# RESEARCH REPORT:

# Cash Holding Levels and Performance of JSE-listed Firms


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# DECLARATION

I, Mampuru Mabalemi Maleka, declare that this research report is my own work, except where otherwise indicated and acknowledged. It is submitted to fulfil the partial requirements for the Master of Management in Finance and Investment degree at the University of the Witwatersrand, Johannesburg. This research report has not, either in whole or in part, been submitted for a degree or diploma to any other institution or university for a similar qualification.

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# ABSTRACT

The purpose of this research is to carry out an empirical study into the determinants of cash and the relationship between the levels of cash holdings and performance by South African listed non-financial firms. Plots were used to identify trends of cash holding at both a market and an industry level. The study used Generalised Method of Moments “GMM” to examine the relationships, and the analysis was also carried out controlling for factors such as primary listing in SA vs non SA, firms listed on the JSE main board vs AltX, pre- vs post-2008 credit crisis, firm size quartile and industry.

The study found a significant negative relationship between cash and asset tangibility ratios, capital expenditure, and firm size irrespective of the control variable under study, whilst leverage ratio remains an insignificant determinant of cash holdings by firms throughout. The significance of the cashflow volatility is the strongest amongst large firms and amongst firms in the *Consumer Services* industry. The study also found a significant positive relationship between performance and cash for both the operating and market performance measures under the baseline data, which is contrary to the agency theory that excess cash erodes value. However, the results changed when constraining the analysis to cash-rich firms, where an insignificant positive relationship was found between cash and operating performance, but a significant positive relationship between cash and market performance. These conflicting results show that in the presence of good form of corporate governance, excess cash holding may not necessarily erode shareholder value.

Key words: JSE, South Africa, Cash holdings, Performance, Agency theory, Free cash flow theory

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# CHAPTER 1.

## 1.1 Introduction

This research investigates the impact of cash holdings on operating and market performance by listed non-financial firms in South Africa (hereinafter referred to as "SA"). Availability of cash in a company is critical in ensuring continued survival of firms, but excess cash can expose firms to agency problems which may result in erosion of shareholder value. It is, therefore, pivotal that managers maintain an appropriate level of liquidity to ensure an optimal value for shareholders.

This chapter presents introduction to the thesis and its context. The chapter is organised as follows: Section 1.2 presents the context of the study. Section 1.3 presents the research problem, Section 1.4 the research objectives, Section 1.5 the significance of the study and Section 1.6 the benefits of the study. Section 1.7 provides an outline of the research report and the chapter ends with a summary.

## 1.2 Context of the study

Availability or access to cash is imperative to the existence of firms due to various reasons, including for "transaction motive", "precautionary motive" and "speculative motive" (Keynes, 1936). Transaction motive is when cash is kept to meet current needs. Precautionary motive meets the need to allow for unforeseen unfavourable contingencies whilst the speculative motive meets that to take advantage of favourable future changes in asset prices. Any excess cash that a firm may have is best invested in property, plant and equipment (hereinafter referred to as "PPE"). In this way, the firm's future value is enhanced because PPE is expected to generate an investment multiplier effect within the firm and in the economy in general. This means, any excess cash that is not invested in PPE implies that, firms are denied opportunities to benefit from the corresponding investment multiplier, and this is expected to create a suboptimal value for shareholders. Furthermore, by hoarding cash, firms' agency costs may rise in that managers may end up spending the cash on perquisite items.

Anecdotal evidence (e.g., Khanyile, 2015) shows that firms listed on the Johannesburg Stock Exchange (hereinafter referred to as “JSE”) hold excess cash, raising questions on possible erosion of shareholder value. High levels of cash holdings by SA firms have previously been looked on unfavourably by policy makers (Mittner, 2016; ANCWL, 2016) whose objectives include growing the economy, meeting inflation targets and creating employment. The policy makers’ views stem largely from the theory that when firms hoard cash, the economy suffers opportunity costs of a lost investment multiplier effect. In addition, high cash holdings deny the revenue authority the much-needed taxation revenue, which would be payable on dividend declaration or as VAT on purchases of PPE.

Fernandes and Gonenc (2015) found that foreign multinationals in emerging economies tend to hold significantly high levels of cash to avoid paying tax on repatriation of earnings into their home countries. As at June 2016, 7% of JSE-listed companies were multinationals with primary listing elsewhere, but this percentage increases to 30% when the analysis is constrained to the Top 40 firms by market capitalisation. The high percentage of multinationals amongst the top firms on the JSE may consequently lead to the public notion that multinationals operating in SA are hoarding cash as part of their delayed repatriation strategy.

Ryan (2015) found that 32 JSE-listed firms were able to simultaneously grow both their cash and earnings, at a minimum of 20% p.a., over the same five-year period, implying that these firms succeeded in using their high cash holdings to generate value to shareholders. Khanyile (2015) explained that the growing levels of cash holdings by all types of firms in SA in 2015 could be attributed to a slumping confidence index as lack of progress in national development plans and policy uncertainty around key topics such as land ownership and power supply. Both Ryan (2015) and Khanyile (2015) views on SA corporate cash holdings are consistent with the precautionary motive.

According to Nyamgero’s (2015) research covering the period 1990-2014, SA firms’ cash holdings, measured using ratios, were the highest in the 2000s, lower in the 2010s and the lowest in 1990s. He found that it is the absolute amounts of cash, rather than the cash-to-total-assets ratios, that rose in the 2010s. His findings bring into question the accuracy of and motives behind the 2015 media headlines (e.g., Khanyile, 2015) and public sentiments that SA corporate cash holdings are at their all-time high.

Research on the perceived high levels of corporate cash holdings and its impact attracts an increasing number of scholarly interests across the world, resulting in increased public awareness and consequently, prompting calls for reforms in some countries. In 2014, the South Korean government introduced a 10% tax on domestic firms with too much cash (Kim, 2013). The introduction of this corporate cash tax followed a period of persistently high cash holdings by the South Korean firms, and the primary objective behind the tax reform was to compel the firms to invest in PPE or pay the retained profits out as dividends, all in the hope of uplifting the country's economic growth (Kim, 2013). Japan's new code of corporate governance became effective in June 2015. The code compels Japanese firms to present clear plans on allocation of all resources (including cash) available to management and append corresponding targets for profitability and capital efficiency. This will ensure management remuneration is directly linked to firms' achievements against the said targets (Moody's, 2015). The Japanese regulators and shareholder watchdogs are hoping that the revised governance code will instil discipline amongst managers to reduce the country's corporate cash piles and stimulate growth. It could be that reforms, such as the 2014 Korean corporate tax on corporate excess cash and/or the 2015 revised Japanese corporate governance code, may resonate with SA policy makers who are looking for all possible avenues to stimulate growth, increase tax revenues and create employment.

The purpose of this study is to establish whether the levels of cash holdings by JSE-listed firms in different industries have changed over the last decade, and the impact this may have had on the firms' operating and market performance.

## 1.3 Research problem

Extant literature shows that firms hold cash for various reasons, including transaction motive, speculative motive and precautionary motive (Keynes, 1936). Firms are expected to keep optimal cash levels to ensure they are well-positioned to maximise benefits of holding cash while minimising the associated costs. Managers are therefore expected to invest their excess cash in PPE to enhance future growth of their firms and thereby maximise shareholders' wealth. Investing cash in PPE does not only benefit shareholders but the economy at large in that it results in investment multiplier which

leads to the uplifting of the economy. In addition, investing in PPE is expected to improve and/or expand production facilities, leading to reduced expenses and/or increased revenues for firms which should subsequently improve earnings leading to improved taxation for the revenue authorities.

Anecdotal evidence shows that SA firms hold high levels of cash (Khanyile, 2015; Nyamgero, 2015) and are therefore, not pro-actively contributing in the improvement of the ailing economy which grew by 1.3% in 2015 according to the World Bank. The problem is that it is not clear how hoarding cash impacts earnings of JSE-listed firms and what factors actually influence the levels of cash these firms hold. Classical theory states that cash erodes value (Keynes, 1936) and hence should be kept at minimal levels, however empirical evidence emerging in other parts of the world shows otherwise (e.g., Mikkelson & Partch, 2003).

## 1.4 Research objectives

The objectives of this study are stated as follows:

- To investigate the levels of cash holding by JSE-listed firms over time
- To establish factors which influence the levels of cash holding by JSE-listed firms
- To analyse the relationship between firms' cash holding and their operating and market performance

## 1.5 Significance of the study

Free Cash Flow Theory dictates that the presence of high cash holdings will exacerbate the related agency problems in a firm, hence will hinder performance and subsequently result in suboptimal value for shareholders (Jensen, 1986). The theory is supported by a number of empirical studies (e.g., Harford, 1999; Schwetzler & Reimund, 2004), however there have been several studies which show evidence contrary to the theory in the context of countries with high shareholder protection and strong form of corporate governance (Mikkelson & Partch, 2003; Harford et al., 2008; Anedeberhan, 2012).

Nyamgero (2015) found that SA firms hold varying levels of cash over different decades, where cash was measured in terms of ratios, but he did not assess the impact of the resulting cash holdings on firm performance whilst Siame (2012) examined the relationship between liquidity and firm profitability, and found a significant negative relationship between working capital and operating profitability amongst SA listed firms.

An interpretation of Matemilola, et al. (2012) study is that SA firms prefer internal funds to finance their activities, but they would also go for debt-financing where the market conditions are favourable. If SA firms hold high levels of cash as a result of unfavourable interest rates, the decision may be optimal to the shareholders. However, Matemilola et al. (2012) study focused purely on the variable interactions of Pecking Order Theory and Trade-off Theory, and in particular interactions between firm cash and firm leverage, and they also did not carry out any analysis on the corresponding firm performance.

Therefore this study hopes to fill the gap found between Siame (2012) and Nyamgero (2015) studies, namely whether actual cash holdings have a bearing on the actual performance of their respective firms. This study aims to achieve this through providing empirical evidence into the factors contributing to the levels of cash holdings by SA JSE-listed firms and into whether the resulting levels are associated with low or high firm performance. This study will therefore test the classical and emerging alternative theories in an SA context.

The findings of this study are expected to contribute to the emerging knowledge on the levels of cash holdings by SA listed firms. In particular, this study will assess whether the recent media headlines on high cash holdings by SA firms are valid, and test the nature of any relationship between the levels of cash holding and firm performance. The findings of this study are also expected to contribute towards assessing whether SA managers can be holistically trusted with any excess cash they may hold given the strong form of governance amongst the JSE-listed firms or if agency theory is prevalent and hence there is a need to regularly monitor corporate cash holdings to ensure optimal performance.

## 1.6 Benefits of the study

The findings of this study are expected to benefit various parties: policy makers, managers, shareholders and capital markets.

Firstly, the results may help inform policy formulation for regulators who are charged with managing SA macro-economic factors and growing the economy given the conflicting effects of globalisation. SA, like South Korea, may consider introducing a new tax policy targeting firms with excess cash, where the primary aim will be to discourage firms from hoarding cash and indirectly promote economic growth through firms investing in PPE and/or paying dividends.

Secondly, the findings of this study may provide managers with a framework to manage the levels of their firms' cash holdings to ensure optimal firm performance. Managers' remuneration is linked to firm performance as a way to mitigate agency risk and align managers' interests with those of their shareholders.

Thirdly, this study may also contribute to how a firm's level of cash holdings is considered in stock valuation models which are used to inform investment decisions. The theoretical prices in the valuation models are mainly driven by macro-economic factors and firm-specific inputs which are then compared with the prevailing market prices to determine whether a firm is over-, under- or appropriately-priced.

Lastly, the results of this study may help capital markets determine the role of cash in evaluating a firm's risk premium for financing decision. Capital markets are most interested in ensuring security of their capital and hence, they aim to provide lending to firms which are more likely to continue operating on an ongoing basis and servicing their debt on a timely basis.

## 1.7 Structure of the report

The final report is structured as follows. Chapter 2 presents a detailed analysis of both theoretical and empirical literature on corporate cash holdings and any relationship with performance. Chapter 3 discusses the research methodology. Chapter 4 presents the data statistics and regression results from assessing which cash determinants are significant for JSE-listed non-financial firms and the nature of the relationship between cash holdings and firm performance. Chapter 5 discusses the results, presents the conclusions of this study and makes recommendations.

## Chapter summary

This chapter introduced the research topic on corporate cash holdings in SA and corresponding public view, highlighting findings of similar studies in other parts of the world. The next chapter will provide literature review and empirical evidence.

# CHAPTER 2. LITERATURE REVIEW

## 2.1 Introduction

This chapter lays out the two main theories underpinning this study, and then presents the classical theories on the motives for holding cash and the effects of excess cash on firm performance. It then proceeds by comparing and contrasting the emerging empirical evidence across the world. The chapter concludes by presenting the hypotheses for the study.

## 2.2 Theoretical Underpinnings

The classical literature that explains the relationship between corporate cash and performance is underpinned by the Agency Theory and its sub-component, the Free Cash Flow Theory.

### 2.2.1 Agency Theory

The agency theory stems from the nature of the principal-agent relationship in firms and the conflicts of interests that are inherent in this relationship. The agency theory has continued to dominate the world of finance as it provides meaningful framework from which to understand managerial behaviour and decipher optimal forms of institutions to minimise the arising conflicts of interests.

Jensen and Meckling (1976) provided the application for the agency theory as put forward by Mitnick, and argued that agency problems are caused by an incomplete contractual relationship between the shareholders and managers, hence all the unceasing efforts to have a complete contract in place to tackle agency problems. In a later study, Jensen (1986) described three forms of agency costs: contractual arrangements with managers, residual loss from suboptimal decisions by managers and monitoring of managers' actions.

Wang (2010) outlined four solutions suggested by various authors to tackle agency problems. First, an increase in financial leverage will reduce the level of free cash flow but also force managers to be bonded with a financial institution on a major project and hence help assess the viability of the project. Second, a threat of corporate takeover will help keep managers at bay in that a takeover may put their employment at risk. Third, a distribution of idle cash to shareholders, either as dividends or share buybacks as this will minimise the level of free cash flow at the managers' disposal. Fourth, an increase of management shareholding in the firm will help deepen the degree of alignment between the shareholders' and managers' interests. The first and the third solutions by Wang (2010) are in support of keeping the amount of excess cash at minimal levels.

The evolution of agency theory has resulted in numerous reforms across the spectrum, including regulatory, corporate institutional and incentives policies. A classic illustration of reforms emanating from managing agency problems is the establishment and constant revisions to corporate governance codes in many jurisdictions. SA introduced King I Code in 1994, followed by King II in 2002, King III in 2009 and King IV will be effective from April 2017.

### 2.2.2 Free Cash Flow Theory

Free Cash Flow Theory is a sub-component of the Agency Theory. Assuming all consumers are rational, in the event of high free cash flow and no viable investment opportunities, shareholders will prefer that any emerging free cash flow is returned as dividends. Dividend payouts are expected to give shareholders an optimal value, compared to when free cash flow is retained by firms to provide cushion in future years but could also encourage wasteful expenditure or slacking by managers. The conflict of interests inherent in the management of free cash flow brings about its own set of agency problems.

