-value = 0.5864)	0.7492 (p-value = 0.4538)
Autocorrelation test (2)	-0.1644 (p-value = 0.8694)	-1.2890 (p-value = 0.1974)

To assess the robustness of these results, a robustness test is performed consistent with Zhenxu (2008). The deviation on optimal managerial ownership is adjusted for firm size adjusted. The rationale provided in Zhenxu (2008) and adopted in this study is that the size of the firm may affect the size/magnitude of the deviations. Zhenxu (2008) advances that CEO's/managers of large firm would find it more costly to purchase share equity in a large firm relative to CEO who managed small firms. The size-adjusted deviations are therefore used to factor in the size effect.

4.2.2. CEO Robustness Test - Size-adjusted deviations and Firm Value

To test the robustness of the results, the estimations are adjusted for firm size. The GMM estimates in tables 25 and 26 produce similar and consistent estimations when adjusted for size. The results

therefore continue to reject the null hypothesis that deviations from optimal managerial ownership reduce firm value. The size adjusted GMM estimation model test results are in tables 27,28 and 29 are also consistent with has been reported above. The Sargan test produces p-values less than the recommended 0.25 for all measures of firm performance. There are no signs of serial autocorrelation for all measures of firm performance.

Table 28 - Optimal CEO Ownership and Firm Value (Excluding Covid-19 Period) – Size Adjusted

Optimal CEO Ownership and Firm Value (Excluding Covid-19 Period) – Size Adjusted						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
CEO Deviations	-0.166 (0.174)	-0.204 (0.163)	-0.048 (0.205)	0.013 (0.086)	-0.070 (0.098)	-0.075*** (0.027)
CEO Deviations and Dummy		-0.133 (0.177)			0.276*** (0.067)	0.135*** (0.035)
Number of Observations	506		506		506	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

Table 29 - Optimal CEO Ownership and Firm Value (Including Covid-19 Period) – Size Adjusted

Optimal CEO Ownership and Firm Value (Including Covid-19 Period) – Size Adjusted						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
CEO Deviations	0.697* (0.406)	0.804*** (0.271)	0.052 (0.078)	0.088* (0.045)	0.168 (0.193)	0.331*** (0.128)
CEO Deviations and Dummy		0.595 (0.371)		0.206*** (0.065)		0.509** (0.201)
Number of Observations	606		606		606	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

Table 30 - Optimal CEO Ownership and Tobin's Q Model Robustness Tests – Size Adjusted

Optimal CEO Ownership and Tobin's Q Model Robustness Tests – Size Adjusted		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	41.7227 (p-value = 0.1167)	56.3223 (p-value = 0.1200)
Autocorrelation test (1)	-1.5479 (p-value = 0.1217)	-2.2117 (p-value = 0.0261)
Autocorrelation test (2)	-0.9399 (p-value = 0.3473)	0.7211 (p-value = 0.47082)

Table 31 - Optimal CEO Ownership and ROE Model Robustness Tests – Size Adjusted

Optimal CEO Ownership and ROE Model Robustness Tests – Size Adjusted		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	45.7203 (p-value = 0.0550)	53.2363 (p-value = 0.1869)
Autocorrelation test (1)	-0.0078 (p-value = 0.9938)	-0.4978 (p-value = 0.6187)

Autocorrelation test (2)	-0.1313 (p-value = 0.8956)	0.6045 (p-value = 0.5455)

Table 32 - Optimal CEO Ownership and ROA Model Robustness Tests – Size Adjusted

Optimal CEO Ownership and ROA Model Robustness Tests – Size Adjusted		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	40.311 (p-value = 0.1486)	52.2889 (p-value = 0.2119)
Autocorrelation test (1)	-0.5816 (p-value = 0.5608)	-0.8147 (p-value = 0.4153)
Autocorrelation test (2)	-0.7303 (p-value = 0.4652)	-0.5514 (p-value = 0.5813)

4.2.3. Optimal Executive Ownership and Firm Value

The next reported GMM estimates are on optimal Executive Team ownership and firm value. The results below in tables 30 and 31 report the descriptive statistics on the optimal executive equity ownership and firm value. The results show that on average, executive managerial ownership is -1.0278% (-1.1547% pre Covid-19 period), compared to an actual average ownership of 8.2400% (9.5370% pre Covid-19 period). The median ownership is 0.0000% (for both the pre and including Covid-19 period) and the 95th percentile is 2.1380% (3.1309%). The signs of the residuals are consistent with those found for CEO ownership and those reported in Zhenxu (2008).

Table 33 - Predicted Executive Team Ownership and Residuals from GGM (Excluding Covid-19 Period)

Predicted Executive Team Ownership and Residuals from GGM (Excluding Covid-19 Period)				
Variable	Mean	Median	75th Percentile	95th Percentile
Executive Team Ownership	9.5370	1.8130	10.5138	45.1741
Predicted Executive Team Ownership	-1.1547	-0.0536	0.0000	3.1309
Residuals	-1.0042	0.0000	1.7158	6.2565

Table 34 - Predicted Executive Team Ownership and Residuals from GGM (Including Covid-19 Period)

Predicted Executive Team Ownership and Residuals from GGM (Including Covid-19 Period)				
Variable	Mean	Median	75th Percentile	95th Percentile
Executive Team Ownership	8.3400	0.9730	9.3086	43.1050
Predicted Executive Team Ownership	-1.0278	0.0000	0.0000	2.1370
Residuals	-0.4740	0.0000	1.2026	6.2908

The model diagnostics tests in table 32 below indicate that the GMM estimations used to generate optimal ownership are largely correctly specified with sufficient instrumental and significant explanatory variables. The Sargan test is 0.15 (0.29 pre Covid-19 period) which less than the 0.25 Rodman recommended level. The AR(2) p-value is 0.112 (0.696 pre Covid-19 period) which indicates that there are no signs of serial autocorrelation in the GMM estimation.

Table 35 - Predicted Executive Team Ownership Model Robustness Tests

Predicted Executive Team Ownership Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	2.4843 (p-value = 0.2888)	13.1828 (p-value = 0.1545)
Autocorrelation test (1)	1.1429 (p-value = 0.2530)	-1.3626 (p-value = 0.1730)
Autocorrelation test (2)	-1.5809 (p-value = 0.1139)	-0.3907 (p-value = 0.6960)

In contrast to the results reported for CEO ownership, tables 33 and 34 document conflicting results dependent on the measure of firm value and whether the Covid-19 period has been included or excluded. The GMM estimates on executive team equity ownership and firm value using Tobin's Q as measure of firm value show that the estimation on deviation from executive ownership is 0.001 (0.008 pre Covid-19 period), which is not statically significant when the Covid-19 period is included and statistically significant at the 5% level when the period is excluded.

The estimations indicate that an increase in firm value can be expected from a deviation in executive team ownership both below and above the optimal level. These results differ when the interaction term is included. The estimation for the deviations in executive ownership is then -0.001 (0.007 pre the Covid-19 period) and the interaction term is -0.002 (-0.001 pre Covid-19 period). The sum of these estimations is negative when the Covid-19 period is included and positive when excludes, which indicates that the firm value can be expected to fall when there is a deviation from optimal executive ownership and the decrease in firm value can be expected both below and above the optimal level when the Covid-19 period is included with the opposite to be expected when the period is excluded. These results are however also statistically insignificant when the Covid-19 period included and statistically significant at the 5% when the period excluded.

When ROA is used as a measure of firm value, the GMM estimates in tables 33 and 34 report a value of -0.0003 (0.0001 pre Covid-19 period) which is in contrast to the results when Tobin's Q

is used as measure of firm value. This indicates that firm value can be expected to decrease from a deviation in optimal executive ownership when the Covid-19 period is included with the opposite to hold when the Covid-19 excluded. The sign of the value remains consistent when the interaction term is included, and the summation of the deviations and interaction term is negative with or without the Covid-19 period. Both the results are however statistically insignificant. Lastly, ROE is used as measure of firm value. The results are consistent and insignificant with those observed for Tobin's Q.

Table 36 - Optimal Executive Team Ownership and Firm Value (Excluding Covid-19 Period)

Optimal Executive Team Ownership and Firm Value (Excluding Covid-19 Period)						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
Executive Team Deviations	0.008** (0.004)	0.007** (0.004)	-0.001 (0.002)	0.001 (0.001)	0.0001 (0.0003)	0.00002 (0.001)
Executive Team Deviations and Dummy		-0.001 (0.003)		0.001 (0.001)		-0.00004 (0.001)
Number of Observations	243		243		243	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

Table 37 - Optimal Executive Team Ownership and Firm Value (Including Covid-19 Period)

Optimal Executive Team Ownership and Firm Value (Including Covid-19 Period)						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
Executive Team Deviations	0.001 (0.001)	-0.001 (0.002)	0.0002 (0.0004)	-0.00000 (0.001)	-0.0003 (0.0003)	-0.0001 (0.0003)
Executive Team Deviations and Dummy		-0.002 (0.003)		0.0004 (0.001)		0.0002 (0.0003)
Number of Observations	304		304		304	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

The model diagnostics show that the model is correctly specified with sufficient instrumental variables and significant explanatory variables (with the exception of ROA). The Sargan test p-value when Tobin's Q is used as a measure of firm value is 0.21, 0.12 for ROE and 0.16 for ROA. All of these p-values are less than the 0.25 level recommended by Rodman (2009). The test for serial autocorrelation reports a p-value of 0.883 for Tobin's Q, 0.949 for ROE and 0.403 for ROA. Therefore, we fail to reject the null hypothesis of no serial autocorrelation for all measures of firm performance. Lastly, the p-values for the Wald test for Tobin's Q and ROE are less than 0.005

indicating that the explanatory variables are significant. The ROA Wald test p-value is however over 0.05 but not significantly so to declare the model incorrectly specified taking into account the other model test performed.

Consistent with the CEO ownership dataset, to assess the robustness of these results, the deviations are adjusted for size using firm size. The results of this robustness test are reported in the next section.

Table 38 - Optimal Executive Team Ownership and Tobin's Q Model Robustness Tests

Optimal Executive Team Ownership and Tobin's Q Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	21.7099 (p-value = 0.0409)	16.8253 (p-value = 0.2074)
Autocorrelation test (1)	-0.6932 (p-value = 0.4882)	-1.2683 (p-value = 0.2047)
Autocorrelation test (2)	1.1572 (p-value = 0.2472)	-0.1460 (p-value = 0.8840)

Table 39 - Optimal Executive Team Ownership and ROE Model Robustness Tests

Optimal Executive Team Ownership and ROE Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	38.5215 (p-value = 0.0610)	45.8934 (p-value = 0.1250)
Autocorrelation test (1)	0.6701 (p-value = 0.5028)	0.6754 (p-value = 0.4993)
Autocorrelation test (2)	-0.5205 (p-value = 0.6027)	0.0638 (p-value = 0.9491)

Table 40 - Optimal Executive Team Ownership and ROA Model Robustness Tests

Optimal Executive Team Ownership and ROA Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	47.651 (p-value = 0.0752)	58.9580 (p-value = 0.1560)
Autocorrelation test (1)	-0.0440 (p-value = 0.9649)	-0.3218 (p-value = 0.7476)
Autocorrelation test (2)	-0.4826 (p-value = 0.6294)	-0.8361 (p-value = 0.4031)

4.2.4. Executive Team Robustness Test - Size-adjusted deviations and Firm Value

Consistent with CEO ownership, the deviations are adjusted for firm size to test the robustness of the results. Table 38 reports the results of firm size adjusted deviations and firm value. The GMM estimates continue to produce conflicting results dependent on the measure of firm value and whether the sample period included or excluded the Covid-19 global pandemic period. The results

observed above for Tobin's Q, ROA and ROE remain consistent and remain statistically insignificant after adjusting for Size. The results therefore continue to show that there is no statistically significant relationship between optimal executive team equity ownership and firm, therefore not supporting null hypothesis that deviations from optimal managerial ownership reduces firm value.

Table 41 - Optimal Executive Team Ownership and Firm Value (Excluding Covid-19 Period) – Size Adjusted

Optimal Executive Team Ownership and Firm Value (Excluding Covid-19 Period) – Size Adjusted						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
Executive Team Deviations	1.057*** (0.222)	0.237 (0.220)	-0.126 (0.120)	-0.124 (0.120)	-0.195* (0.107)	-0.196* (0.107)
Executive Team Deviations and Dummy		-0.012 (0.025)		0.002 (0.007)		0.005 (0.012)
Number of Observations	243		243		243	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

Table 42 - Optimal Executive Team Ownership and Firm Value (Including Covid-19 Period) – Size Adjusted

Optimal Executive Team Ownership and Firm Value (Including Covid-19 Period) – Size Adjusted						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
Executive Team Deviations	0.011 (0.014)	-0.032 (0.032)	0.001 (0.004)	0.005 (0.009)	-0.003 (0.003)	-0.002 (0.004)
Executive Team Deviations and Dummy		-0.006 (0.036)		0.004 (0.008)		0.001 (0.003)
Number of Observations	304		304		304	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

The model diagnostics are consistent with has been observed in the non-size adjusted model. The Sargan test p-values are within the recommended levels in Rodman (2009) and there are no signs of autocorrelation in all measures of firm performance. In the next section the Insiders ownership results are reported.

Table 43 - Optimal Executive Team Ownership and Tobin's Q Model Robustness Tests – Size Adjusted

Optimal Executive Team Ownership and Tobin's Q Model Robustness Tests – Size Adjusted	
Excluding Covid-19 Period	**Including Covid-19 Period**

Sargan test	44.3543 (p-value = 0.1336)	17.1862 (p-value = 0.1909)
Autocorrelation test (1)	-0.7317 (p-value = 0.4643)	-1.3094 (p-value = 0.1904)
Autocorrelation test (2)	1.1849 (p-value = 0.2361)	-0.0839 (p-value = 0.9332)

Table 44 - Optimal Executive Team Ownership and ROE Model Robustness Tests – Size Adjusted

Optimal Executive Team Ownership and ROE Model Robustness Tests – Size Adjusted		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	43.0152 (p-value = 0.07403)	55.769 (p-value = 0.2354)
Autocorrelation test (1)	-0.0127 (p-value = 0.9899)	-0.1446 (p-value = 0.8850)
Autocorrelation test (2)	-0.5103 (p-value = 0.6098)	0.4806 (p-value = 0.6308)

Table 45 - Optimal Executive Team Ownership and ROA Model Robustness Tests – Size Adjusted

Optimal Executive Team Ownership and ROA Model Robustness Tests – Size Adjusted		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	41.2081 (p-value = 0.1276)	58.9151 (p-value = 0.1569)
Autocorrelation test (1)	-0.6420 (p-value = 0.5209)	-0.3216 (p-value = 0.7477)
Autocorrelation test (2)	-0.7068 (p-value = 0.4796)	-0.8352 (p-value = 0.4036)

4.2.5. Optimal Executive Ownership and Firm Value

The last dataset examined is Insiders ownership, which refers to equity ownership by employees of South African firms. The Insiders ownership dataset has a sample size of 10 years as opposed to the 5-year datasets for CEO and Executive Team equity ownership. Table 43 and 44 below report the predicted Insiders ownership and its residuals**.** The predict optimal ownership is consistent with those reported for CEO and Executive Team ownership. The GMM estimates show an average value of -0.0633% (-0.08014% pre Covid-19 period) relative to an average value of 1.7060% (1.7860% pre Covid-19 period) actual ownership, a median value of 0.0000% and the 95th percentile of 0.2055%.