Jensen (1986) defined free cash flow as the cash flow remaining after deductions of the cashflow required for all projects with positive net present values, and argued that when firms have low free cash flow, all their capital projects would need to be financed through the capital markets and this will bring management under scrutiny and ensure that only projects that are value-adding are approved and pursued. Jensen (1986) found that industries with free cash flow led to inefficient mergers and takeovers, hence confirmed the Free Cash Flow Hypothesis.

The Hypothesis was also proven by Voght and Vu (2000), who found that firms which distributed their free cash flow to shareholders through either dividends or share repurchases tend to have better operating performance than those who retain their free cash flows.

Given that firms' earnings can be manipulated in either direction, investors' focus has been shifting towards adopting free cash flow as an incrementally informative measure of performance and as an input towards remuneration of managers (Akono, 2016). Also, the growing view of the contractual value of free cash flow has led to the current practice where share prices are linked to their firms' levels of free cash flow, and any changes in share prices is as a result of the emerging actual cashflows deviating from the expected levels (Robert, 2002). Therefore, when remuneration is pegged to the actual level of free cash flow and subsequently to firms' share prices, managers are discouraged from pursuing high risk and high return investment opportunities and are thus directly and indirectly incentivised to accumulate and keep high levels of free cashflow. The likely lost investment opportunity to shareholders presents an unintended outcome of mitigating agency problems associated with free cash flow. This behaviour is a combination of two of the three forms of agency costs described by Jensen (1986), namely the contractual arrangements and the residual loss from suboptimal decisions.

In firms where there are viable investment opportunities, cash holding is valued positively, so that the value placed on every dollar of cash is higher than a dollar because the shareholders are of the view that agency problems are more contained in such environments (Pinkowitz, 2005). Conversely, where there are no valuable investment opportunities, a firm's cash is valued at less than a dollar (Pinkowitz, 2005). Therefore the agency cost of holding cash depends on the investment opportunities available and being pursued by a firm under consideration.

Richardson (2006) study provided empirical evidence to the Free Cash Flow Hypothesis using firms in the US over the period 1988-2002. He found significant evidence that firms with the highest levels of cashflow engage in over-investment, resulting in suboptimal value for shareholders, and found little evidence that governance structures have been effective in mitigating the related agency costs. Richardson (2006) findings are in support of the Free Cash Flow Hypothesis.

However Harford et al. (2008) argued that the Free Cash Flow Hypothesis is more entrenched in firms with weak form of corporate governance, and where corporate governance is strong; it emerges through speedy spending by managers to ensure the high cash holdings are never reflected in the financials as the high levels will increase the level of scrutiny from shareholders. This to some extent is consistent with Richardson's (2006) findings that related agency costs exist independent of the governance structure in place; they just present themselves in a different form.

## 2.3 Motives for holding cash

Motives for holding cash can be driven by internal needs such as having cash to meet day-to-day operational costs or external such as demonstrating particular liquidity levels to ensure favourable lending terms. Keynes (1936) argued that cash has a purpose but that high levels are unnecessary and should be avoided, especially in listed firms which have easy access to the capital markets, because such firms will not incur expensive charges in accessing such financing. Therefore, holding excess cash for "transaction motive" is unnecessary for listed firms with high credit ratings.

Myers and Majluf (1984) provided a counter-argument that financial slack (hoarding cash) has value because firms would be able to invest in positive net positive value (hereinafter referred to as "NPV") projects without incurring transactional costs of accessing external capital markets. Therefore Myers and Majluf (1984) conclusions are consistent with the "transaction motive" of holding cash.

The argument for holding cash for transactional motive is further proven by Pinkowitz and Williamson (2001) study which showed that Japanese firms increased their cash holdings during periods when banks' lending terms were overbearing.

Jensen (1986) argued that excess cash creates conflicts between the owners and managers of capital, because the former prefer dividend payouts which reduce excess cash whilst the latter prefer excess cash which allows them to carry on with their job without the need to seek assistance from the capital markets. Jensen (1986) further argued that the Free Cash Flow Theory implied that managers of firms with unused

borrowing power and large free cash flows are more likely to undertake low-benefit or even value-destroying mergers, unless the merger is in a declining industry, and he concluded that excess cash breeds agency problems but these are minimised where the firm is in a declining industry. Jensen (1986) supports a “speculative motive” for holding cash where the industry is in a declining phase.

Rating agencies use liquidity as a critical factor in assessing a firm’s credit rating (Moody’s, 2015). Therefore since firms aim to attain a high credit rating to reduce cost of financing their debt in the markets, they will be indirectly motivated to keep and demonstrate sufficient levels of liquidity.

Further to the above contrary theoretical arguments on cash hoarding, the body of knowledge has grown to provide a wide range of empirical evidence, covering both sides of the theory on the need and costs of holding excess cash.

## 2.4 Determinants of cash holdings

Firms have been found to hold higher levels of cash during election years where the outcome is not predictable (Julio & Yook, 2010). Government policies influence the way firms make investment decisions, and therefore firms will hold back on capital expenditure until any uncertainty on election outcome and possible policy changes is resolved. Khanyile (2015) made a related observation on SA firms which have been holding off investing in PPE due to slumping confidence index and policy uncertainty around land ownership and power supply.

Levels of cash holdings by firms are linked to growth opportunities and research and development (hereinafter referred to as “R&D”) intensity (Mikkelson & Partch, 2003). A similar conclusion was reached on Nigerian firms in a study which found a significant positive relationship between cash holding and firms’ growth opportunities (Ogundipe et al., 2012). A significant positive relationship between cash and growth opportunities is consistent with both the precautionary and transaction motives, and hence is in support of Myers and Majluf (1984). Growth opportunities and R&D spending are functions of the firm’s industry.

Sander et al. (2014) found that cash-to-assets ratios by firms in Estonia were dependent on industries, and that, industries which rely heavily on human capital such as *Healthcare* and *Technology* hold relatively high levels of cash. Similarly, in a study on Canadian firms, McVanel and Perevalov (2008) showed that cash holding levels differed by industries, with the knowledge-based *Biotechnology* and *Telecommunications* industries, holding significantly high levels of cash. They attributed the high cash holdings to the requirements of high R&D expenditure and a high number of investment opportunities available. McVanel and Perevalov (2008) also found that firms in the *Resource* industry hold relatively high cash, largely impelled by high commodity prices. In South Africa, Siame (2012) argued that firms in the *Consumer Services and Consumer Goods* industries are characterised by fast-moving goods which are usually paid in cash hence firms in these two industries hold high levels of cash to avoid stock-outs and to improve customer experience. Siame (2012) found that these firms have relatively low market capitalisation but are also more profitable on capital employed.

To the extent that transactional costs faced by firms are fixed, it is expected that large efficient firms will benefit from economies of scale (Bates et al., 2009) and therefore are expected to hold lower levels of cash. Empirical evidence on US listed firms during 1980-2004 support the argument for a negative relationship between cash and firm size (Bates et al., 2009). Similar findings were also confirmed on Nigerian firms (Ogundipe et al., 2012), Estonian firms (Sander et al., 2014), and firms in both the developed and emerging markets (Fernandes & Gonenc, 2015). Therefore a negative relationship is expected between firm size and cash holding.

Firms with greatest access to the capital markets, including higher credit rating, tend to hold lower ratios of cash-to-total assets (Opler et al., 1999). This is in spite of a requirement for firms to demonstrate liquidity to secure buy-in from capital markets and to maintain liquidity to ensure their continued ability to service the capital debt should the banks' loans not be favourable (Moody's, 2015). However, Dittmar et al. (2003) did not find any significant relationship to support the hypothesis that firms hold cash because of low access to capital, but rather because of low shareholder protection Therefore, the nature of the relationship between cash and access to capital market depends on the prevailing form of corporate governance.

A number of studies argue and provide evidence that leverage enables firms to hold low levels of cash (Wang, 2010; Mikkelson & Partch, 2003). Furthermore, Mikkelson and Partch (2003) explained Minton and Wruck's 2001 findings that firms with low leverage levels have unusually high levels of cash holdings because of a mismatch between the investment opportunities the firms have versus the type of collateral required by the financiers. Therefore this relationship may differ by industry given that investment opportunities are a function of an industry. However, Ogundipe et al. (2012) argued by referencing the agency theory that where firms are highly leveraged, the opposite may happen as those firms may find it difficult and expensive to raise new debt and hence their need to keep high cash levels to avoid financial distress. Using data on Nigerian listed non-financial firms, Ogundipe et al. (2012) found a significant positive relationship between leverage and cash holdings, which supported their argument that high cash holdings reflect the preferences of entrenched managers consistent with the agency theory, but contrary to evidence of other studies.

Duchin (2010) argues that a significant negative relationship between cash holdings and level of diversification by firms is due to the underlying coinsurance between the diverse business units that allow a firm to face lower total risk and hence the need to hold lower cash, because of lower cross-divisional correlations in investment opportunities. Kim (2013) also found a significant negative relationship between cash holdings and level of diversification amongst firms owned by '*chaebols*' in South Korea. However this significant negative relationship could not be confirmed for developing countries by Atanasova et al. (2015) and Fernandes and Gonenc (2015), who both found the relationship less significant, with Atanasova et al. (2015) arguing that the differences were found to be explained better by other variables such as product market competitiveness and corporate governance.

In a study on Estonian firms following a tax reform in 2000 whose primary objective was to encourage investment in R&D, the cash-to-assets ratio increased substantially because the corporation tax was now calculated based on earnings distributed hence the motive for firms to hoard cash (Sander et al., 2014). Sander et al. (2014) explained that although the cash holding has increased, the tax reform objectives have not been attained as firms are simply hoarding the retained cash instead of using it to invest in the long-term assets. Estonian firms have been able to accumulate these high levels of cash because the shareholders would only prefer distribution of cash as dividends

provided they expect the external rate of return to be higher than the internal rate of return post corporation tax (Sander et al., 2014).

Fernandes and Gonenc (2015) found a significant negative relationship between cash hoarding and multinationals when analysing both developed and emerging countries together, and suggested that the economies of scale on cash management from diversification by geography as the reason underpinning this relationship. However, when controlling for emerging countries, they found a significant positive relationship between cash hoarding and multinationals due to their need to finance their expansion plans (Fernandes & Gonenc, 2015), suggesting that multinationals in emerging countries rely on internal financing for expansion plans.

Dittmar et al. (2003) found a significant relationship to support the hypothesis that firms hold high levels of cash because of low shareholder protection; this provides evidence for the existence of agency theory amongst firms with low form of corporate governance.

## 2.5 Impact of cash on operating and market performance

The empirical literature available covers both developed and emerging markets on the varying relationship between cash and performance. Proxies used for operating and market performance included the Return on Assets, the Return on Equity, and the Tobin-Q ratio.

A study on US-listed firms over the period 1971-1994 found that large firms with high credit ratings have access to capital markets and therefore tend to hold lower ratios of cash-to-total-assets (Opler et al., 1999). This suggests that the classical “transactional motive” for hoarding cash by large firms may be unfounded given their relatively easy access to capital markets. This is consistent with Keynes’ (1936) argument that firms with access to capital markets should not hold excess cash, as transactional costs of securing finance will not be overbearing. Opler et al. (1999) also found that firms with strong growth opportunities and riskier cashflows hold relatively higher ratios of cash-to-total-assets, giving evidence to the “precautionary motive”, and supporting the view that cash enhances value, as it allows these firms to transact at an efficient rate.

US-listed firms with persistently high cash holdings during 1986-1990 have shown higher performance in the subsequent five-year period 1992-1996 than those with persistently low cash holdings and those with momentary high cash reserves over the same periods (Mikkelson & Partch, 2003). This empirical study proved the theoretical argument by Myers and Majluf (1984) that cash hoarding can be of value to firms.

Harford (1999) analysed mergers and acquisition activities in the US during 1950-1994, and found that acquisitions by cash-rich firms, as opposed to those fully financed were more likely to be followed by abnormal declines in operating performance, and eventually destroying shareholder value. His finding corroborates Jensen (1986) that managers with excess cash in non-declining industries tend to engage in investments with negative NPV.

Schwetzler and Reimund (2004) aimed to improve on Mikkelson and Partch's (2003) persistent cash research methodology and applied it on qualifying German-listed firms. Schwetzler and Reimund (2004) found a significant operating underperformance on firms that previously held excess cash over a three-year period, and thus their findings were in support of the Free Cash Flow Hypothesis. Schwetzler and Reimund (2004) findings were consistent with Jensen's (1986) argument that firms with excess cash invest in suboptimal projects when their respective industries are not in declining phases.

A significant negative relationship between firms' cash levels and their performance in terms of firm value was also found in a study on Dutch-listed firms with anti-takeover provisions, but not on those without these provisions (Anedeberhan, 2012). Both (Anedeberhan (2012) and Harford et al. (2008) prove that when corporate governance is present, excess cash does not hinder performance.

A significant positive relationship was found between cash holdings and Tobin-Q ratios in the widely-held Australian-listed non-financial firms over the period 1995-2010, whilst the closely-held firms showed a significant negative relationship (Ameer, 2012). This study provides evidence against the "transaction motive" as those widely-held firms can easily access external capital markets but choose not to, and yet the market did not penalise them but seemed to place high replacement value on them. Ameer (2012)

findings are consistent with other empirical studies (Anedeberhan, 2012; Harford et al., 2008) that where corporate governance is entrenched, high cash holdings by firms do not negatively affect their performance.

A study covering the period 2000-2011 on Jordan-listed non-financial firms found a significant positive relationship between firms' cash and profitability, providing evidence that cash enhances firm value (Abushammala & Sulaiman, 2014).

Kim (2013) found that a significantly higher ratio of South Korean firms with high cash holdings prior to 1997 survived the 1997/1998 Asian financial crisis, which supports the precautionary motive for holding cash. The same conclusion was reached when the firms were divided by their ownership structures: those owned by business groups (also known as "*chaebols*"-owned) and *non-chaebols*. However, the relationship between cash and performance depended on the organisational structure, meaning the relationship was more significant prior to the crisis for *chaebols*-owned and less significant prior to the crisis for *non-chaebols*, suggesting heightened scrutiny on corporate cash holdings by chaebols post the 1997/1998 Asian crisis (Kim, 2013).

Naoki (2012) found that, over a period between 1990-2010 cash holding and firm performance had a significant positive relationship amongst Japanese firms, where performance was measured in terms of both return on assets and price-to-book ratio. Furthermore, Naoki (2012) found out that the positive relationship between cash holding and performance has weakened since 2008 credit crisis, though it is still significant.

## 2.6 Hypotheses development

Consistent with the objectives of this study, two main hypotheses are proposed.

The level of cash holding by firms has been found to be significantly influenced by firm-specific factors such as industry (McVanel & Perevalov, 2008; Sander et al., 2014), firm size (Bates et al., 2009), R&D (Mikkelson & Partch, 2003), leverage ratios, dividend payout ratios (Voght & Vu, 2000), multinationals (Fernandes & Gonenc, 2015) and shareholder protectionism (Harford et al., 2008; Anedeberhan, 2012).