Table 46 - Predicted Insiders Ownership and Residuals from GGM (Excluding Covid-19 Period)

Predicted Insiders Ownership and Residuals from GGM (Excluding Covid-19 Period)				
Variable	Mean	Median	75th Percentile	95th Percentile
Insiders Ownership	1.786	0.121	0.622	8.804
Predicted Insiders Ownership	-0.08014	0.00000	0.0374463	0.7939527
Residuals	-0.13264	0.00000	0.0374463	0.7939527

Table 47 - Predicted Insiders Ownership and Residuals from GGM (Including Covid-19 Period)

Predicted Insiders Ownership and Residuals from GGM (Including Covid-19 Period)				
Variable	Mean	Median	75th Percentile	95th Percentile
Insiders Ownership	1.7060	0.1100	0.5720	8.6296

Predicted Insiders Ownership	-0.0633	0.0000	0.0000	0.2055
Residuals	-0.1290	0.0000	0.0229	0.6917

The model diagnostics tests in table 45 below indicate that the GMM estimations used to generate optimal ownership are largely correctly specified with sufficient instrumental and significant explanatory variables. The Sargan test is 0.17 (0.14 pre Covid-19 period) which less than the 0.25 Rodman recommended level. The AR(2) p-value is 0.452 (0.583 pre Covid-19 period) which indicates that there are no signs of serial autocorrelation in the GMM estimation.

Table 48 - Predicted Insiders Ownership Model Robustness Tests

Predicted Insiders Ownership Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	8.2399 (p-value = 0.1435)	7.715927 (p-value = 0.1726)
Autocorrelation test (1)	-0.0201 (p-value = 0.9839)	0.07992583 (p-value = 0.9363)
Autocorrelation test (2)	0.5490 (p-value = 0.5830)	0.4524824 (p-value = 0.65092)

The GMM estimates on tables 46 and 47 produce estimates similar to those reported for CEO ownership. The estimates on optimal Insiders ownership and firm value produce a value of 0.001 including and excluding the Covid-19 period for ownership deviations using Tobin's Q as a measure of firm value. The sum value of the deviations and dummy variable is negative when the Covid-19 period is included and positive when the period is excluded from the sample period, the results when the Covid-19 period is included are consistent with Zhenxu (2008). The results are however statistically significant. The results are consistent when ROA and ROE are used as a measure of firm value and are also statistically insignificant.

Table 49 - Optimal Insiders Ownership and Firm Value (Excluding Covid-19 Period)

Optimal Insiders Ownership and Firm Value (Excluding Covid-19 Period)						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
Insiders Deviations	0.001 (0.002)	0.011 (0.011)	-0.001 (0.001)	-0.001 (0.002)	-0.001** (0.0004)	-0.001 (0.001)
Insiders Deviations and Dummy		0.012 (0.014)		0.00001 (0.002)		-0.0005 (0.001)
Number of Observations	944		944		944	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

Table 50 - Optimal Insiders Ownership and Firm Value (Including Covid-19 Period)

Optimal Insiders Ownership and Firm Value (Including Covid-19 Period)						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
Insiders Deviations	0.001 (0.003)	0.0004 (0.007)	0.0004 (0.0004)	-0.002 (0.002)	0.0003 (0.0003)	-0.0001 (0.002)
Insiders Deviations and Dummy		-0.001 (0.008)		-0.003 (0.003)		-0.0005 (0.002)
Number of Observations	1 067		1 067		1 067	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

The model robustness tests below in tables 48, 49 and 50 produce concerning results particularly when ROE and ROA are used as measures firm value. The Sargan test p-value for Tobin's Q is consistent with the less 0.25 and more than 0.10 recommended by Rodman (2009), while the p-values for ROA and ROE are however significantly lower than the recommended levels. Using AR(2) as a test of serial autocorrelation, the results show that there are no signs of serial autocorrelation when Tobin's Q is used as a measure of firm value. We however fail to reject the null hypothesis of no serial autocorrelation for ROE and ROA.

Overall, the model robustness tests results suggest that the GMM approach when ROE and ROA are used as measures of firm value cannot be relied upon to draw statistical inferences while the Tobin's Q results is more reliable.

Table 51 - Optimal Insiders Ownership and Tobin's Q Model Robustness Tests

Optimal Insiders Ownership and Tobin's Q Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	112.5053 (p-value = 0.20407)	129.859 (p-value = 0.1623)
Autocorrelation test (1)	-1.9546 (p-value = 0.050628)	-2.2184 (p-value = 0.0265)
Autocorrelation test (2)	-1.2514 (p-value = 0.2108)	-1.2402 (p-value = 0.2149)

Table 52 - Optimal Insiders Ownership and ROE Model Robustness Tests

Optimal Insiders Ownership and ROE Model Robustness Tests		
	Excluding Covid-19 Period	Including Covid-19 Period
Sargan test	21.3891 (p-value = 0.0656)	25.2373 (p-value = 0.021481)
Autocorrelation test (1)	-1.9970 (p-value = 0.0458)	-2.2931 (p-value = 0.021845)
Autocorrelation test (2)	1.3921 (p-value = 0.1639)	1.7433 (p-value = 0.08128

Table 53 - Optimal Insiders Ownership and ROA Model Robustness Tests

Optimal Insiders Ownership and ROA Model Robustness Tests		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	23.625 (p-value = 0.0087)	34.3245 (p-value = 0.0011)
Autocorrelation test (1)	-2.0884 (p-value = 0.0368)	-2.2376 (p-value = 0.0252)
Autocorrelation test (2)	1.3804 (p-value = 0.1675)	1.7262 (p-value = 0.0843)

The same robustness test is applied to CEO and Executive Team ownership is applied to Insiders ownership. The Insiders ownership size adjusted deviations are reported in the next section.

4.2.6. Insiders Robustness Test - Size-adjusted deviations and Firm Value

The size adjusted GMM estimation results are consistent with has been reported above. The results continue to show conflicting results depending on the measure of firm performance used. The model robustness tests remain consistent, the robustness tests show that the GMM estimation model is valid when Tobin's Q is used as measure of firm performance and produces unreliable estimations for ROE and ROA.

Table 54 - Optimal Insiders Ownership and Firm Value (Excluding Covid-19 Period) – Size Adjusted

Optimal Insiders Ownership and Firm Value (Excluding Covid-19 Period) – Size Adjusted						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
Insiders Deviations	0.014 (0.022)	0.011 (0.011)	-0.010*** (0.003)	-0.005 (0.013)	-0.003 (0.004)	-0.002 (0.005)
Insiders Deviations and Dummy		0.125 (0.158)		0.007 (0.016)		0.002 (0.007)
Number of Observations	944		944		944	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

Table 55 - Optimal Insiders Ownership and Firm Value (Including Covid-19 Period) – Size Adjusted

Optimal Insiders Ownership and Firm Value (Including Covid-19 Period) – Size Adjusted						
	Tobin's Q		ROE		ROA	
	(1)	(2)	(3)	(4)	(5)	(6)
Insiders Deviations	0.017 (0.027)	0.001 (0.007)	0.010* (0.005)	-0.012 (0.024)	0.003 (0.002)	-0.006 (0.015)
Insiders Deviations and Dummy		-0.004 (0.087)		-0.026 (0.024)		-0.011 (0.017)
Number of Observations	1 067		1 067		1 067	
Significance levels:	*p<0.1; **p<0.05; ***p<0.01					

Table 56 - Optimal Insiders Ownership and Tobin's Q Model Robustness Tests – Size Adjusted

Optimal Insiders Ownership and Tobin's Q Model Robustness Tests – Size Adjusted		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	114.0910 (p-value = 0.1759)	129.8089 (p-value = 0.1633)
Autocorrelation test (1)	-1.9750 (p-value = 0.0483)	-2.2183 (p-value = 0.0265)
Autocorrelation test (2)	-1.2488 (p-value = 0.2117)	-1.2403 (p-value = 0.2149)

Table 57 - Optimal Insiders Ownership and ROE Model Robustness Tests – Size Adjusted

Optimal Insiders Ownership and ROE Model Robustness Tests – Size Adjusted		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	99.9751 (p-value = 0.1439)	25.0510 (p-value = 0.0227)
Autocorrelation test (1)	-1.6648 (p-value = 0.0960)	-2.294521 (p-value = 0.0218)
Autocorrelation test (2)	0.52887 (p-value = 0.5969)	1.751099 (p-value = 0.0800)

Table 58 - Optimal Insiders Ownership and ROA Model Robustness Tests – Size Adjusted

Optimal Insiders Ownership and ROA Model Robustness Tests – Size Adjusted		
	Excluding Covid-19 Period	**Including Covid-19 Period**
Sargan test	107.7972 (p-value = 0.0560)	130.2067 (p-value = 0.3336)
Autocorrelation test (1)	-1.8969 (p-value = 0.0578)	-1.8029 (p-value = 0.0714)
Autocorrelation test (2)	0.5885 (p-value = 0.5562)	-0.2513628 (p-value = 0.8015)

4.3. Ownership and Firm Value Results Summary

The core objective of this study is to test where optimal managerial ownership reduces firm value as reported in Zhenxu (2008) for US firms using CEO equity ownership. In the South African context this hypothesis is tested using CEO equity ownership, Executive Team equity ownership and Insiders equity ownership. To test this hypothesis a GMM approach was used, consistent the approach adopted in Zhenxu (2008). The GMM approach is first used to test whether there is a relationship between managerial ownership and firm value then to test whether deviations below and above managerial ownership reduce firm value. The hypotheses below are tested:

Ho: There is a relationship between managerial ownership and firm value.

H_1: There is no relationship between managerial ownership and firm value

H_2: Deviations on both sides of optimal managerial ownership reduce firm value.

H_3: Deviations on both sides of optimal managerial ownership does not reduce firm value.

Consistent with Zhenxu (2008) the GMM estimation results on CEO ownership and firm value produce statistically insignificant results showing that there is no direct relationship between managerial ownership (COE, Executive Team and Insiders) and firm value for all measures of firm (Tobin's Q, ROA and ROE) both for periods including and excluding the Covid-19 global pandemic.

The GMM estimation results for CEO ownership are in contrast to what has been reported in Zhenxu (2008). The results reject the hypothesis that deviations from CEO equity ownership reduce firm value at the 1% significance level for Tobin's Q and at the 5% significance level for ROE and ROA. The GMM estimation results on Executive Team and Insiders ownership are however inconsistent and fail to meet the condition to support the hypothesis that deviations from managerial ownership reduce firm value. Overall, the core hypothesis of the study is rejected – this study finds no evidence that deviations from managerial ownership reduces firm value, these results are consistent including and excluding the Covid-19 period.

4.4. Ownership and Market Share Performance

In this results section the ownership and market performance results are reported, based on a buy and hold investment strategy based on manager-owned firm portfolios. The portfolios will be constructed solely based on publicly available information about managerial ownership and will be rebalanced every six months. The portfolios will be both equally and value weighted, and managerial ownership will be defined as the percentage of outstanding shares a manager/employee holds. The portfolios are overlapping starting from June 2015. The returns are considered during the period 2015 to 2020 and transaction costs for rebalancing the portfolios every six months are assumed to be constant. The hypothesis below will be tested:

H_4: A buy and hold trading strategy based on managerial-owned firms outperforms non-managerial owned firms.

H_5: A buy and hold trading strategy based on managerial-owned firms does not outperform non-managerial owned firms.

Table 59 - Ownership Descriptive Statistics

	CEO Ownership	Non-CEO Ownership	Executive Team Ownership	Non-Executive Team Ownership	Insiders Ownership	Non- Insiders Ownership
Number of observations	623	1 319	844	1 098	1 611	330
Minimum Market Cap	R1.7bn	R392.9mil	R1.0bn	R392.9mil	R687.0mil	R393.0mil
Mean Market Cap	R139.9bn	R57.4bn	R117.1bn	R58.6bn	R78.5bn	R108.2bn
Maximum Market Cap	R2.2trn	R2.6trn	R2.2trn	R2.6trn	R2.6trn	R2.6trn

The descriptive statistics show that (except for Insiders ownership) there is generally more non-ownership observations, which indicates that the non-ownership portfolio will generally have more firms when the results are examined – making it essential to report both equally and value weighted results. The CEO ownership portfolio has a mean market cap of R139.0 billion while the mean market cap for non-CEO ownership portfolio is R57.4 billion. The Executive Team ownership portfolio has a mean market cap of R117.1 billion while the non-Executive Team mean market is R58.6 billion. Lastly, the Insiders ownership portfolio has a mean market cap of R78.5 billion while the mean non-Insiders market cap is R108.2 billion. The market cap for the ownership and non-ownership portfolios significantly differs, reporting the results for both market and equally weighted is essential to draw meaningful and unbiased conclusions. The results on whether there is a statistical difference between these ownership groups are reported in the sub-sections below.

4.4.1. CEO Ownership and Market Share Performance

The t-Test is used to determine whether there exists a statistically significant difference between the ownership portfolio consisting of firms with CEO ownership and non-ownership portfolios. The equally weighted results are reported in table 60, the equally weighted results produce a t stat of 3,1118 with p-values of 0,0009 for the one tail test and 0,0019 for the two-tail test. The p-values are both less than 0.05. The equally weighted results therefore fail to reject the null hypothesis of ownership portfolios significantly outperforming non-ownership portfolios at the 5% confidence level. The results remain significant and consistent when results are value weighted in table 61 below.

Overall, the results the show that there is a statistically significant difference between the ownership groups both for when returns are equally, and value weighted. The results fail to reject

the null hypothesis that CEO ownership portfolios perform better than non-ownership portfolio over the period 2015 to 2020.

Table 60 - CEO Ownership and Share Return t-Test – Equally Weighted

	CEO Ownership	*Non-CEO Ownership*
Mean	1.5163	-0.31704
Variance	707.6000	874.2627
Observations	3324	6513
Hypothesized Mean Difference	0	
df	7345	
t Stat	3.1118	
P(T<=t) one-tail	0.0009	
t Critical one-tail	1.6451	
P(T<=t) two-tail	0.0019	
t Critical two-tail	1.9603	

Table 61 - CEO Ownership and Share Return t-Test – Value Weighted

	CEO Ownership	*Non-CEO Ownership*
Mean	0.0659	0.0299
Variance	0.256342056	0.1586
Observations	3324	6513
Hypothesized Mean Difference	0	
df	5475	
t Stat	3.5697	
P(T<=t) one-tail	0.0002	
t Critical one-tail	1.6451	
P(T<=t) two-tail	0.0004	
t Critical two-tail	1.9604	

In the next two sections the t-test results for the Executive Team and Insiders ownership groups are reported.