*H1: The level of cash holding differs by firm-specific factors*

Ameer (2012) study found a significantly positive relationship between cash holding and Tobin-Q ratio amongst widely-held firms in Australia whilst Anedeberhan (2012) found a significant negative relationship amongst Dutch-listed firms with anti-takeover provisions.

*H2: There exists a positive relationship between cash and performance*

## Chapter summary

This chapter outlined the key theories underpinning this study, namely the agency theory and its sub-component, the free cashflow hypothesis. It presented several classical arguments on how excess cash can exacerbate agency problems in firms, and then sought to provide the counter-arguments using a number of the emerging empirical literature which show that cash can enhance firms' performance. The main hypotheses to be tested were stated. The next chapter outlines the methodology used in modelling the relationships between cash holding and cash determinants, and between cash and performance of firms.

# CHAPTER 3. RESEARCH METHODOLOGY

## 3.1 Introduction

This chapter presents the research methodology. The chapter is organised as follows: Section 3.2 discusses the sample data and its sources. Section 3.3 presents the research design as well as the variables used to test the hypotheses, as outlined in Chapter 2 above. Section 3.4 describes the limitations of the model. The summary concludes the chapter.

## 3.2 Data

The purpose of this research is to assess the relationship between cash holdings and performance. The data used to make this assessment include firm's cash ratio, return on equity, industry, etc. The firm-specific data was obtained from *Bloomberg* while macro-economic data was obtained from the *SA Reserve Bank.*

The research sample is drawn from non-financial firms listed on the JSE, both on the main board and on the Alternative Exchange (hereinafter referred to as "AltX") board, over the period 2003 to 2015. Financial firms have been excluded from this study because their cash holding is biased as it includes their regulatory capital, which differs by the type and amount of financial products and services they sell. This exclusion of financial firms is consistent with previous studies (Ameer, 2012; Abushammala & Sulaiman, 2014).

Firms with less than 3 years' data have been excluded because they would results in a few data points, which may restrict the use of lagged variables in modelling and also skew results as their cash holding may be more influenced by the fact that they are new rather than due to the other firm-specific attributes.

The research period is between 2003 and 2015. Beginning the research in 2003 ensures that all financials are analysed following the adoption of King II corporate governance code of 2002 and the last year of study is 2015. The adoption of King II ensures the presence of strong form of governance which helps in mitigating agency-

related costs of hoarding cash. Analysing data across various forms of corporate governance will introduce heterogeneity as research shows that inadequately controlled managers spend free cash flow on wasteful projects (Jensen, 1986), hence the need to control data to a period of similar level of corporate governance.

Table 1 below presents the sample composition, from the total population downloaded on JSE-listed firms, and applying the various sampling rules.

| Description | Count |
|---|---|
| **Firms listed on JSE as at 30th June 2016** | 383 |
| **Less** Financial firms | 147 |
| Non-financial firms with less than 3 years' of data | 4 |
| AB-InBev | 1 |
| **Total firms used in the models** | 231 |

Table 1: Sample composition from SA-listed firms on the 30th June 2016

Lastly, each firm was assessed for complete information for each year under study, and where information was missing on at least one variable under study, the data relating to that particular year for that specific firm was marked as missing in totality.

After excluding for years with missing information on any variable(s) under study, the final sample stood at 231 firms with 1,507 firm-years observations. Appendix A gives the full list of selected firms under study. The resulting sample is an unbalanced panel data set, as some firms ceased existing or were delisted during the period of study whilst others got listed during the period of study.

## 3.3 Research design

The first part of the design analyses cash holding data using standard plots to identify if there are any conspicuous trends over time. The second and third parts involve using the Generalised Method of Moments "GMM" techniques to test whether the variables under study are significant determinants of cash holding, and to test the significance and nature of the relationship between firm cash levels and performance.

### 3.3.1 Analysing changes in cash holding over time

As in Harford et al. (2008), this study uses a ratio of cash plus cash equivalents as a percentage of total assets as a primary cash measure. This measure is used to analyse

the trend in the cash holding by JSE listed non-financial firms. Any trends will be deduced from time graphs.

The models will make use of Cash-to-Total-Assets Ratio "*CTAR*" as the primary cash measure. $\boldsymbol{CTAR}_{i,t}$ is the cash holding of firm *i*, at time *t*, and is calculated as Cash and Cash Equivalents to Total Assets less Cash and Cash and Equivalents. The cash holding trend over time would also tested using two other cash measures: Cash-to-Net-Assets Ratio "*CNAR*" and Cash-to-Sales Ratio "*CSR*".

### 3.3.2 Modelling determinants of cash

In the second part of the design, the research variables that significantly influence firm cash levels are identified from the literature. From the literature (e.g., Harford, 2008), there are certain variables that influence the firms' cash holding, and these variables include: assets tangibility, capital expenditure, dividend payout ratio and others.

Model (1) is specified as follows:

$$\boldsymbol{CTAR}_{i,t} = \lambda_0 + \lambda_1\, AST_{i,t} + \lambda_2\, CFV_{i,t} + \lambda_3\, CPX_{i,t} + \lambda_4\, DIV_{i,t} + \lambda_5\, LEV_{i,t} + \lambda_6\, SZ_{i,t} + \theta X_{i,t} + e_{i,t}$$

Where $\boldsymbol{CTAR}_{i,t}$ is the cash holding of firm *i*, at time *t*, Cash holding can be expressed a Cash-to-Total-Assets Ratio "*CTAR*" and calculated as Cash and Cash Equivalents to Total Assets less Cash and Cash and Equivalents); $\boldsymbol{AST_{i,t}}$ is the ratio of asset tangibility, measured as the fixed assets over total assets; $\boldsymbol{CFV_{i,t}}$ is the Cashflow Volatility, measured as the standard deviation of the firm's cashflow over total assets in the last 3 years; $\boldsymbol{CPX_{i,t}}$ is the ratio of capital expenditure, measured as the capital expenditure over total assets; $\boldsymbol{DIV_{i,t}}$ is the dividend payout ratio, measured as the actual dividend payments over total earnings earned; $\boldsymbol{LEV_{i,t}}$ is the leverage ratio, measured as total debt over total assets; $\boldsymbol{SZ_{i,t}}$ is the firm size, measured as a natural logarithm of total assets; $\boldsymbol{X}$ is a vector of control variables, consisting of several factors found in other studies to have an influence on firms' cash holding levels, viz. board of listing of the firm ($BRD_i$), measured as a binary variable where 0=main board of the JSE and 1=alternative board, industry ($IND_i$), macroeconomic environment ($INT_t$), measured as either pre-2008 credit crisis vs post-2008 credit crisis, quartile of the size of the firm ($SZQ_{i,t}$), measured as the size quartile under which the firm's average size of time is classified where size is measured as a natural logarithm of total assets, multinational status of the firm ($MLT_i$), measured as a binary variable where 0=primary listing on JSE

and 1=secondary listing on JSE; $\boldsymbol{\lambda_0}$ is the constant, the unobservable heterogeneity which is both time- and firm-independent, and $\boldsymbol{e_{i,t}}$ is the error term.

Table 2 below presents the variables in the model and how those variables are measured.

| Variable | Name in the model | Description | Measure |
|---|---|---|---|
| CTAR | Cash ratio | This is a ratio of assets available immediately for use in a firm. | $\frac{Cash+Cash\ Equivalents}{Total\ Assets}$ |
| AST | Asset tangibility ratio | This gives a percentage of the firm's assets which are tangible, and excludes intangible items such as goodwill, patents and trademarks. | $\frac{Fixed\ Assets}{Total\ Assets}$ |
| CPX | Capex ratio | It is an indication of how a firm uses its revenues to invest in future growth through capital projects. | $\frac{Capital\ Expenditure}{Total\ Assets}$ |
| DIV | Dividend payout ratio | It measures the ratio of earnings paid to shareholders. A high ratio encourages managers to use resources more efficiently. | $\frac{Dividends}{Total\ Earnings}$ |
| LEV | Leverage ratio | This ratio illustrates the extent to which the firm uses leverage to advance the firm's business goals. | $\frac{Total\ Debt}{Total\ Assets}$ |
| SZ | Firm size | This gives an indication of the extent to which a firm benefits from economies of scale. | *Log (Total Assets)* |
| BRD | Listing board | When a firm is listed on the main board vs the Alt-X means higher reporting requirements and more scrutiny by the market. | *Value = 0, if listed on main board of the JSE and = 1 otherwise* |
| IND | Industry | These are also known as super-sectors. JSE has 9 industries, including "Financial". This study focuses on all except Financial. | *Value =1(Basic Materials), =2(Consumer Goods), =3(Consumer Services), =4(Healthcare), =5(Industrials), =6(Oil&Gas), =7(Technology) and =8(Telecommunications)* |
| INT | Macro-environment | This is a binary factor to assess the change in the relationship dynamics following the 2008 credit crisis. | *Value = 0 (pre-2008), = 1 (post-2008)* |
| MLT | Multinational status | This indicator determines whether the firm repatriates its earnings to its offshore holding firm. | *Value = 0, if primary listing is on the JSE and = 1 otherwise* |
| SZQ | Firm size quartile | Each firm is categorised into its size quartile for each year, which is calculated as the firm's natural logarithm of total assets in that particular year. "Largest" is the first quartile, "Average" is the second and third quartiles and "Small" is the fourth quartile | *Value = 1("small"), =2 ("average") and = 3 ("large")* |

*Table 2: Description of variables used in the cash model*

### 3.3.3 Modelling the impact of cash on firm performance

The third part of the design investigates the effect of cash levels on firms' operating and market performance. Operating performance is measured by Return on Equity (hereinafter referred to as "RoE"), whilst market performance using Tobin-Q ratio (hereinafter referred to as "TqR"). The use of both RoE and TqR as performance metrics ensures that results are analysed from both an internal-based accounting and an external-based market approaches.

Model (2) is specified as follows:

$$\boldsymbol{Y_{i,t}} = \beta_0 + \beta_1\, CTAR_{i,t} + \beta_2\, AST_{i,t} + \beta_3 CFV_{i,t} + \beta_4 CPX_{i,t} + \beta_5 DIV_{i,t} + \beta_6 LEV_{i,t} + \beta_7 SZ_{i,t} + \theta X_{i,t} + \varepsilon_{i,t}$$

Where $\boldsymbol{Y_{i,t}}$ is a performance measure of firm *i*, at time *t. Performance can be measured as return on equity (**RoE**$_{i,t}$) or Tobin-Q Ratio (**TqR**$_{i,t}$); **CTAR**$_{i,t}$* is the cash holding of firm *i*, at time *t*, defined earlier as Cash-to-Total-Asset Ratio; $\beta_0$ is a constant, the unobservable heterogeneity which is specific to each firm in a specified industry, $\varepsilon_t$ is the error term and the other variables as defined earlier in *equation (1)*.

Table 3 below presents the additional exogenous and control variables and descriptions of how they are measured.

| Variable | Name in the model | Description | Measure |
|---|---|---|---|
| RoE | Return on Equity | The measure gives shareholders a better picture of how much return has been earned based on the capital they have invested and how managers are better in using leverage to enhance shareholders' returns. | $\frac{Net\ Income}{Equity}$ |
| TqR | Tobin-Q ratio | The measure gives a fair market valuation of the firm relative to the assets held, where a value greater than 1 represents a firm that is overvalued, while a value below 1 a firm that is undervalued | $\frac{Fixed\ Assets}{Total\ Assets)}$ |
| CRQ | Cash ratio quartile | Each firm is categorised into its cash ratio (CTAR) quartile for each year, which is calculated as the firm's CTAR, as defined earlier in that particular year. "Cash-rich" is the first quartile, "Cash-average" is the second and third quartiles and "cash-poor" is the fourth quartile | *Value = 1("cash-poor"), =2 ("cash-average") and = 3 ("cash-rich")* |

*Table 3: Description of additional variables used in the performance model*

## 3.4 Limitations of the model

The proposed cash determinants and performance models may suffer from other unobserved variables, which may be correlated with either the exogenous or the endogenous variables, or even both, hence a dynamic panel modelling may be more appropriate. Therefore Model (1) and Model (2) specified earlier will be amended and specified with lagged variables as Model (3) and Model (4) respectively.

Model (3) is specified as follows:

$$\boldsymbol{CTAR}_{i,t} - \boldsymbol{CTAR}_{i,t-1} = \lambda_0 + \lambda_1\left(AST_{i,t} - AST_{i,t-1}\right) + \lambda_2(CFV_{i,t} - CFV_{i,t-1}) + \lambda_3(CPX_{i,t} - CPX_{i,t-1}) + \lambda_4\,(DIV_{i,t} - DIV_{i,t-1}) + \lambda_5(LEV_{i,t} - LEV_{i,t-1}) + \lambda_6(SZ_{i,t} - SZ_{i,t-1}) + \theta X_{i,t} + e_{i,t} - e_{i,t}$$

Model (4) is specified as follows:

$$\boldsymbol{Y}_{i,t} - \boldsymbol{Y}_{i,t-1} = \beta_0(Y_{i,t-1} - Y_{i,t-2}) + \beta_1\,(CTAR_{i,t} - CTAR_{i,t-1}) + \beta_2\,(AST_{i,t} - AST_{i,t-1}) + \beta_3(CFV_{i,t} - CFV_{i,t-1}) + \beta_4(CPX_{i,t} - CPX_{i,t-1}) + \beta_5(DIV_{i,t} - DIV_{i,t-1}) + \beta_6(LEV_{i,t} - LEV_{i,t-1}) + \beta_7(SZ_{i,t} - SZ_{i,t-1}) + \theta X_{i,t} + (\varepsilon_{i,t} - \varepsilon_{i,t-1})$$

Furthermore, the resulting models may not apply in the following: other time periods, listed financial firms and unlisted firms.

## Chapter summary

This chapter described the data used in testing the hypotheses and the reasons behind the selections and exclusions made. The chapter then presented the selected regression models and reasons to support the model choices, and concluded with a description of the model limitations and a summary of the key statistics. The next chapter presents the sample statistics and results of the regressions used to test the hypotheses.

# CHAPTER 4. RESEARCH FINDINGS

## 4.1 Introduction

This chapter presents the results from the analysis. The chapter is organised as follows: Section 4.2 presents the descriptive statistics for the variables used. Section 4.3 presents the cash levels and trends over time. Section 4.4 presents the results of the factors that influence the cash levels of the firm. Section 4.5 presents the findings of the extent to which the cash levels affect the performance of the firms.

## 4.2 Description of sample

### 4.2.1 Univariate Analysis

Cash and performance measures were calculated using the selected 1,507 firm-years observations, and the resulting key statistics (minimum, maximum, mean, median, standard deviation and kurtosis) are outlined in Table 4 overleaf.

None of the cash measures are normally distributed, and amongst the proposed exogenous variables, firm size is the only exogenous variable that is normal using the Jarque-Bera test. Lastly, both performance measures, RoE and TqR are not normally distributed. Therefore it is essential that unit root analysis is carried out to test if these abnormalities can be corrected using lagged variables instead, as set out in section 4.2.3 below.