4.4.2. Executive Team Ownership and Market Share Performance

The results on Executive Team ownership portfolio are consistent with those reported for the CEO ownership group. The equally weighted Executive Team results are reported in table 62 below. The results produce a t stat of 3,4631 with p-values of 0,0003 and 0,0005 for the one tail test and two-tailed test. These o-values are both less than 0.05. As with the CEO ownership group, the results fail to reject the null hypothesis of ownership portfolios outperforming non-ownership portfolios at the 5% confidence interval. The results remain consistent and statistically significant when the returns are adjusted for firm size in table 63 below.

Table 62 - Executive Team Ownership and Share Return t-Test – Equally Weighted

	Executive Team Ownership	*Non-Executive Team Ownership*
Mean	1.365066697	-0.632404145
Variance	793.3890321	839.1072184
Observations	4604	5233
Hypothesized Mean Difference	0	
df	9737	
t Stat	3.463141487	
P(T<=t) one-tail	0.000268102	
t Critical one-tail	1.645010135	
P(T<=t) two-tail	0.000536203	
t Critical two-tail	1.960207649	

Table 63 - Executive Team Ownership and Share Return t-Test – Value Weighted

	Executive Team Ownership	*Non-Executive Team Ownership*
Mean	0.0560	0.0298
Variance	0.1935	0.1902
Observations	4604	5233
Hypothesized Mean Difference	0	
df	9655	
t Stat	2.9499	
P(T<=t) one-tail	0.0016	
t Critical one-tail	1.6450	
P(T<=t) two-tail	0.0032	
t Critical two-tail	1.9602	

4.4.3. Insiders Ownership and Market Share Performance

The results reported for the Insiders ownership group are in contrast to those reported for CEO and Executive Team ownership groups. The insiders equally weighted t test results in table 64 produce a t test of 1,3026 with p-values of 0,0964 and 0,1928 for the one tail test and two-tail test. Both the p-values are greater than 0.05. The results remain consistent when the returns are value weighted in table 65. We therefore reject the null hypothesis that ownership portfolios overperform non-ownership portfolios for the Insiders ownership group.

Table 64 - Insiders Ownership and Share Return t-Test – Equally Weighted

	Insiders Ownership	*Non-Executive Ownership*
Mean	0.5133	-0.6149
Variance	728.2520	1211.4800
Observations	7999	1838
Hypothesized Mean Difference	0	
df	2369	
t Stat	1.3026	
P(T<=t) one-tail	0.0964	
t Critical one-tail	1.6455	
P(T<=t) two-tail	0.1928	
t Critical two-tail	1.9610	

Table 65 - Insiders Ownership and Share Return t-Test – Value Weighted

	Insiders Ownership	*Non-Insiders Ownership*
Mean	0.0378	0.0604
Variance	0.1458	0.3925
Observations	7999	1838
Hypothesized Mean Difference	0	
df	2160	
t Stat	-1.4849	
P(T<=t) one-tail	0.0689	
t Critical one-tail	1.6456	
P(T<=t) two-tail	0.1377	
t Critical two-tail	1.9611	

4.5. Ownership and Market Share Performance Results Summary

The second part of this study's methodology is to test the market performance of equity ownership using the three ownership groups (CEO, Executive Team, and Insiders) under the null hypothesis that ownership portfolios outperform non-ownership portfolio during the period 2015 to 2020 with the overlapping portfolios rebalanced every six months and with the assumption that there are no transaction costs.

Overall, the results fail to reject the hypothesis that ownership portfolios outperform non-ownership portfolios for all ownership groups. The ownership portfolios consistently outperform the non-ownership portfolios for both equally and value weighted returns with the expectation of the Insiders ownership group.

4.6. Results Summary and Discussion

4.6.1. Results Summary

The main aim of this study is to examine the impact of equity (managerial) ownership from different ownership groups (CEOs, Executive Team, and Insiders) on firm value using accounting measures such as ROA, and ROE, market value based measures such as Tobin's Q and market performance using share returns for South African firms. The methodology and approach used in Zhenxu (2008) is adopted in this study. While Zhenxu (2008) uses the Fixed Effects methodology to test the impact of ownership on firm value, the GMM estimation technique has been used in this study to produce more efficient and consistent estimates as documented in Wooldridge (2001). The hypotheses below are examined:

Ho: There is a statistically significant relationship between managerial ownership and firm value.

H_1: There is no statistically significant relationship between managerial ownership and firm value

H_2: Deviations on both sides of optimal managerial ownership reduce firm value.

H_3: Deviations on both sides of optimal managerial ownership does not reduce firm value.

H_4: A buy and hold trading strategy based on managerial-owned firms outperforms non-managerial owned firms.

H_5: A buy and hold trading strategy based on managerial-owned firms does not outperform non-managerial owned firms

The GMM estimation results for hypothesis H_0 and H_1 are consistent with what has been reported in Zhenxu (2008). The results show no statistically significant direct relationship between the different ownership groups and firm value for all measures of firm performances used in this study. The results are however not consistent with what has been reported in Zhenxu (2008) when testing for H_2 and H_3 – this is explicitly testing whether deviations from optimal managerial, both below and above the optimal ownership, reduces firm value. The GMM estimation results reject the hypothesis that deviations from optimal managerial ownership reduce firm value for the CEO ownership group. These results are statistically significant at the 1% level when using Tobin's Q as a measure of firm value, and statistically significant at the 5% level when ROE and ROA are used as measures of firm value. Although statistically insignificant, the GMM estimation results on Executive Team and Insiders ownership also reject the hypothesis that deviations from optimal ownership reduces firm value. These results remain consistent when the Covid-19 period is excluded from the sample period.

To test hypothesis H_4 and H_5 buy and hold portfolios consisting of ownership firms from the different ownership groups (CEOs, Executive Team, and Insiders Ownership) are constructed and compares to non-ownership groups during the period 2015 to 2020. The overlapping portfolios are rebalanced every six months and it assumed that transaction costs are constant. The share returns are reported for both equally and value weighted. The results fail to reject the hypothesis that ownership portfolios outperform non-ownership portfolios for all ownership groups. The ownership portfolios consistently outperform the non-ownership portfolios for both equally and value weighted returns with the expectation of the Insiders ownership group.

Overall, while ownership portfolios consistently outperform non-ownership portfolios, this study finds no statistically significant relationship between managerial ownership and firm value (consistent with the findings in Demstez and Lehn, 1985; Himmelberg et al. 1999; and Zhenxu, 2008). While Zhenxu's (2008) findings on US firms show that deviations from optimal CEO managerial ownership reduce firm value, in the South African context this study finds no evidence that deviations from optimal ownership reduces firm value with the ownership groups extended to the Executive Team and Insiders for the same sample time period used in Zhenxu (2008).

4.6.2. Results Discussion

The GMM estimation results on optimal ownership and firm value reject the core hypothesis of this study which is that deviation from optimal ownership reduces firm value, while the market share performance of ownership portfolio consistently outperforms non-ownership portfolios suggesting that there is some value in vesting equity ownership particularly in CEOs and Executive Teams.

4.6.3. Ownership and firm value: Developed versus Emerging Markets

The results on ownership and firm value continue to differ based on whether the firms in the studies are in developed or emerging markets. Hayes, Mehran and Schaefer's (2004) study on S&P 500 firms with CEO ownership finds that firm performance is positively related to ownership. Fahlenbrach (2009) also conducts a similar study on ownership and firm performance using founder CEOs of publicly listed US firms and finds that firms with founder CEOs produce an abnormal mark share return of 10.7% annually. Other studies include Zhenxu (2009) and Lilienfeld-Toal and Ruenzi (2014). Zhenxu (2009) finds that US firms who deviate from optimal CEO ownership reduce their firm value and Lilienfeld-Toal and Ruenzi (2014) find that an investment strategy based on publicly available managerial ownership information delivers abnormal returns of 4% to 10% annually.

The empirical evidence from developed markets is clear on managerial ownership and firm value and indicates that there exists a relationship between firm value and equity ownership (more particularly CEO equity ownership). It further shows that this relationship is largely positive and value adding both when the market performance and more accounting based measures (such as the market to book ratio used in Hayes, Mehran and Schaefer, 2004 and the Tobin's Q used in Zhenxu, 2009) are used as measures of firm value. While the results found in this study contrast with what has been reported above, they are mainly consistent with the studies conducted in emerging markets.

Using a sample of 1 397 Indian manufacturing firms Selarka (2005) studies the impact of different blocks of equity ownership which includes Insiders ownership. Selarka (2005) finds a curvilinear relationship between firm value and managerial ownership, firm performance as measured by the market to book ration declines until ownership is at high degree of managerial ownership. Lins (2003) samples 800 firms in eight East Asian countries to examine the impact of managerial equity holdings and firm value as measured by share returns. The study finds that when managers own equity in the firm, the firm value tends to be relatively lower. Ntim (2013) finds similar evidence for South African firms which list on JSE when examining different managerial ownership groups and firm value. The findings show that when CEO and Executive Teams have higher equity ownership in the firms which they manage the market valuation of those firms is lower. More recent South African studies are consistent with this finding. Mugobo, Mutize and Aspeling (2016) sample 40 JSE listed firms and 40 private firms during the period 2001 to 2010 and finds that Insiders ownership is negative related to firm value as measured by ROA. Lastly, Komati (2017) studies the effect ownership and firm value of 143 JSE listed firms during the period 2004 to 2014 and finds that managerial ownership is negatively related to firm performance as measured by ROA and ROE.

The empirical evidence in emerging markets is clear and consistent. There exists a relationship between managerial ownership and firm although it is largely negative for an example equity ownership group ranging from CEOs, Executive Teams and Insiders are associated with lower accounting firm value (ROE and ROA). The results of this study align to empirical evidence reported in both developed and emerging market but lean more towards emerging markets.

Consistent with what has been reported in developed markets, this study finds no significant relationship between equity ownership groups (CEOs, Executive Team, and Insiders) and finds that equity ownership portfolios consistently have a higher share return in the JSE non-equity ownership portfolio. This study aligns to the empirical evidence in emerging markets by reporting that deviations from optimal managerial ownership does not reduce firm value indicating that firms are free to choose any level of managerial ownership. Judging from the empirical evidence, the lower the managerial ownership, the higher the firm value.

In the South African context, equity ownership appears to not be the correct tool in aligning the interest of managers and shareholders as equity ownership appears to have a negative impact on firm value. The question then remains, how then do shareholders of the modern-day corporation incentivise managers to look after their capital with the same "anxious vigilance"? To answer this question, focus likely needs to be placed in behavioral explanations of agency related costs and the role of financial slack.

4.6.4. Behavioral Agency Cost Explanation and the role of Financial Slack

The empirical evidence particularly in the South African context suggests that equity ownership might not be the most effective tool to align the interest of managers and shareholders. It has been well documented that manager do not have a consistent rational decision-making framework especially in the presence of uncertainty (Kahneman and Tversky, 1979). Given the complex and increasingly uncertain environment that corporations operate in today it is essential for managers not only be relied upon to make value maximising decision but to also make decisions that align their interest with those of the owners of the firms they manage. It is essential for shareholders to understand the inherent behavior of managers which are custodians to the firms they own, more so when it comes to investment decisions.

A study of the Fortune 500 CEOs by Malmendier and Tate (2005) shows that managers tend to overinvest when they have access to internal funds and are more cautious of their investment decisions when they must rely on outside capital. Managers are prone to hubris and overinvestment in the presence of excess internal funds (as has been documented in the seminal work of Jensen, 1986), while equity ownership in more developed markets might assist with controlling for this

type of behavior and aligning the interest of managers and shareholder the same tool cannot be relied upon in more emerging markets such as South Africa.

While corporate finance literature and practices have advanced over the years, the principal agency issue and Jensen's (1986) free cash flow problem remains. Further, equity ownership does not appear to be an effective tool to resolve these issues particularly in emerging markets. To align the interest of managers and shareholders and control for managers' behavior in executing self-enrichment investment policies, debt appears to be a more effective measure but requires a very good understanding of the role of financial slack.

As documented on the literature review of this study, the corporate debt policy of a firm can be used to control financial slack and therefore control the behavior of managers to incentivise these managers to pursue value adding initiatives, as illustrated from the work of Easterbrook (1984) and Jensen (1986). One of the models documented by Fairchild (2007) shows that debt can be used to increase the effort of an overconfident manager in aligning their interest with those of shareholders and maximising firm value. While increasing debt and committing custodians of shareholders' capital to mandatory regular payments can be effective in ensuring interest of managers and shareholders are aligned and firm value maximised, there needs to be a careful consideration of the cost of financial distress and necessity of financial slack particularly during periods of economic downturn and high uncertainty. The use of debt to manage agency cost is therefore a balancing exercise, as firms need to restrict the excess free cash flow at the disposal of managers while also ensuring that managers have sufficient cash to enable investment in innovation which has been empirically proven (Zona, 2012) to be essential during period of economic downturn.

Overall, while debt can be used to control managers' behaviour and increase their efforts toward value maximising decisions, too much debt can hinder the operational efficiency of a firm and limit its capability to execute innovative and positive NPV projects.

4.6.5. Results Discussion Summary

The results of this study largely support the empirical evidence on ownership and firm value reported in emerging markets. Equity ownership from different ownership groups (CEOs, Executive Teams, and Insiders) are generally associated with relatively lower firm value. While the second part of this study finds that ownership portfolios outperform non-ownership portfolios, the results are however not sufficient to support equity ownership as an effective mechanism to align the interest of managers with those of shareholders.

To ensure that managers look after the capital of shareholders with the same "anxious vigilance", debt appears to be a more effective tool to control managers' self-enrichment behavior and incentive them to maximise firm value. However, debt has its drawbacks namely the cost of financial distress and necessity of financial slack. Debt appears to be effective in controlling agency costs however too much debt can hinder the operational efficiency of firms and their ability to navigate period of economic downturns and high uncertainty. The next section provides are conclusion of this study.

5. Conclusion

This study set out to advance the understanding of how owners can incentivise their stewards through equity ownership to act in their best interest or, in the context of this study, to look after their capital with the same 'anxious vigilance'. Through adoption of the approach applied in Zhenxu (2008) and extending the approach to include other ownership groups and a more robust and consistent estimation technique, this study empirically examines the relationship between equity ownership of CEOs, Executive Teams and Insiders and firm value using accounting-based measures (ROA, and ROE) and market value based measure Tobin's Q as measures of firm value. To ensure that a robust and comprehensive approach is adopted, the study also examines the relationship between ownership and firm value based on the market share performance of ownership firms portfolios versus non-ownership firms portfolio. The study is based on a sample size of South African listed firms during the period 2010 to 2020.