### 4.2.2 Correlation matrix

Table 5 below shows the results of the correlation analysis carried out on the cash measure, explanatory variables and performance measures**.** Table 5 shows that some correlation coefficients are significant, indicating that multicollinearity should be taken into account during regressions.

| Statistic | CTAR | CNAR | CSR | AST | CFV | CPX | DIV | LEV | SZ | ROE | TQR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mean** | 0.12 | 0.18 | 0.15 | 0.32 | 0.09 | -1.44 | 0.59 | 0.48 | 3.47 | 0.19 | 1.64 |
| **Median** | 0.09 | 0.10 | 0.08 | 0.26 | 0.05 | -0.05 | 0.33 | 0.47 | 3.49 | 0.16 | 1.38 |
| **Maximum** | 0.87 | 6.93 | 12.83 | 0.90 | 27.13 | 0.00 | 73.99 | 2.36 | 6.25 | 39.20 | 6.29 |
| **Minimum** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -608.92 | 0.00 | 0.03 | 0.37 | -6.44 | 0.28 |
| **Std. Dev.** | 0.12 | 0.34 | 0.41 | 0.23 | 0.72 | 21.54 | 3.22 | 0.20 | 0.94 | 1.06 | 0.89 |
| **Skewness** | 2.04 | 9.20 | 21.89 | 0.53 | 36.00 | -23.40 | 17.04 | 1.28 | 0.01 | 32.80 | 1.78 |
| **Kurtosis** | 8.57 | 140.10 | 619.72 | 2.15 | 1355.99 | 592.33 | 322.26 | 12.17 | 2.96 | 1219.88 | 7.15 |
| **Jarque-Bera** | 2 995 | 1 201 499 | 24 002 367 | 115 | 115 270 068 | 21 945 408 | 6 473 108 | 5 689 | 0 | 93 251 295 | 1 872 |
| ***Probability*** | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.94* | *0.00* | *0.00* |
| **Sum** | 186.12 | 271.31 | 224.80 | 478.36 | 138.39 | -2 168.87 | 883.17 | 728.81 | 5 226.29 | 281.73 | 2 473.85 |
| **Sum Sq. Dev.** | 22.19 | 170.56 | 257.83 | 78.59 | 770.73 | 699 020.03 | 15 649.44 | 57.55 | 1 322.15 | 1 693.26 | 1 202.03 |
| **Observations** | 1 507 | 1 507 | 1 507 | 1 507 | 1 507 | 1 507 | 1 507 | 1 507 | 1 507 | 1 507 | 1 507 |

*Table 4: Key statistics on all variables*

| Correlation | | CTAR | CNAR | CSR | AST | CFV | CPX | DIV | LEV | SZ | ROE | TQR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CTAR** | | 1 | | | | | | | | | | |
| | *prob* | ----- | | | | | | | | | | |
| **CNAR** | | 0.840 | 1 | | | | | | | | | |
| | *prob* | *0.000* | ----- | | | | | | | | | |
| **CSR** | | 0.280 | 0.288 | 1 | | | | | | | | |
| | *prob* | *0.000* | *0.000* | ----- | | | | | | | | |
| **AST** | | -0.328 | -0.247 | -0.088 | 1 | | | | | | | |
| | *prob* | *0.000* | *0.000* | *0.001* | ----- | | | | | | | |
| **CFV** | | 0.015 | 0.056 | 0.024 | 0.034 | 1 | | | | | | |
| | *prob* | *0.573* | *0.030* | *0.359* | *0.192* | ----- | | | | | | |
| **CPX** | | 0.028 | 0.017 | 0.005 | -0.064 | -0.003 | 1 | | | | | |
| | *prob* | *0.278* | *0.499* | *0.834* | *0.013* | *0.918* | ----- | | | | | |
| **DIV** | | -0.008 | -0.003 | -0.007 | 0.025 | 0.329 | 0.002 | 1 | | | | |
| | *prob* | *0.764* | *0.904* | *0.796* | *0.336* | *0.000* | *0.945* | ----- | | | | |
| **LEV** | | -0.191 | -0.176 | -0.176 | -0.023 | 0.132 | -0.055 | 0.027 | 1 | | | |
| | *prob* | *0.000* | *0.000* | *0.000* | *0.371* | *0.000* | *0.034* | *0.291* | ----- | | | |
| **SZ** | | -0.261 | -0.242 | -0.049 | 0.279 | -0.124 | 0.128 | 0.003 | 0.162 | 1 | | |
| | *prob* | *0.000* | *0.000* | *0.060* | *0.000* | *0.000* | *0.000* | *0.920* | *0.000* | ----- | | |
| **ROE** | | 0.010 | 0.017 | -0.014 | -0.007 | 0.031 | 0.056 | 0.009 | 0.071 | -0.015 | 1 | |
| | *prob* | *0.706* | *0.505* | *0.598* | *0.792* | *0.233* | *0.029* | *0.725* | *0.006* | *0.552* | ----- | |
| **TQR** | | 0.108 | 0.086 | 0.000 | 0.044 | 0.032 | -0.035 | 0.004 | -0.009 | 0.153 | 0.090 | 1 |
| | *prob* | *0.000* | *0.001* | *0.989* | *0.090* | *0.222* | *0.174* | *0.885* | *0.738* | *0.000* | *0.000* | ----- |

*Table 5: Correlation matrix of all variables*

### 4.2.3 Unit root tests

To ensure that the regression analysis does not give spurious estimates, the variables are first tested for stationarity, using several tests for unit root. Table 6 below shows the results of the summary unit root tests carried out on all variables:

| | CTAR | CNAR | CSR | AST | CFV | CPX | DIV | LEV | SZ | ROE | TQR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Null: Unit root (assumes common unit root process)** | | | | | | | | | | | |
| Levin, Lin & Chu t* | -11.4 | -12.7 | 10.7 | -19.0 | -115.2 | -22.8 | -17.7 | -7.7 | 9.5 | -95.7 | -13.0 |
| *Prob* | *0.00* | *0.00* | *1.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *1.00* | *0.00* | *0.00* |
| **Null: Unit root (assumes individual unit root process)** | | | | | | | | | | | |
| Im, Pesaran & Shin W | -4.4 | -5.0 | -4.0 | -3.4 | -21.9 | -9.7 | -6.7 | -1.2 | 8.6 | -15.0 | -3.4 |
| *Prob* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.12* | *1.00* | *0.00* | *0.00* |
| ADF - Fisher Chi-square | 392.5 | 412.3 | 437.2 | 355.0 | 487.4 | 529.2 | 493.0 | 314.6 | 227.9 | 510.2 | 361.6 |
| *prob* | *0.00* | *0.00* | *0.00* | *0.02* | *0.00* | *0.00* | *0.00* | *0.30* | *1.00* | *0.00* | *0.015* |
| PP - Fisher Chi-square | 446.3 | 477.0 | 488.4 | 430.2 | 597.2 | 649.2 | 563.9 | 373.9 | 388.5 | 584.7 | 403.5 |
| *prob* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* | *0.00* |

*Table 6: Summary of the various unit root test results of all variables*

Using a criterion of satisfying at least three unit root tests in assessing results, Table 6 shows LEV and SZ as the only variables where $p<0.05$ in less than three tests, indicating that their respective null hypotheses should be rejected in at least two tests, hence the conclusion that LEV and SZ have unit root processes. On testing for the presence of unit root in the first differences of these two variables, the results are $p<0.05$ under all tests as outlined in Table 7 below. Therefore the null hypotheses are rejected and can conclude that D(LEV) and D(SZ) have no unit root processes, hence the use of lagged variables in estimating coefficients would be appropriate.

| | D(LEV) | D(SZ) |
|---|---|---|
| **Null: Unit root (assumes common unit root process)** | | |
| Levin, Lin & Chu t* | -43.0 | -25.7 |
| *prob* | *0.00* | *0.00* |
| **Null: Unit root (assumes individual unit root process)** | | |
| Im, Pesaran and Shin W-stat | -15.1 | -11.9 |
| *prob* | *0.00* | *0.00* |
| ADF - Fisher Chi-square | 625.1 | 548.5 |
| *prob* | *0.00* | *0.00* |
| PP - Fisher Chi-square | 726.6 | 638.6 |
| *prob* | *0.00* | *0.00* |

*Table 7: Summary of the unit root test results of first differences of Leverage and Firm Size*

## 4.3 Cash holding trends over time

### 4.3.1 Baseline cash holding trends

Figure 1 below presents the various cash measures over the period of study:

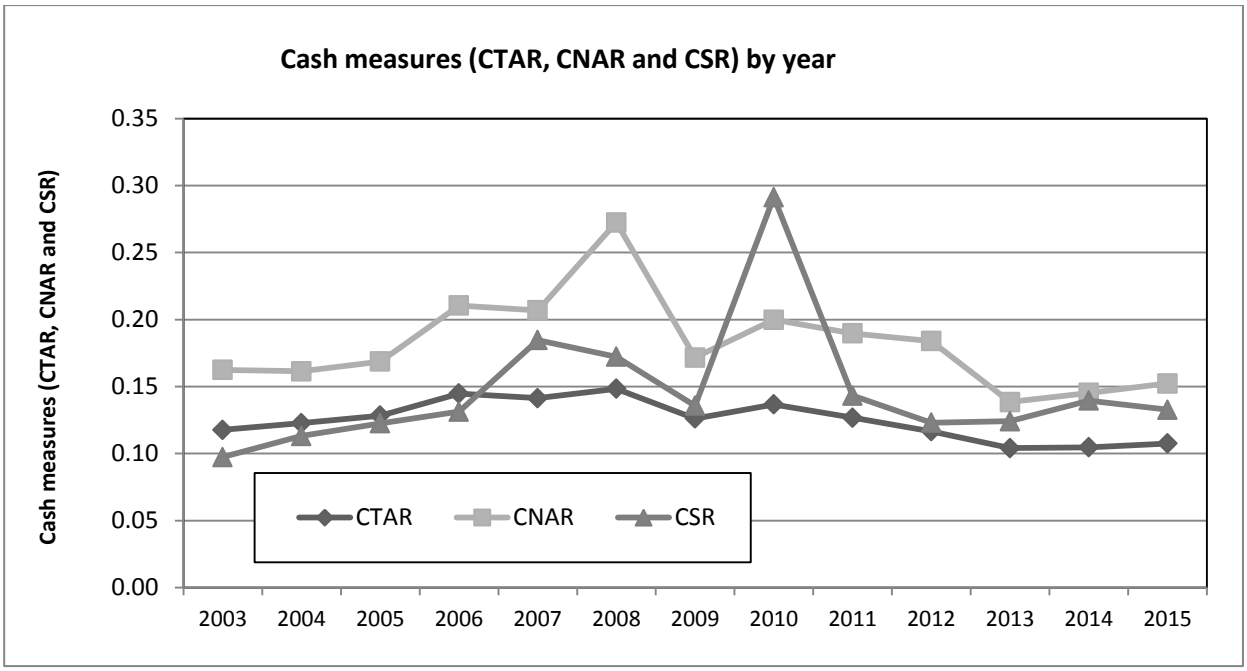


*Figure 1: Cash measures over time*

Figure 1 above shows an increasing trend for the period 2003-2007/8 and a downward trend for the period post the 2008 credit crisis. Expectantly CNAR is consistently above CTAR, although the gap between the two cash measures keeps narrowing over the period 2009-2015, which means that firms have decreased their non-cash assets more than their cash holding. CSR appears to be neck-on-neck with CTAR with the exception of 2010, which is largely due to two firms which were previously purely investment firms and began their trading operations in 2010: Grand Parade Investments Limited “GPL” (GPI, 2010) and ZCI Limited “ZCI” (ZCI, 2010). Also the relationship between CSR and CTAR appears to have changed in 2014, although this seems to be converging in 2015.

The 2008 hump in CTAR coincides with the interest rate peak in SA at the 12% level and the oil price peak at USD147, and the sudden rise in cash levels during the two years in 2014 and 2015 coincides with rising interest rates after five years of decreasing rates. The cash trends also appear to be moving together with platinum prices which saw a peak in 2008, a steady recovery over 2009-2010, and a falling trend since 2011.

### 4.3.2 Cash holding trends classified by industry

Table 8 below presents firm count by industry and a summary of the average CTAR by industry over the period of study:

| Industry | Count | Average CTAR |
|---|---|---|
| Basic Materials | 63 | 0.0920 |
| Consumer Goods | 25 | 0.0876 |
| Consumer Services | 40 | 0.1377 |
| Health Care | 7 | 0.0970 |
| Industrials | 65 | 0.0734 |
| Oil & Gas | 10 | 0.0698 |
| Technology | 14 | 0.2413 |
| Telecommunications | 7 | 0.2222 |
| Utilities | 0 | N/A |
| **TOTAL** | **231** | **0.1064** |

*Table 8: Firm count and average CTAR by industry*

Figure 2 overleaf presents average CTAR by year, categorised by industry. *Consumer Services*, *Technology* and *Telecommunications* are the three industries that show higher cash holdings in the majority of periods. *Technology* industry shows a downward trend until year 2014, the *Telecommunications* industry shows an upward trend pre the 2008 credit crisis and seems to stabilise in the period post the crisis, and the *Consumer Services* industry's cash holding has been roughly steady throughout the period of study other than in 2008 and also in the last three years 2013-2015.

Cash holding in *Basic Materials*, *Industrials* and *Oil&Gas* industries have peaks in 2008, coinciding with the 2008 peak in prices of crude oil and platinum. Moreover, *Oil & Gas* and *Industrials* are the industries that show the lowest cash holdings in the majority of the years. Like the *Consumer Services* industry, cash holding amongst firms in the *Consumer Goods* industry has also been relatively steady over the period of study. However, unlike the 2008 slump in the *Consumer Services*, the *Consumer Goods* industry shows a slight hump in 2007. The *Healthcare* industry started off slightly volatile in the period leading to 2008, but seems to have stabilised post 2008. In addition, the industry has an outlier in 2007, which is attributed to Aspen Pharmacare Holdings Limited "APN" which increased its cash and cash equivalents in multiples in anticipation of the international transactions (Aspen, 2007; Aspen, 2008).

Overall, all industries, other than *Technology* and *Telecommunication*, show some form of oscillating behaviour around their long-term means.