The results find evidence contrary to what has been reported in developed markets, the GMM estimation results reject the hypothesis that deviations from optimal managerial ownership, both below and above, reduce firm value for the CEO ownership group. These results are statistically significant at the 1% level when using Tobin's Q as a measure of firm value, and statistically significant at the 5% level when ROE and ROA are used as measures of firm value. Although statistically insignificant, the GMM estimation results on Executive Team and Insiders ownership also reject the hypothesis that deviations from optimal ownership, both below and above, reduce firm value. The results are consistent when the Covid-19 period is excluded from the sample period.

The market performance results are however more consistent with what has been reported in developed markets, the results support the hypothesis that ownership portfolios outperform non-ownership portfolios both equally and value weighted, the CEO and Executive Team ownership groups produce a t-stat significantly different from 0 both for the one tail and two-tail tests. The Insiders ownership however does not produce the same results.

The results overall show that equity ownership is not a reliable mechanism to align the interest of managers with those of the shareholders particularly in emerging markets. The GMM estimation results of this study are consistent with other studies reported in emerging markets (Ntim, 2013, Mugobo, Mutize and Aspeling, 2016 and Komati, 2017). While equity ownership has empirical support as an effective mechanism to control for agency costs in developed markets it appears to not be as effective in emerging markets. The results of this study and other studies in emerging markets make debt seem more feasible in controlling for agency related costs. The corporate debt policy of a firm can be used to control financial slack and therefore control the behavior of managers and incentivise these managers to pursue value adding initiatives (Easterbrook, 1984 and Jensen, 1986). One of the models documented by Fairchild (2007) shows that debt can be used to increase the effort of an overconfident manager to align their interests with those of shareholders and maximising firm value. Debt however has its drawbacks, mainly in the form of costs of financial distress and the necessity of financial slack.

While this study has advanced the understanding of ownership and firm value in emerging markets, it has certain limitations. The study uses the ownership of the different groups without factoring in

share options which are highly influential to the behavior of managers. The options data obtained was inconsistent and unfortunately could not be included in this study. Time-Varying Parameters model can also be applied as an alternative to generating the research outputs of the study. Lasty, while the sample size of this study is consistent with the base study (Zhenxu, 2008), a longer period should be considered. Unfortunately, the sample size of this study was dependent on the availability of data from Bloomberg and other financial data sources.

The areas for future research should include factoring share options held by CEOs, Executive Teams, and insiders and if the data permits, a longer period. While the concept has not been adequately developed in both emerging and developed markets, exploring the relationship between debt (more so optimal debt) and firm value would provide interesting feedback into using the corporate debt policy to control for agency related as has been theorical proposed in corporate finance seminal studies (Jensen and Meckling, 1976). There have been studies that examine optimal cash holding (Harford, 1999 and Dittmar and Marhrt-Smith, 2006) the approach in these studies can be adopted to examine empirically ‘optimal debt holding’.

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Appendices

Appendix I: List of listed companies in the South African Johannesburg Stock Exchange (JSE) in the period 2010 to 2020

Ticker	Name
SAB SJ Equity	Abi Sab Group Holding Ltd
ABG SJ Equity	Absa Group Ltd
APF SJ Equity	Accelerate Property Fund Ltd
AIP SJ Equity	Adcock Ingram Holdings Ltd
ADR SJ Equity	Adcorp Holdings Ltd
ADH SJ Equity	Advtech Ltd
AFE SJ Equity	AECI Ltd
AFX SJ Equity	African Oxygen Ltd
AIL SJ Equity	African Rainbow Capital Investments Ltd
ARI SJ Equity	African Rainbow Minerals Ltd
AFT SJ Equity	Afrimat Ltd
ACT SJ Equity	AfroCentric Investment Corp Ltd
AFH SJ Equity	Alexander Forbes Group Holdings Ltd
AEL SJ Equity	Altron Ltd
AEN SJ Equity	Altron Ltd
AMS SJ Equity	Anglo American Platinum Ltd
AGL SJ Equity	Anglo American PLC
ANG SJ Equity	AngloGold Ashanti Ltd
ANH SJ Equity	Anheuser-Busch InBev SA/NV
AQP SJ Equity	Aquarius Platinum Ltd
ACL SJ Equity	ArcelorMittal South Africa Ltd
AHB SJ Equity	Arrowhead Properties Ltd
AWA SJ Equity	Arrowhead Properties Ltd/Old
AWB SJ Equity	Arrowhead Properties Ltd/Old
ASC SJ Equity	Ascendis Health Ltd
AIA SJ Equity	Ascension Properties Ltd
APN SJ Equity	Aspen Pharmacare Holdings Ltd
ASR SJ Equity	Assore Ltd
ARL SJ Equity	Astral Foods Ltd
ATT SJ Equity	Attacq Ltd
AEG SJ Equity	Aveng Ltd
AVI SJ Equity	AVI Ltd
BWN SJ Equity	Balwin Properties Ltd
BAW SJ Equity	Barloworld Ltd
BHP SJ Equity	BHP Group PLC
BID SJ Equity	Bid Corp Ltd
BVT SJ Equity	Bidvest Group Ltd/The

BLU SJ Equity	Blue Label Telecoms Ltd
BAT SJ Equity	Brait PLC
BRN SJ Equity	Brimstone Investment Corp Ltd
BTI SJ Equity	British American Tobacco PLC
CGR SJ Equity	Calgro M3 Holdings Ltd
CVH SJ Equity	Capevin Holdings Ltd
CCO SJ Equity	Capital & Counties Properties PLC
CRP SJ Equity	Capital & Regional PLC
CPF SJ Equity	Capital Property Fund Ltd
CPI SJ Equity	Capitec Bank Holdings Ltd
CTK SJ Equity	Cartrack Holdings Ltd
CSB SJ Equity	Cashbuild Ltd
CAT SJ Equity	Caxton and CTP Publishers and Printers L
CHP SJ Equity	Choppies Enterprises Ltd
CFR SJ Equity	Cie Financiere Richemont SA
CLH SJ Equity	City Lodge Hotels Ltd
CLS SJ Equity	Clicks Group Ltd
CLI SJ Equity	Clientele Ltd
CLR SJ Equity	Clover Industries Ltd
CIL SJ Equity	Consolidated Infrastructure Group Ltd
CML SJ Equity	Coronation Fund Managers Ltd
COH SJ Equity	Curro Holdings Ltd
DTC SJ Equity	DataTec Ltd
DLT SJ Equity	Delta Property Fund Ltd
DIB SJ Equity	Dipula Income Fund Ltd
DCP SJ Equity	Dis-Chem Pharmacies Ltd
DSY SJ Equity	Discovery Ltd
DGH SJ Equity	Distell Group Holdings Ltd
DST SJ Equity	Distell Group Ltd
DRD SJ Equity	DRDGOLD Ltd
EMI SJ Equity	Emira Property Fund Ltd
EOH SJ Equity	EOH Holdings Ltd
EPP SJ Equity	EPP NV
EQU SJ Equity	Equites Property Fund Ltd
EXX SJ Equity	Exxaro Resources Ltd
FBR SJ Equity	Famous Brands Ltd
FGL SJ Equity	Finbond Group Ltd
FSR SJ Equity	FirstRand Ltd
FFA SJ Equity	Fortress REIT Ltd
FFB SJ Equity	Fortress REIT Ltd
TFG SJ Equity	Foschini Group Ltd/The
GML SJ Equity	Gemfields Group Ltd
GLN SJ Equity	Glencore PLC