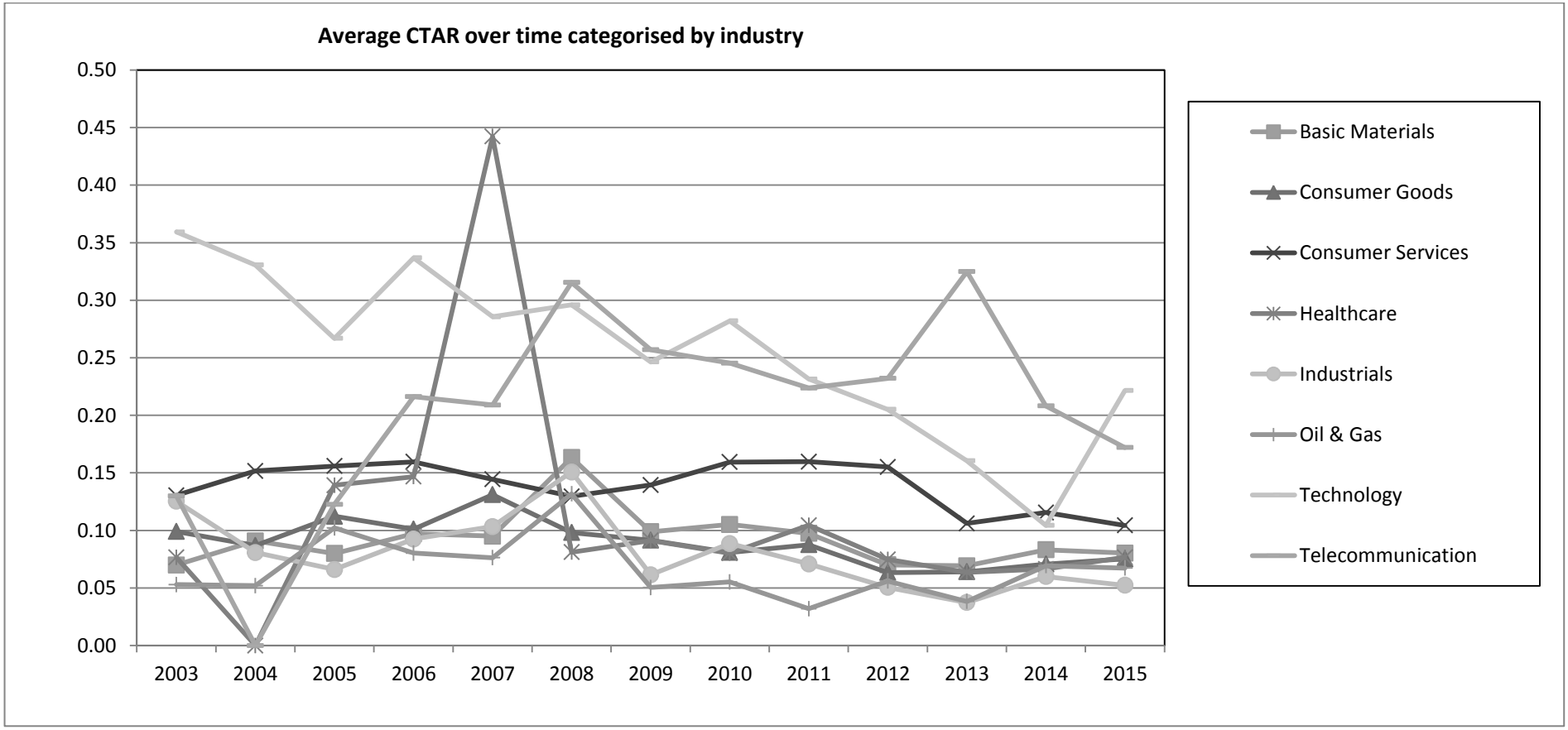


*Figure 2: Cash measure over time by industry*

## 4.4 Firm-specific attributes on cash holding

This section tests whether the pre-specified firm features influence the level of cash holdings. The firm-specific factors to be tested are: Asset tangibility, Cashflow volatility, Capital expenditure, Dividend payout ratio, Leverage ratio and Firm size. As outlined earlier in section 3.3.2, these factors are represented by AST, CFV, CPX, DIV, LEV and SZ respectively.

### 4.4.1 Cash holding determinants

Table 9 presents regression results under baseline and a number of scenarios where control variables are changed one at a time, namely: primary listing (SA or non-SA), listing board (Main or AltX), interest rate environment (pre 2008 or post 2008) and size of firm (small, average or large). All scenarios pass the four statistical tests for the model: the Sargan-Hansen Statistic test (represented by the J-statistic in the tables) shows $p>0.05$ hence the null hypothesis that "*over-identifying restrictions are valid*" is accepted, Instrument Rank is higher than the sum of estimated coefficients and the Arellano-Bond serial autocorrelation tests give $p<0.05$ under AR(1) and $p>0.05$ under AR(2) hence the null hypothesis that there is no serial correlation is accepted.

Under the baseline, AST, CPX and SZ are significant negative determinants, whilst CFV, DIV and LEV are not significant. When controlling for primary listing, the significance of CFV and LEV relationships to CTAR strengthens, but remain insignificant at the 5% level. A similar impact is observed on the CFV coefficient when controlling for the type of listing board where its significance improves for the main board. No statistical differences from baseline relationships are observed when controlling for pre- and post-2008 credit crunch. The CFV coefficient is significantly positive in large firms, and not a significant factor amongst the small- and average-sized firms.

### 4.4.2 Cash holding determinants by industry

Table 10 presents GMM regression results of cash determinants when controlling for industry. All industry scenarios pass statistical tests for the model: the Sargan-Hansen Statistic test with $p>0.05$ hence the null hypothesis that "*over-identifying restrictions are valid*" is accepted, Instrument Rank is higher than the sum of estimated coefficients and the Arellano-Bond serial autocorrelation tests give $p<0.05$ under AR(1) and $p>0.05$ under AR(2) hence the null hypothesis that there is no serial correlation is accepted.

Statistical differences in the relationships between CTAR and the specified variables are only observed with respect to the CFV coefficient, which was positive, but insignificant under the baseline scenario, and is strengthened, though remains insignificant, amongst firms in the *Consumer Services* and *Technology* industries.

## 4.5 Performance model results

### 4.5.1 Return of equity relationship

Tables 11, 12 and 13 present regression results on the relationship between RoE and CTAR, controlling for various scenarios. RoE scenarios also pass the four statistical tests for the model: the Sargan-Hansen Statistic test with $p>0.05$ hence the null hypothesis that "*over-identifying restrictions are valid*" is accepted, Instrument Rank is higher than the sum of estimated coefficients and the Arellano-Bond serial autocorrelation tests give $p<0.05$ under AR(1) and $p>0.05$ under AR(2) hence the null hypothesis that there is no serial correlation is accepted.

Table 11 shows the relationship between RoE and CTAR as significantly positive under both the baseline scenario and scenarios 1-9, though the relationship is the least significant at 10% amongst the large-sized firms. CPX becomes a significant positive determinant of RoE pre the 2008 credit crisis and a significant negative determinant amongst firms categorised as small-sized, as shown in Table 11. AST, DIV and SZ are consistently significant negative determinants of RoE, whilst LEV is consistently a significant positive determinant.

Table 12 shows that the RoE and CTAR positive relationship remains significant at the 1% level when firms are categorised by industry. The significant positive relationship between RoE and CTAR is more pronounced under *Basic Materials*, *Consumer Services* and *Industrials*, where the increases in CTAR cause increases in RoE which are above the average rate derived under the baseline scenario. Table 12 also shows that CPX becomes a significant negative determinant of operating performance amongst firms in the *Technology* industry. AST, DIV and SZ remain significant negative determinants of RoE across all industries, whilst LEV remains a significant positive determinant.

Table 13 shows that the relationship between RoE and CTAR is only significantly positive amongst the cash-poor and cash-average firms, and insignificantly positive amongst the cash-rich firms. The impact of the cash on RoE was the highest amongst the cash-poor firms. AST, CFV, DIV and SZ are significant negative determinants whilst LEV is a significant positive determinant. CPX coefficient is only significantly positive amongst the cash-poor and the cash-rich firms.

### 4.5.2 Tobin-Q ratio relationship

Tables 14, 15 and 16 present regression results on the relationship between TqR and CTAR. TqR scenarios also pass the four statistical tests for the model: the Sargan-Hansen Statistic test with $p>0.05$ hence the null hypothesis that "*over-identifying restrictions are valid*" is accepted, Instrument Rank is higher than the sum of estimated coefficients and the Arellano-Bond serial autocorrelation tests give $p<0.05$ under AR(1) and $p>0.05$ under AR(2) hence the null hypothesis that there is no serial correlation is accepted. Like under RoE, the relationship between TqR and CTAR is significantly positive at the 5% level under all the specified scenarios.

Table 14 illustrates that the significant positive relationships between TqR and CTAR are the highest when firms are categorised by the JSE board (main vs AltX) they are listed on and during the period post the 2008 credit crisis. The impact of CTAR on TqR is the lowest amongst the average-sized and the large-sized firms. Table 13 also shows that the impact of the changes in TqR to the changes in CFV strengthens when controlling for firms listed on the JSE AltX, and the impact was also stronger in the period prior to the 2008 credit crisis.

In Table 15, the significant positive relationship between TqR and CTAR shows that CTAR has the highest impact on TqR amongst firms in the *Consumer Goods* industry, and the lowest impact on TqR amongst firms in the *Telecommunications* industry. In both Tables 14 and 15, CPX is a significant positive determinant of TqR across all specified scenarios and all industries, whilst LEV and SZ remain significant negative determinants. AST, CFV and DIV are insignificant determinants of TqR.

Table 16 shows significant positive relationship between TqR and CTAR amongst the cash-poor, the cash-average and the cash-rich firms. The impact of changes in CTAR on changes in TqR was the lowest amongst the cash-rich firms. AST, CFV and DIV are insignificant determinants of TqR, whilst CPX, LEV and SZ are significantly positive, negative and negative respectively, this was similar to findings under other scenarios.

## Chapter summary

This chapter outlined a summary of key statistics and analysed cash holding trends over the period of study. The chapter then presented regression results from testing various cash determinants, including controlling for several characteristics and industry. The chapter concluded with regression results from analysing the relationship between cash and the two performance measures under several scenarios, including controlling for the industry and the firm's cash ratio quartile.

| Control Variable | Baseline | Primary Listing (SA) | Primary Listing (non SA) | JSE Listing Board (Main) | JSE Listing Board (AltX) | Economic Environment (pre 2008) | Economic Environment (post 2008) | Firm Size Category (Small) | Firm Size Category (Average) | Firm Size Category (Large) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Scenario** | (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| **Panel observations** | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 |
| **CTAR(-1) coefficient** | **0.4651** | **0.5207** | **0.4736** | **0.5265** | **0.4684** | **0.4586** | **0.5404** | **0.4725** | **0.4708** | **0.4870** |
| *t-stat* | *17.64**** | *21.03**** | *18.18**** | *22.02**** | *17.90**** | *17.69**** | *24.57**** | *16.38**** | *18.50**** | *19.13**** |
| **AST coefficient** | **-0.5121** | **-0.5322** | **-0.5261** | **-0.5597** | **-0.4951** | **-0.4890** | **-0.4463** | **-0.5111** | **-0.5138** | **-0.5643** |
| *t-stat* | *-8.33**** | *-8.55**** | *-8.86**** | *-9.08**** | *-8.15**** | *-8.46**** | *-7.99**** | *-7.90**** | *-8.29**** | *-9.39**** |
| **CFV coefficient** | **0.0939** | **0.1046** | **0.1015** | **0.1205** | **0.0858** | **0.0853** | **0.0793** | **0.0727** | **0.0975** | **0.1200** |
| *t-stat* | *1.51* | *1.68** | *1.61* | *1.9** | *1.36* | *1.38* | *1.61* | *1.10* | *1.56* | *1.88* |
| **CPX coefficient** | **-0.0004** | **-0.0005** | **-0.0004** | **-0.0005** | **-0.0003** | **-0.0003** | **-0.0003** | **-0.0004** | **-0.0004** | **-0.0005** |
| *t-stat* | *-2.73**** | *-3.36**** | *-2.76**** | *-3.49**** | *-2.43*** | *-2.50*** | *-2.43*** | *-3.14**** | *-2.75**** | *-3.39**** |
| **DIV coefficient** | **0.0001** | **0.0001** | **0.0001** | **0.0001** | **0.0001** | **0.0001** | **0.0002** | **0.0001** | **0.0001** | **0.0001** |
| *t-stat* | *0.38* | *0.26* | *0.42* | *0.22* | *0.50* | *0.46* | *0.75* | *0.43* | *0.41* | *0.40* |
| **LEV coefficient** | **-0.0331** | **-0.0544** | **-0.0179** | **-0.0364** | **-0.0254** | **-0.0381** | **-0.0540** | **-0.0762** | **-0.0275** | **-0.0221** |
| *t-stat* | *-0.69* | *-1.15* | *-0.37* | *-0.77* | *-0.53* | *-0.83* | *-1.48* | *-1.50* | *-0.58* | *-0.46* |
| **SZ coefficient** | **-0.0481** | **-0.0353** | **-0.0430** | **-0.0292** | **-0.0482** | **-0.0518** | **-0.0366** | **-0.0540** | **-0.0458** | **-0.0392** |
| *t-stat* | *-4.12**** | *-3.51**** | *-3.81**** | *-3.07**** | *-4.04**** | *-4.48**** | *-3.89**** | *-4.26**** | *-4.25**** | *-3.65**** |
| **J-statistic** | 58.91 | 57.69 | 58.62 | 56.91 | 59.20 | 60.19 | 62.48 | 59.85 | 58.61 | 58.80 |
| **Prob(J-statistic)** | 0.69 | 0.76 | 0.73 | 0.78 | 0.71 | 0.68 | 0.60 | 0.69 | 0.73 | 0.72 |
| **Instrument Rank** | 72 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| **Arellano-Bond Serial Test** | | | | | | | | | | |
| AR(1): m-statistic | -4.17*** | -4.38*** | -4.20*** | -4.35*** | -4.19*** | -4.17*** | -4.43*** | -4.10*** | -4.08*** | -4.26*** |
| AR(2): m-statistic | -0.61 | -0.52 | -0.60 | -0.52 | -0.61 | -0.62 | -0.51 | -0.57 | -0.61 | -0.58 |

***Table 9:*** *GMM Results for CTAR, using baseline data and controlling for structures of firms and economic environment where 1%, 5% and 10% statistical significance levels are represented by ***, ** and * respectively*

| Control Variable | Baseline | Industry (Basic Materials) | Industry (Consumer Goods) | Industry (Consumer Services) | Industry (Healthcare) | Industry (Industrials) | Industry (Oil & Gas) | Industry (Technology) | Industry (Telecoms) |
|---|---|---|---|---|---|---|---|---|---|
| **Scenario** | (0) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) |
| **Panel observations** | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 |
| **CTAR(-1) coefficient** | **0.4651** | **0.4690** | **0.4692** | **0.5099** | **0.4650** | **0.4922** | **0.4714** | **0.4576** | **0.4711** |
| *t-stat* | *17.64**** | *18.53**** | *17.76**** | *22.01**** | *17.72**** | *18.86**** | *18.72**** | *16.96**** | *17.68**** |
| **AST coefficient** | **-0.5121** | **-0.5124** | **-0.5329** | **-0.4864** | **-0.5089** | **-0.5006** | **-0.4959** | **-0.5239** | **-0.5234** |
| *t-stat* | *-8.33**** | *-8.27**** | *-8.93**** | *-8.08**** | *-8.49**** | *-8.31**** | *-8.42**** | *-8.41**** | *-8.44* |
| **CFV coefficient** | **0.0939** | **0.0907** | **0.1014** | **0.1143** | **0.0933** | **0.0937** | **0.0820** | **0.1005** | **0.0966** |
| *t-stat* | *1.51* | *1.49* | *1.61* | *1.84** | *1.51* | *1.54* | *1.48* | *1.65** | *1.54* |
| **CPX coefficient** | **-0.0004** | **-0.0004** | **-0.0004** | **-0.0003** | **-0.0004** | **-0.0004** | **-0.0003** | **-0.0004** | **-0.0004** |
| *t-stat* | *-2.73**** | *-2.75**** | *-2.82**** | *-2.50*** | *-2.74**** | *-2.77**** | *-2.57*** | *-3.06**** | *-2.91**** |
| **DIV coefficient** | **0.0001** | **0.0001** | **0.0001** | **0.0001** | **0.0001** | **0.0001** | **0.0002** | **0.0001** | **0.0001** |
| *t-stat* | *0.38* | *0.43* | *0.41* | *0.49* | *0.38* | *0.29* | *0.67* | *0.33* | *0.36* |
| **LEV coefficient** | **-0.0331** | **-0.0309** | **-0.0202** | **-0.0235** | **-0.0337** | **-0.0408** | **-0.0294** | **-0.0496** | **-0.0367** |
| *t-stat* | *-0.69* | *-0.66* | *-0.41* | *-0.54* | *-0.71* | *-0.87* | *-0.67* | *-1.03* | *-0.75* |
| **SZ coefficient** | **-0.0481** | **-0.0477** | **-0.0450** | **-0.0356** | **-0.0486** | **-0.0435** | **-0.0485** | **-0.0480** | **-0.0478** |
| *t-stat* | *-4.12**** | *-4.10**** | *-3.93**** | *-3.42**** | *-4.28**** | *-4.04**** | *-4.39**** | *-4.17**** | *-4.12**** |
| **J-statistic** | 58.91 | 58.66 | 59.24 | 63.81 | 59.06 | 58.60 | 61.56 | 58.85 | 58.98 |
| **Prob(J-statistic)** | 0.69 | 0.73 | 0.71 | 0.55 | 0.72 | 0.73 | 0.63 | 0.72 | 0.72 |
| **Instrument Rank** | 72 | 73 | 73 | 73 | 73 | 73 | 0 | 73 | 73 |
| **Arellano-Bond Serial Test** | | | | | | | | | |
| AR(1): m-statistic | -4.17*** | -4.14*** | -4.17*** | -4.41*** | -4.17*** | -4.20*** | -4.26*** | -4.11*** | -4.18*** |
| AR(2): m-statistic | -0.61 | -0.60 | -0.61 | -0.58 | -0.61 | -0.57 | -0.59 | -0.62 | -0.60 |

***Table 10:*** *GMM Results for CTAR, using baseline data and controlling for one industry at a time*
*where 1%, 5% and 10% statistical significance levels are represented by ***, ** and * respectively*

| Control Variable | Baseline | Primary Listing (SA) | Primary Listing (non SA) | JSE Listing Board (Main) | JSE Listing Board (AltX) | Economic Environment (pre 2008) | Economic Environment (post 2008) | Firm Size Category (Small) | Firm Size Category (Average) | Firm Size Category (Large) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Scenario** | (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| **Panel observations** | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 |
| **RoE(-1) coefficient** | **0.1359** | **0.1344** | **0.1350** | **0.1322** | **0.1366** | **0.1151** | **0.1472** | **0.1255** | **0.1272** | **0.1270** |
| *t-stat* | *14.15**** | *14.60**** | *14.41**** | *14.54**** | *14.50**** | *14.12**** | *15.73**** | *12.23**** | *13.14**** | *14.24**** |
| **CTAR coefficient** | **0.3626** | **0.3621** | **0.3661** | **0.3559** | **0.3726** | **0.2182** | **0.3110** | **0.6136** | **0.4230** | **0.2108** |
| *t-stat* | *2.59**** | *2.81**** | *2.60**** | *2.70**** | *2.71**** | *2.69**** | *2.36*** | *3.56**** | *2.77**** | *1.73** |
| **AST coefficient** | **-0.9547** | **-0.9476** | **-0.9546** | **-0.9380** | **-0.9297** | **-0.6600** | **-0.8507** | **-0.9333** | **-0.9725** | **-0.8138** |
| *t-stat* | *-11.44**** | *-11.83**** | *-11.49**** | *-11.53**** | *-11.51**** | *-10.49**** | *-9.68**** | *-12.54**** | *-11.83**** | *-10.83**** |
| **CFV coefficient** | **-0.9640** | **-0.9559** | **-0.9654** | **-0.9561** | **-1.0005** | **-0.9257** | **-1.0465** | **-1.1320** | **-0.9489** | **-0.9800** |
| *t-stat* | *-12.96**** | *-12.70**** | *-12.99**** | *-12.62**** | *-13.79**** | *-15.23**** | *-14.57**** | *-14.98**** | *-12.88**** | *-12.81**** |
| **CPX coefficient** | **-0.0001** | **-0.0001** | **-0.0001** | **-0.0001** | **-0.0001** | **0.0008** | **0.0002** | **-0.0006** | **-0.0002** | **0.0002** |
| *t-stat* | *-0.51* | *-0.40* | *-0.57* | *-0.30* | *-0.38* | *4.93**** | *0.71* | *-2.28*** | *-0.84* | *1.04* |
| **DIV coefficient** | **-0.0079** | **-0.0079** | **-0.0078** | **-0.0079** | **-0.0079** | **-0.0078** | **-0.0079** | **-0.0071** | **-0.0077** | **-0.0077** |
| *t-stat* | *-5.46**** | *-5.57**** | *-5.64**** | *-5.59**** | *-5.55**** | *-7.35**** | *-5.29**** | *-5.10**** | *-5.46**** | *-5.98**** |
| **LEV coefficient** | **0.4380** | **0.4441** | **0.4280** | **0.4360** | **0.4355** | **0.4891** | **0.5026** | **0.2771** | **0.4074** | **0.3848** |
| *t-stat* | *8.82**** | *8.89**** | *8.89**** | *9.03**** | *9.29**** | *11.35**** | *10.18**** | *5.32**** | *7.92**** | *8.92**** |
| **SZ coefficient** | **-0.0755** | **-0.0733** | **-0.0770** | **-0.0781** | **-0.0773** | **-0.1051** | **-0.0699** | **-0.0764** | **-0.0784** | **-0.1103** |
| *t-stat* | *-2.69**** | *-3.06**** | *-2.77**** | *-3.23**** | *-2.80**** | *-5.35**** | *-2.46*** | *-2.67**** | *-2.79**** | *-4.43**** |
| **J-statistic** | 59.56 | 59.73 | 59.56 | 59.64 | 61.06 | 61.45 | 59.19 | 58.98 | 60.85 | 61.96 |
| **Prob(J-statistic)** | 0.67 | 0.69 | 0.70 | 0.70 | 0.65 | 0.64 | 0.71 | 0.72 | 0.66 | 0.62 |
| **Instrument Rank** | 73 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| **Arellano-Bond Serial Test** | | | | | | | | | | |
| AR(1): m-statistic | -2.72*** | -2.72*** | -2.71*** | -2.72*** | -2.73*** | -2.75*** | -2.76*** | -2.69*** | -2.71*** | -2.68*** |
| AR(2): m-statistic | 0.78 | 0.78 | 0.77 | 0.77 | 0.73 | 0.76 | 0.78 | 0.35 | 0.71 | 0.73 |

***Table 11:*** *GMM Results for RoE, using baseline data and controlling for structures of firms and economic environment where 1%, 5% and 10% statistical significance levels are represented by ***, ** and * respectively*

| Variables | Baseline | Industry (Basic Materials) | Industry (Consumer Goods) | Industry (Consumer Services) | Industry (Healthcare) | Industry (Industrials) | Industry (Oil & Gas) | Industry (Technology) | Industry (Telecoms) |
|---|---|---|---|---|---|---|---|---|---|
| **Scenario** | (0) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) |
| **Panel observations** | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 |
| **RoE(-1) coefficient** | **0.1359** | **0.1326** | **0.1301** | **0.1552** | **0.1350** | **0.1382** | **0.1364** | **0.1480** | **0.1355** |
| *t-stat* | *14.15**** | *14.52**** | *13.61**** | *15.69**** | *14.42**** | *15.27**** | *14.58**** | *15.33**** | *13.98**** |
| **CTAR coefficient** | **0.3626** | **0.4460** | **0.3732** | **0.4277** | **0.3774** | **0.4541** | **0.3575** | **0.3296** | **0.3515** |
| *t-stat* | *2.59**** | *3.13**** | *2.64**** | *2.72**** | *2.88**** | *3.59**** | *2.58**** | *2.58*** | *2.50*** |
| **AST coefficient** | **-0.9547** | **-0.9491** | **-0.9232** | **-0.9118** | **-0.9137** | **-0.9418** | **-0.9022** | **-0.9844** | **-0.9480** |
| *t-stat* | *-11.44**** | *-12.33**** | *-12.22**** | *-10.81**** | *-11.19**** | *-13.24**** | *-10.83**** | *-12.86**** | *-10.92**** |
| **CFV coefficient** | **-0.9640** | **-0.6497** | **-0.9650** | **-0.8956** | **-0.9724** | **-1.0204** | **-0.9882** | **-0.9060** | **-0.9590** |
| *t-stat* | *-12.96**** | *-9.38**** | *-13.01**** | *-12.01**** | *-13.62**** | *-14.63**** | *-13.64**** | *-12.44**** | *-13.20**** |
| **CPX coefficient** | **-0.0001** | **-0.0004** | **-0.0002** | **-0.0003** | **-0.0001** | **-0.0003** | **0.0001** | **-0.0005** | **-0.0001** |
| *t-stat* | *-0.51* | *-1.74** | *-0.76* | *-0.98* | *-0.42* | *-1.29* | *0.19* | *-2.20*** | *-0.41* |
| **DIV coefficient** | **-0.0079** | **-0.0074** | **-0.0075** | **-0.0080** | **-0.0078** | **-0.0078** | **-0.0079** | **-0.0071** | **-0.0080** |
| *t-stat* | *-5.46**** | *-6.32**** | *-5.92**** | *-5.54**** | *-5.56**** | *-5.97**** | *-5.31**** | *-5.55**** | *-5.51**** |
| **LEV coefficient** | **0.4380** | **0.3251** | **0.3684** | **0.4188** | **0.4149** | **0.4112** | **0.4718** | **0.3298** | **0.4396** |
| *t-stat* | *8.82**** | *7.24**** | *7.96**** | *9.57**** | *9.26**** | *9.25**** | *9.24**** | *7.12**** | *8.82**** |
| **SZ coefficient** | **-0.0755** | **-0.0726** | **-0.0860** | **-0.0625** | **-0.0801** | **-0.0521** | **-0.0790** | **-0.0635** | **-0.0740** |
| *t-stat* | *-2.69**** | *-2.79**** | *-3.31**** | *-2.27**** | *-2.96**** | *-2.05*** | *-2.82**** | *-2.43*** | *-2.62**** |
| **J-statistic** | 59.56 | 58.57 | 60.69 | 59.34 | 62.61 | 65.33 | 60.52 | 59.65 | 59.67 |
| **Prob(J-statistic)** | 0.67 | 0.73 | 0.66 | 0.71 | 0.60 | 0.50 | 0.67 | 0.70 | 0.70 |
| **Instrument Rank** | 73 | 74 | 74 | 74 | 0 | 74 | 74 | 74 | 74 |
| **Arellano-Bond Serial Test** | | | | | | | | | |
| AR(1): m-statistic | -2.72*** | -2.71*** | -2.68*** | -2.74*** | -2.72*** | -2.74*** | -2.75*** | -2.68*** | -2.72*** |
| AR(2): m-statistic | 0.78 | 1.04 | 0.71 | 0.93 | 0.75 | 0.68 | 0.78 | 0.87 | 0.79 |

***Table 12:*** *GMM Results for RoE, using baseline data and controlling for one industry at a time*
*where 1%, 5% and 10% statistical significance levels are represented by ***, ** and * respectively*

| Variables | Baseline | Cash-poor | Cash-average | Cash-rich |
|---|---|---|---|---|
| **Scenario** | (0) | (18) | (19) | (20) |
| **Panel observations** | 1,013 | 1,013 | 1,013 | 1,013 |
| **RoE(-1) coefficient** | **0.1359** | **0.1384** | **0.1352** | **0.1315** |
| *t-stat* | *14.15**** | *16.04**** | *14.44**** | *15.09**** |
| **CTAR coefficient** | **0.3626** | **0.1483** | **0.4740** | **0.1096** |
| *t-stat* | *2.59**** | *2.11*** | *3.28**** | *1.56* |
| **AST coefficient** | **-0.9547** | **-0.8383** | **-0.9719** | **-0.8334** |
| *t-stat* | *-11.44**** | *-11.11**** | *-12.28**** | *-10.26**** |
| **CFV coefficient** | **-0.9640** | **-1.0900** | **-0.8857** | **-1.0995** |
| *t-stat* | *-12.96**** | *-16.08**** | *-12.15**** | *-16.06**** |
| **CPX coefficient** | **-0.0001** | **0.0005** | **-0.0003** | **0.0004** |
| *t-stat* | *-0.51* | *2.42*** | *-1.24* | *2.15*** |
| **DIV coefficient** | **-0.0079** | **-0.0067** | **-0.0076** | **-0.0077** |
| *t-stat* | *-5.46**** | *-6.25**** | *-5.84**** | *-5.99**** |
| **LEV coefficient** | **0.4380** | **0.5325** | **0.4098** | **0.4886** |
| *t-stat* | *8.82**** | *10.62**** | *8.43**** | *10.35**** |
| **SZ coefficient** | **-0.0755** | **-0.0886** | **-0.0719** | **-0.0946** |
| *t-stat* | *-2.69**** | *-3.73**** | *-2.70**** | *-4.08**** |
| **J-statistic** | 59.56 | 67.18 | 61.78 | 60.82 |
| **Prob(J-statistic)** | 0.67 | 0.44 | 0.62 | 0.66 |
| **Instrument Rank** | 73 | 74 | 74 | 74 |
| **Arellano-Bond Serial Test** | | | | |
| AR(1): m-statistic | -2.72*** | -2.71*** | -2.75*** | -2.71*** |
| AR(2): m-statistic | 0.78 | 0.66 | 0.82 | 0.63 |