GFI SJ Equity	Gold Fields Ltd
GPL SJ Equity	Grand Parade Investments Ltd
GND SJ Equity	Grindrod Ltd
GRF SJ Equity	Group Five Ltd/South Africa
GRT SJ Equity	Growthpoint Properties Ltd
HMN SJ Equity	Hammerson PLC
HAR SJ Equity	Harmony Gold Mining Co Ltd
HSP SJ Equity	Holdsport Ltd
HCI SJ Equity	Hosken Consolidated Investments Ltd
HPB SJ Equity	Hospitality Property Fund Ltd
HPA SJ Equity	Hospitality Property Fund Ltd
HWN SJ Equity	Howden Africa Holdings Ltd
HDC SJ Equity	Hudaco Industries Ltd
HLM SJ Equity	Hulamin Ltd
HYP SJ Equity	Hyprop Investments Ltd
ILV SJ Equity	Illovo Sugar Pty Ltd
IMP SJ Equity	Impala Platinum Holdings Ltd
IPL SJ Equity	Imperial Logistics Ltd
ILU SJ Equity	Indluplace Properties Ltd
MLI SJ Equity	Industrials REIT Ltd
ITU SJ Equity	Intu Properties PLC
INL SJ Equity	Investec Ltd
INP SJ Equity	Investec PLC
IPF SJ Equity	Investec Property Fund Ltd
IVT SJ Equity	Invicta Holdings Ltd
IAP SJ Equity	Irongate Group
ITE SJ Equity	Italtile Ltd
JSE SJ Equity	JSE Ltd
KAP SJ Equity	KAP Industrial Holdings Ltd
KIO SJ Equity	Kumba Iron Ore Ltd
LEW SJ Equity	Lewis Group Ltd
LBH SJ Equity	Liberty Holdings Ltd
L2D SJ Equity	Liberty Two Degrees Ltd
LBR SJ Equity	Libstar Holdings Ltd
LHC SJ Equity	Life Healthcare Group Holdings Ltd
LTE SJ Equity	Lighthouse Capital Ltd
L4L SJ Equity	Long4Life Ltd
MSP SJ Equity	MAS Real Estate Inc
MSM SJ Equity	Massmart Holdings Ltd
MEI SJ Equity	Mediclinic International PLC
MDC SJ Equity	Mediclinic International RF Pty Ltd
MRF SJ Equity	Merafe Resources Ltd
MTA SJ Equity	Metair Investments Ltd

MIX SJ Equity	MiX Telematics Ltd
MTM SJ Equity	Momentum Metropolitan Holdings
MND SJ Equity	Mondi Ltd
MNP SJ Equity	Mondi PLC
MNK SJ Equity	Montauk Holdings Ltd
MTH SJ Equity	Motus Holdings Ltd
MPT SJ Equity	Mpact Ltd
MRP SJ Equity	Mr Price Group Ltd
MTN SJ Equity	MTN Group Ltd
MCG SJ Equity	MultiChoice Group
MUR SJ Equity	Murray & Roberts Holdings Ltd
NPK SJ Equity	Nampak Ltd
NPN SJ Equity	Naspers Ltd
NED SJ Equity	Nedbank Group Ltd
NRP SJ Equity	NEPI Rockcastle PLC
NT1 SJ Equity	Net 1 UEPS Technologies Inc
NTC SJ Equity	Netcare Ltd
NEP SJ Equity	New Europe Property Investments PLC
NY1 SJ Equity	Ninety One Ltd
N91 SJ Equity	Ninety One PLC
NIV SJ Equity	Niveus Investments Ltd
NPH SJ Equity	Northam Platinum Holdings Ltd
NVS SJ Equity	Novus Holdings Ltd
OCE SJ Equity	Oceana Group Ltd
OCT SJ Equity	Octodec Investments Ltd
OMU SJ Equity	Old Mutual Ltd
OML SJ Equity	Om Residual UK Ltd
OMN SJ Equity	Omnia Holdings Ltd
PAN SJ Equity	Pan African Resources PLC
PPH SJ Equity	Pepkor Holdings Ltd
PGR SJ Equity	Peregrine Holdings Ltd
PIK SJ Equity	Pick n Pay Stores Ltd
PFG SJ Equity	Pioneer Foods Group Ltd
PIV SJ Equity	Pivotal Fund Ltd/The
PPC SJ Equity	PPC Ltd
PRX SJ Equity	Prosus NV
PSG SJ Equity	PSG Group Ltd
KST SJ Equity	PSG Konsult Ltd
QLT SJ Equity	Quilter PLC
RMI SJ Equity	Rand Merchant Investment Holdings Ltd
RBX SJ Equity	Raubex Group Ltd
RCL SJ Equity	RCL Foods Ltd/South Africa
RPL SJ Equity	RDI REIT PLC

REB SJ Equity	Rebosis Property Fund Ltd
RDF SJ Equity	Redefine Properties Ltd
REI SJ Equity	Reinet Investments SCA
RNI SJ Equity	Reinet Investments SCA
REM SJ Equity	Remgro Ltd
RES SJ Equity	Resilient REIT Ltd
RLO SJ Equity	Reunert Ltd
RFG SJ Equity	RFG Holdings Ltd
RMH SJ Equity	RMB Holdings Ltd
ROC SJ Equity	Rockcastle Global Real Estate Co Ltd
RBP SJ Equity	Royal Bafokeng Platinum Ltd
SAC SJ Equity	SA Corporate Real Estate Ltd
SLM SJ Equity	Sanlam Ltd
SNT SJ Equity	Santam Ltd
SAP SJ Equity	Sappi Ltd
SOL SJ Equity	Sasol Ltd
SCD SJ Equity	Schroder European Real Estate Investment
SHP SJ Equity	Shoprite Holdings Ltd
SSW SJ Equity	Sibanye Stillwater Ltd
LON SJ Equity	Sibanye UK Ltd
SRE SJ Equity	Sirius Real Estate Ltd
S32 SJ Equity	South32 Ltd
SPP SJ Equity	SPAR Group Ltd/The
SUR SJ Equity	Spur Corp Ltd
SDO SJ Equity	Stadio Holdings Ltd
SBK SJ Equity	Standard Bank Group Ltd
SNH SJ Equity	Steinhoff International Holdings NV
SSS SJ Equity	Stor-Age Property REIT Ltd
SUI SJ Equity	Sun International Ltd/South Africa
SPG SJ Equity	Super Group Ltd/South Africa
TKG SJ Equity	Telkom SA SOC Ltd
TXT SJ Equity	Textainer Group Holdings Ltd
TEX SJ Equity	Texton Property Fund Ltd
TBS SJ Equity	Tiger Brands Ltd
TON SJ Equity	Tongaat Hulett Pvt Ltd
TDH SJ Equity	Tradehold Ltd
TCP SJ Equity	Transaction Capital Ltd
TRE SJ Equity	Trencor Ltd
TTO SJ Equity	Trustco Group Holdings Ltd
TRU SJ Equity	Truworths International Ltd
TSG SJ Equity	Tsogo Sun Gaming Ltd
TGO SJ Equity	Tsogo Sun Hotels Ltd
VOD SJ Equity	Vodacom Group Ltd

VKE SJ Equity	Vukile Property Fund Ltd
WBO SJ Equity	Wilson Bayly Holmes-Ovcon Ltd
WHL SJ Equity	Woolworths Holdings Ltd/South Africa
ZED SJ Equity	Zeder Investments Ltd