***Table 13:*** *GMM Results for RoE, using baseline data and controlling for cash ratio quartile of firms where 1%, 5% and 10% statistical significance levels are represented by ***, ** and * respectively*

| Variables | Baseline | Primary Listing (SA) | Primary Listing (non SA) | JSE Listing Board (Main) | JSE Listing Board (AltX) | Economic Environment (pre 2008) | Economic Environment (post 2008) | Firm Size Category (Small) | Firm Size Category (Average) | Firm Size Category (Large) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Scenario** | (0) | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| **Panel observations** | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 |
| **TqR(-1) coefficient** | **0.4944** | **0.4964** | **0.4938** | **0.4948** | **0.4943** | **0.4716** | **0.4989** | **0.4914** | **0.5139** | **0.5059** |
| *t-stat* | *17.97**** | *18.14**** | *18.05**** | *18.01**** | *18.02**** | *16.72**** | *17.80**** | *17.77**** | *18.93**** | *19.15**** |
| **CTAR coefficient** | **1.1529** | **1.1043** | **1.1148** | **1.2274** | **1.2361** | **1.0596** | **1.2091** | **1.1408** | **0.9344** | **0.8661** |
| *t-stat* | *3.39**** | *3.49**** | *3.31**** | *3.81**** | *3.57**** | *3.02**** | *3.73**** | *3.45**** | *2.93**** | *2.77**** |
| **AST coefficient** | **-0.0383** | **-0.0552** | **-0.0846** | **-0.0597** | **-0.1598** | **0.2295** | **0.1134** | **-0.0491** | **-0.0058** | **0.1418** |
| *t-stat* | *-0.09* | *-0.14* | *-0.21* | *-0.14* | *-0.40* | *0.51* | *0.27* | *-0.12* | *-0.01* | *0.34* |
| **CFV coefficient** | **0.6016** | **0.5657** | **0.5017** | **0.6173** | **0.8132** | **0.9536** | **0.5971** | **0.6680** | **0.5911** | **0.5438** |
| *t-stat* | *1.31* | *1.25* | *1.14* | *1.34* | *1.73** | *1.77** | *1.28* | *1.43* | *1.30* | *1.21* |
| **CPX coefficient** | **0.0028** | **0.0028** | **0.0028** | **0.0025** | **0.0022** | **0.0034** | **0.0026** | **0.0029** | **0.0031** | **0.0035** |
| *t-stat* | *2.57*** | *2.69**** | *2.59**** | *2.46*** | *2.19*** | *2.84**** | *2.36*** | *2.64**** | *2.91**** | *3.37**** |
| **DIV coefficient** | **-0.0002** | **-0.0002** | **-0.0001** | **-0.0003** | **-0.0003** | **-0.0008** | **-0.0008** | **-0.0006** | **-0.0007** | **-0.0002** |
| *t-stat* | *-0.10* | *-0.09* | *-0.02* | *-0.14* | *-0.12* | *-0.34* | *-0.36* | *-0.27* | *-0.35* | *-0.10* |
| **LEV coefficient** | **-1.4418** | **-1.4272** | **-1.4356** | **-1.4940** | **-1.5280** | **-1.4904** | **-1.6270** | **-1.3971** | **-1.3728** | **-1.3818** |
| *t-stat* | *-4.84**** | *-4.99**** | *-4.87**** | *-5.12**** | *-5.15**** | *-4.54**** | *-5.42**** | *-4.58**** | *-4.69**** | *-4.68**** |
| **SZ coefficient** | **-0.3220** | **-0.3343** | **-0.3501** | **-0.3021** | **-0.2916** | **-0.3499** | **-0.3034** | **-0.3210** | **-0.3139** | **-0.3682** |
| *t-stat* | *-3.53**** | *-3.85**** | *-3.91**** | *-3.47**** | *-3.18**** | *-3.54**** | *-3.30**** | *-3.49**** | *-3.52**** | *-4.25**** |
| **J-statistic** | 80.35 | 80.49 | 81.64 | 80.71 | 81.03 | 81.97 | 81.64 | 80.84 | 80.87 | 81.43 |
| **Prob(J-statistic)** | 0.09 | 0.11 | 0.09 | 0.11 | 0.10 | 0.09 | 0.09 | 0.10 | 0.10 | 0.10 |
| **Instrument Rank** | 73 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| **Arellano-Bond Serial Test** | | | | | | | | | | |
| AR(1): m-statistic | -4.93*** | -4.93*** | -4.95*** | -4.96*** | -4.95*** | -4.83*** | -4.93*** | -4.93*** | -4.98*** | -4.96*** |
| AR(2): m-statistic | -0.24 | -0.22 | -0.19 | -0.24 | -0.34 | -0.38 | -0.19 | -0.28 | -0.22 | -0.17 |

***Table 14:*** *GMM Results for TqR, using baseline data and controlling for structures of firms and economic environment where 1%, 5% and 10% statistical significance levels are represented by ***, ** and * respectively*

| Variables | Baseline | Industry (Basic Materials) | Industry (Consumer Goods) | Industry (Consumer Services) | Industry (Healthcare) | Industry (Industrials) | Industry (Oil & Gas) | Industry (Technology) | Industry (Telecoms) |
|---|---|---|---|---|---|---|---|---|---|
| **Scenario** | (0) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) |
| **Panel observations** | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 | 1,013 |
| **TqR(-1) coefficient** | **0.4944** | **0.4970** | **0.5041** | **0.5218** | **0.4932** | **0.4933** | **0.4961** | **0.4849** | **0.5037** |
| *t-stat* | *17.97**** | *17.98**** | *17.82**** | *20.09**** | *18.06*** | *18.10**** | *18.33**** | *17.85**** | *19.46**** |
| **CTAR coefficient** | **1.1529** | **1.1745** | **1.2680** | **1.0966** | **1.1623** | **1.1120** | **1.1363** | **1.1646** | **0.7892** |
| *t-stat* | *3.39**** | *3.33**** | *3.70**** | *3.62**** | *3.45**** | *3.34**** | *3.42**** | *4.36**** | *2.80**** |
| **AST coefficient** | **-0.0383** | **-0.0625** | **-0.0113** | **0.0506** | **-0.0119** | **-0.0656** | **0.0845** | **0.0636** | **0.0294** |
| *t-stat* | *-0.09* | *-0.15* | *-0.03* | *0.14* | *-0.03* | *-0.16* | *0.21* | *0.18* | *0.07* |
| **CFV coefficient** | **0.6016** | **0.7132** | **0.4503** | **0.5942** | **0.6416** | **0.6072** | **0.4935** | **0.3733** | **0.5134** |
| *t-stat* | *1.31* | *1.55* | *1.04* | *1.32* | *1.48* | *1.31* | *1.16* | *0.97* | *1.15* |
| **CPX coefficient** | **0.0028** | **0.0027** | **0.0030** | **0.0025** | **0.0027** | **0.0028** | **0.0032** | **0.0035** | **0.0035** |
| *t-stat* | *2.57*** | *2.40*** | *2.87**** | *2.67**** | *2.71**** | *2.65**** | *3.06**** | *3.78**** | *3.61**** |
| **DIV coefficient** | **-0.0002** | **-0.0003** | **-0.0010** | **-0.0008** | **-0.0001** | **0.0000** | **-0.0005** | **-0.0023** | **-0.0012** |
| *t-stat* | *-0.10* | *-0.11* | *-0.50* | *-0.42* | *-0.06* | *0.00* | *-0.23* | *-1.26* | *-0.59* |
| **LEV coefficient** | **-1.4418** | **-1.4482** | **-1.2864** | **-1.6132** | **-1.4774** | **-1.4119** | **-1.3691** | **-1.2468** | **-1.3040** |
| *t-stat* | *-4.84**** | *-4.65**** | *-4.40**** | *-5.99**** | *-5.15**** | *-4.87**** | *-4.82**** | *-4.96**** | *-4.56**** |
| **SZ coefficient** | **-0.3220** | **-0.3207** | **-0.3229** | **-0.3228** | **-0.3081** | **-0.3306** | **-0.3483** | **-0.3620** | **-0.3759** |
| *t-stat* | *-3.53**** | *-3.47**** | *-3.62**** | *-3.66**** | *-3.69**** | *-3.64**** | *-4.13**** | *-4.38**** | *-4.48**** |
| **J-statistic** | 80.35 | 80.74 | 83.03 | 82.84 | 80.63 | 80.43 | 81.01 | 82.29 | 82.19 |
| **Prob(J-statistic)** | 0.09 | 0.10 | 0.08 | 0.08 | 0.11 | 0.11 | 0.10 | 0.08 | 0.09 |
| **Instrument Rank** | 73 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| **Arellano-Bond Serial Test** | | | | | | | | | |
| AR(1): m-statistic | -4.93*** | -4.96*** | -4.98*** | -4.96*** | -4.92*** | -4.92*** | -4.95*** | -4.93*** | -4.92*** |
| AR(2): m-statistic | -0.24 | -0.28 | -0.20 | -0.16 | -0.25 | -0.24 | -0.18 | -0.17 | -0.18 |

***Table 15:*** *GMM Results for TqR, using baseline data and controlling for one industry at a time where 1%, 5% and 10% statistical significance levels are represented by ***, ** and * respectively*

| Variables | Baseline | Cash Poor | Cash Average | Cash Rich |
|---|---|---|---|---|
| **Scenario** | (0) | (18) | (19) | (20) |
| **Panel observations** | 1,013 | 1,013 | 1,013 | 1,013 |
| **TqR(-1) coefficient** | **0.4944** | **0.5020** | **0.5041** | **0.4939** |
| *t-stat* | *17.97**** | *18.15**** | *18.26**** | *18.24**** |
| **CTAR coefficient** | **1.1529** | **1.0752** | **1.0342** | **0.6295** |
| *t-stat* | *3.39**** | *3.16**** | *3.08**** | *2.14*** |
| **AST coefficient** | **-0.0383** | **-0.0813** | **-0.1102** | **-0.0481** |
| *t-stat* | *-0.09* | *-0.19* | *-0.27* | *-0.12* |
| **CFV coefficient** | **0.6016** | **0.4922** | **0.0978** | **0.2937** |
| *t-stat* | *1.31* | *1.14* | *0.26* | *0.73* |
| **CPX coefficient** | **0.0028** | **0.0028** | **0.0031** | **0.0034** |
| *t-stat* | *2.57*** | *2.64**** | *2.98**** | *3.27**** |
| **DIV coefficient** | **-0.0002** | **-0.0007** | **-0.0007** | **0.0007** |
| *t-stat* | *-0.10* | *-0.33* | *-0.33* | *0.26* |
| **LEV coefficient** | **-1.4418** | **-1.4194** | **-1.2952** | **-1.3346** |
| *t-stat* | *-4.84**** | *-4.60**** | *-4.33**** | *-4.76**** |
| **SZ coefficient** | **-0.3220** | **-0.3499** | **-0.4102** | **-0.4208** |
| *t-stat* | *-3.53**** | *-3.84**** | *-4.83**** | *-5.17**** |
| **J-statistic** | 80.35 | 81.40 | 84.76 | 82.89 |
| **Prob(J-statistic)** | 0.09 | 0.10 | 0.06 | 0.08 |
| **Instrument Rank** | 73 | 74 | 74 | 74 |
| **Arellano-Bond Serial Test** | | | | |
| AR(1): m-statistic | -4.93*** | -4.97*** | -5.03*** | -4.91*** |
| AR(2): m-statistic | -0.24 | -0.18 | -0.03 | -0.08 |

***Table 16:*** *GMM Results for TqR, using baseline data and controlling for firms' cash ratio quartiles where 1%, 5% and 10% statistical significance levels are represented by ***, ** and * respectively*

# CHAPTER 5. DISCUSSION AND CONCLUSION

## 5.1 Introduction

This chapter brings together all the results. Section 5.2 discusses different model results by comparing the findings with the literature reviewed. Section 5.3 summarises key results. Section 5.4 makes recommendations on the findings and future improvements to the study.

## 5.2 Discussion on model results

Other than for the two outlier cases where the firms had suddenly become operational from having been previously traded as pure investment companies, all cash measures showed a steadily increasing trend over the period prior to the 2008 credit crisis and a gradually decreasing trend post the crisis. The generally higher cash holdings in the 2000s compared to the relatively lower holdings in the 2010s is consistent with earlier findings by Nyamgero (2015), but is contrary to media headlines (Ryan, 2015; Khanyile 2015) which focussed more on the absolute amounts rather than cash ratios. This study also established that cash trends differed by industry, with the *Consumer Services*, *Technology* and *Telecommunications* industries' cash holdings being considerably higher than the market average, consistent with prior studies in SA and other countries (Siame, 2012; Sander et al., 2014; McVanel & Perevalov, 2008). The 2008 peak in cash holding amongst firms in the *Basic Materials* and *Oil & Gas* industries coincided with that of commodity prices, consistent with the findings of McVanel and Perevalov (2008).

Cash holding was found to be significantly influenced by asset tangibility, capital expenditure and firm size, consistent with past empirical studies (e.g., Bates et al., 2009). The study found that the significance of cashflow volatility as a positive factor in influencing cash holding improves amongst firms listed on the main board of JSE and amongst large-sized firms. This study further established that firms in the *Technology* and *Telecommunications* industries hold higher than market average cash, consistent with Sander et al. (2014) and McVanel and Perevalov (2008). Leverage ratio is an

insignificant determinant of cash holding, which is contrary to empirical studies which found significant though conflicting relationships (Mikkelson & Partch, 2003; Ogundipe et al., 2012). Even when controlling for the post the 2008 credit crisis, leverage ratio's negative relationship with cash strengthens, but remains insignificant.

Relationship between cash and performance was found to be significantly positive under all control variables, and independent of whether RoE or TqR was analysed as an endogenous variable. This finding is contrary to the agency theory but consistent with other studies (e.g. Ameer, 2012). A significant negative relationship between dividend payout ratio and RoE shows that as the dividend payout ratio increases, firms' performance decreases, which is contrary to the free cashflow hypothesis (Voght & Vu, 2000). No marked differences were found in the relationship between cash and RoE when controlling for various characteristics, but the largest impact was observed in the relationship between cash and TqR amongst firms in the *Consumer Services* industry, suggesting cash is most valued by investors in this industry compared to all other industries. This finding is consistent with Siame (2012) argument that cash is king in the *Consumer Services* industry. In spite of leverage having an insignificant relationship with cash, the study found that it was a significant positive determinant of operating performance under all scenarios, implying that managers are able to use leverage to enhance shareholder value. This finding corroborates one of Wang's (2010) suggested solutions that leverage can contribute towards mitigating agency-related problems.

The lowest impact on the relationship between cash and performance was found amongst the large-sized firms when using the RoE measure and within the *Telecommunications* industry when using the TqR measure. These relatively weak relationships may be suggesting underlying behavioural trends. First, that cash in large firms may be contributing less positively to operating performance, because if large firms fail to take advantage of their economies of scale to hold less cash, it is likely to be due to their internal inefficiencies, resulting in relatively low increases in operating performance. Second, that the market may be viewing large cash holdings by firms in the *Telecommunications* industry less positively, because of the market view that the SA *Telecommunications* industry is relatively mature (Deloitte, 2014), hence firms in this industry are unlikely to have any positive NPV investment opportunities, implying no perceived need for firms to hoard cash (McVanel & Perevalov, 2008; Harford, 1999).

When the analysis was controlled for cash-rich firms, CTAR and RoE had an insignificant positive relationship, implying that no conclusive observations can be made from the results on whether excess cash holding enhances shareholder value. This finding neither supports nor disproves the Free Cash Flow Hypothesis. Instead, the study found significant evidence which is contrary to the Free Cash Flow Hypothesis, that capital expenditure ratio and RoE have a significant positive relationship, suggesting that SA cash-rich firms are not pursuing value-destroying projects, unlike in Harford (1999).

Amongst cash-poor firms, cash has a significant positive relationship with both RoE and TqR, implying that availability of cash is imperative to the survival of such firms, both operationally and in the market under the scrutiny of investors. The cash-poor firms, relative to the cash-average and cash-rich firms, showed the highest impact on the relationship between cash and RoE, suggesting low importance of high cash towards enhancing operating performance amongst the cash-average and cash-rich firms.

CTAR has a significant positive influence on TqR under all the cash ratio firm groupings; however the impact was considerably low amongst the cash-rich firms, suggesting that firms with excess cash are viewed less favourably by the market, when compared to cash-poor and cash-average firms. Furthermore, these positive relationships between CTAR and TqR may suggest that there is a strong form of corporate governance amongst JSE-listed firms and hence the high cash holding does not negatively affect firms' performance in general (Anedeberhan, 2012; Harford et al., 2008).

## 5.3 Conclusion

This study examines the determinants of cash holding by JSE-listed firms and the relationship between cash and two key performance metrics, RoE and TqR. The study used three different measures, CTAR, CNAR and CSR, to analyse trends in cash, and found that the levels of cash were generally increasing prior to the 2008 credit crisis and have been decreasing in the period post the crisis. The study also found that cash trends differed when grouping firms by industry, with the most variations observed for the *Consumer Services*, *Technology* and *Telecommunications* industries.

The study found that in general, cash depends negatively on asset tangibility, capital expenditure and firm size. No significant relationships were found between cash and cashflow volatility; however the significance of cashflow volatility strengthened when controlling for the large-sized firms and firms listed on the main board of the JSE. Dividend payout and leverage ratios were consistently insignificant as determinants of cash holding.

Furthermore, the study found that cash and performance have a significant positive relationship, under both RoE and TqR. Though it remained significantly positive, the relationship between cash and TqR had the highest impact amongst firms in the *Consumer Services* industry, and the lowest impact amongst the large-sized firms and those firms in the *Telecommunications* industry. The relationship between RoE and cash was insignificantly positive amongst cash-rich firms, and significantly positive amongst cash-poor and cash-average firms, with the impact being considerably high amongst the cash-poor firms. The relationship between TqR and cash was significantly positive amongst all cash ratio groupings, although the impact was considerably low amongst the cash-rich firms when compared to the cash-poor and cash-average firms.

In summary, cash holding measured using CTAR has not increased over time, however different trends are observed when categorising by industry. Asset tangibility, capital expenditure and firm size remain the most consistent significant determinants of cash. In aggregate, cash and performance have significant positive relationships, however when analysing cash-rich firms, a significant positive relationship is observed only between cash and TqR, and not between cash and RoE. Therefore, contrary to classical theory, but consistent with other empirical studies, this study has found that high levels of cash are associated with high market performance whilst no conclusions can be drawn on the relationship between high cash holding and operating performance. Amongst cash-poor firms, increasing operating performance relies significantly and considerably on increasing cash levels.

## 5.4 Recommendation

The conclusion that cash and performance have a significant positive relationship implies that: managers have generally been good custodians of the excess cash they have held; at an aggregate level, cash can be viewed as a positive input into stock valuation and credit risk evaluation models; and the conclusion may prove less convenient to the policymakers whose previous concerns have centred more on the negative spin-offs from high corporate cash holdings. However, the study could not draw conclusions on the relationship of cash and operating performance amongst cash-rich firms, showing that further analysis is required, which may look at including other variables such as working capital ratios to help improve the validity of the overall models. Lastly, the study focused on JSE-listed firms over the period 2003-2015, a possible improvement could include analysing the relationships over a longer time period to fully capture the impact of the different economic periods.

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# APPENDIX A: List of firms in selected sample

| No | Company | JSE Ticker | Industry |
|---|---|---|---|
| 1 | Accentuate Limited | ACE | Basic Materials |
| 2 | Adapt It Holdings Limited | ADI | Technology |
| 3 | Adcock Ingram Holdings Limited | AIP | Health Care |
| 4 | Adcorp Holdings Limited | ADR | Industrials |
| 5 | Advanced Health Limited | AVL | Health Care |
| 6 | Advtech Limited | ADH | Consumer Services |
| 7 | AECI Limited | AFE | Basic Materials |
| 8 | African And Overseas Enterprises | AOO | Consumer Services |
| 9 | African Eagle Resources Plc | AEA | Basic Materials |
| 10 | African Media Entertainment | AME | Consumer Services |
| 11 | African Oxygen Limited | AFX | Basic Materials |
| 12 | African Rainbow Minerals Limited | ARI | Basic Materials |
| 13 | Afrimat Limited | AFT | Industrials |
| 14 | AH-Vest Limited | AHL | Consumer Goods |
| 15 | Alaris Holdings Limited | ALH | Industrials |
| 16 | Alert Steel Holdings Limited | AET | Consumer Services |
| 17 | Amalgamated Electronic Corp | AER | Industrials |
| 18 | Andulela Investment Holdings | AND | Basic Materials |
| 19 | Anglo American Platinium | AMS | Basic Materials |
| 20 | Anglo American Plc | AGL | Basic Materials |
| 21 | Anglogold Ashanti Limited | ANG | Basic Materials |
| 22 | Ansys Limited | ANS | Industrials |
| 23 | Aquarius Platinum Limited | AQP | Basic Materials |
| 24 | ARB Holdings Limited | ARH | Industrials |
| 25 | Arcelormittal South Africa Limited | ACL | Basic Materials |
| 26 | Argent Industrial Limited | ART | Industrials |
| 27 | Ascendis Health Limited | ASC | Health Care |
| 28 | Aspen Pharmacare Holdings Limited | APN | Health Care |
| 29 | Assore Limited | ASR | Basic Materials |
| 30 | Astral Foods Limited | ARL | Consumer Goods |
| 31 | Astrapak Limited | APK | Industrials |
| 32 | Atlatsa Resources Corporation | ATL | Basic Materials |
| 33 | Aveng Limited | AEG | Industrials |
| 34 | AVI Limited | AVI | Consumer Goods |
| 35 | Awethu Breweries Limited | AWT | Consumer Goods |
| 36 | Barloworld Limited | BAW | Industrials |
| 37 | Basil Read Holdings Limited | BSR | Industrials |
| 38 | Bauba Platinum Limited | BAU | Basic Materials |
| 39 | Beige Holdings Limited | BEG | Consumer Goods |
| 40 | Bell Equipment Limited | BEL | Industrials |
| 41 | BHP Billiton Plc | BIL | Basic Materials |
| 42 | Bioscience Brands Limited | BIO | Health Care |

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|---|---|---|---|
| 43 | Blue Label Telecoms Limited | BLU | Industrials |
| 44 | Bowler Metcalf Limited | BCF | Basic Materials |
| 45 | Brikor Limited | BIK | Industrials |
| 46 | British American Tobacco Plc | BTI | Consumer Goods |
| 47 | BSI Steel Limited | BSS | Basic Materials |
| 48 | Buffalo Coal Corp | BUC | Basic Materials |
| 49 | Buildmax Limited | BDM | Oil & Gas |
| 50 | CAFCA Limited | CAC | Industrials |
| 51 | Capevin Holdings Limited | CVH | Consumer Goods |
| 52 | Cargo Carriers Limited | CRG | Industrials |
| 53 | Cartrack Holdings Limited | CTK | Technology |
| 54 | Cashbuild Limited | CSB | Consumer Services |
| 55 | Caxton CTP Publishers & Printers | CAT | Consumer Services |
| 56 | Central Rand Gold Limited | CRD | Basic Materials |
| 57 | Chemical Specialities Limited | CSP | Basic Materials |
| 58 | Choppies Enterprises Limited | CHP | Consumer Services |
| 59 | Chrometco Limited | CMO | Basic Materials |
| 60 | City Lodge Hotels Limited | CLH | Consumer Services |
| 61 | Clicks Group Limited | CLS | Consumer Services |
| 62 | Clover Industries Limited | CLR | Consumer Goods |
| 63 | Coal Of Africa Limited | CZA | Oil & Gas |
| 64 | Cognition Holdings Limited | CGN | Telecommunications |
| 65 | Comair Limited | COM | Consumer Services |
| 66 | Combined Motor Holdings Limited | CMH | Consumer Services |
| 67 | Compagnie Financiere Richemont SA | CFR | Consumer Goods |
| 68 | Consolidated Infrastructure Grp | CIL | Industrials |
| 69 | Crookes Brothers Limited | CKS | Consumer Goods |
| 70 | CSG Holdings Limited | CSG | Industrials |
| 71 | Cullinan Holdings Limited | CUL | Consumer Services |
| 72 | Curro Holdings Limited | COH | Consumer Services |
| 73 | Datacentrix Holdings Limited | DCT | Technology |
| 74 | Datatec Limited | DTC | Technology |
| 75 | Delrand Resources Limited | DRN | Basic Materials |
| 76 | Delta EMD Limited | DTA | Basic Materials |
| 77 | Diamondcorp Plc | DMC | Basic Materials |
| 78 | Distell Group Limited | DST | Consumer Goods |
| 79 | Distribution And Warehousing Network | DAW | Industrials |
| 80 | Drdgold Limited | DRD | Basic Materials |
| 81 | Eastern Platinum Limited | EPS | Basic Materials |
| 82 | ELB Group Limited | ELR | Industrials |
| 83 | Ellies Holdings Limited | ELI | Technology |
| 84 | enX Group Limited | ENX | Industrials |
| 85 | EOH Holdings Limited | EOH | Technology |
| 86 | Eqstra Holdings Limited | EQS | Industrials |
| 87 | Erin Energy Corporation | ERN | Oil & Gas |
| 88 | Esor Limited | ESR | Industrials |

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|---|---|---|---|
| 89 | Evraz Highveld Steel & Vanadium | EHS | Basic Materials |
| 90 | Exxaro Resources Limited | EXX | Oil & Gas |
| 91 | Famous Brands Limited | FBR | Consumer Services |
| 92 | Ferrum Crescent Limited | FCR | Basic Materials |
| 93 | Firestone Energy Limited | FSE | Basic Materials |
| 94 | Glencore Plc | GLN | Basic Materials |
| 95 | Gold Fields Limited | GFI | Basic Materials |
| 96 | Gooderson Leisure Corporation | GDN | Consumer Services |
| 97 | Grand Parade Investments Limited | GPL | Consumer Services |
| 98 | Grindrod Limited | GND | Industrials |
| 99 | Group Five Limited | GRF | Industrials |
| 100 | Harmony Gold Mining Company | HAR | Basic Materials |
| 101 | Holdsport Limited | HSP | Consumer Services |
| 102 | Homechoice International Plc | HIL | Consumer Services |
| 103 | Hosken Consolidated Investments | HCI | Industrials |
| 104 | Howden Africa Holdings Limited | HWN | Industrials |
| 105 | Hudaco Industries Limited | HDC | Industrials |
| 106 | Huge Group Limited | HUG | Telecommunications |
| 107 | Hulamin Limited | HLM | Basic Materials |
| 108 | Hwange Colliery Company Limited | HWA | Basic Materials |
| 109 | Illovo Sugar Limited | ILV | Consumer Goods |
| 110 | Imbalie Beauty Limited | ILE | Consumer Goods |
| 111 | Impala Platinum Holdings Limited | IMP | Basic Materials |
| 112 | Imperial Holdings Limited | IPL | Consumer Services |
| 113 | Insimbi Refractory & Alloy Sup | ISB | Industrials |
| 114 | Interwaste Holdings Limited | IWE | Industrials |
| 115 | Invicta Holdings Limited | IVT | Industrials |
| 116 | IPSA Group Plc | IPS | Industrials |
| 117 | ISA Holdings Limited | ISA | Technology |
| 118 | Italtile Limited | ITE | Consumer Services |
| 119 | Jasco Electronics Holdings Limited | JSC | Industrials |
| 120 | Jubilee Platinum Plc | JBL | Basic Materials |
| 121 | KAP Industrial Holdings Limited | KAP | Industrials |
| 122 | Kaydav Group Limited | KDV | Industrials |
| 123 | Keaton Energy Holdings Limited | KEH | Oil & Gas |
| 124 | Kibo Mining Plc | KBO | Basic Materials |
| 125 | Kumba Iron Ore Limited | KIO | Basic Materials |
| 126 | Labat Africa Limited | LAB | Technology |
| 127 | Lewis Group Limited | LEW | Consumer Services |
| 128 | Life Healthcare Group Holdings | LHC | Health Care |
| 129 | Lonmin Plc | LON | Basic Materials |
| 130 | Marshall Monteagle Plc | MMP | Industrials |
| 131 | Masonite (Africa) Limited | MAS | Basic Materials |
| 132 | Massmart Holdings Limited | MSM | Consumer Services |
| 133 | Master Drilling Group | MDI | Basic Materials |
| 134 | Mazor Group Limited | MZR | Industrials |

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|---|---|---|---|
| 135 | Merafe Resources Limited | MRF | Basic Materials |
| 136 | Metair Investments Limited | MTA | Consumer Goods |
| 137 | Metrofile Holdings Limited | MFL | Technology |
| 138 | Mine Restoration Investments | MRI | Industrials |
| 139 | Miranda Mineral Holdings Limited | MMH | Basic Materials |
| 140 | Mix Telematics Limited | MIX | Industrials |
| 141 | Mondi Limited | MND | Basic Materials |
| 142 | Mondi Plc | MNP | Industrials |
| 143 | Moneyweb Holdings Limited | MNY | Technology |
| 144 | Mpact Limited | MPT | Industrials |
| 145 | MTN Group Limited | MTN | Telecommunications |
| 146 | Murray & Roberts Holdings Limited | MUR | Industrials |
| 147 | Mustek Limited | MST | Technology |
| 148 | Nampak Limited | NPK | Industrials |
| 149 | Naspers Limited | NPN | Consumer Services |
| 150 | Net 1 UEPS Technologies Inc | NT1 | Technology |
| 151 | Netcare Limited | NTC | Health Care |
| 152 | Northam Platinum Limited | NHM | Basic Materials |
| 153 | Novus Holdings Limited | NVS | Industrials |
| 154 | Nutritional Holdings Limited | NUT | Consumer Goods |
| 155 | Nu-World Holdings Limited | NWL | Consumer Goods |
| 156 | Oando Plc | OAO | Oil & Gas |
| 157 | Oceana Group Limited | OCE | Consumer Goods |
| 158 | Omnia Holdings Limited | OMN | Basic Materials |
| 159 | Onelogix Group Limited | OLG | Industrials |
| 160 | Pan African Resources Plc | PAN | Basic Materials |
| 161 | Petmin Limited | PET | Basic Materials |
| 162 | Phumelela Gaming & Leisure Limited | PHM | Consumer Services |
| 163 | Pick N Pay Holdings Limited | PWK | Consumer Services |
| 164 | Pick N Pay Stores Limited | PIK | Consumer Services |
| 165 | Pinnacle Holdings | PNC | Technology |
| 166 | Pioneer Food Group Limited | PFG | Consumer Goods |
| 167 | Platfields Limited | PLL | Basic Materials |
| 168 | PPC Limited | PPC | Industrials |
| 169 | Primeserv Group Limited | PMV | Industrials |
| 170 | Protech Khuthele Holdings Limited | PKH | Industrials |
| 171 | PSV Holdings Limited | PSV | Industrials |
| 172 | Quantum Foods Holdings Limited | QFH | Consumer Goods |
| 173 | Randgold & Exploration Company | RNG | Basic Materials |
| 174 | Rare Holdings Limited | RAR | Industrials |
| 175 | Raubex Group Limited | RBX | Industrials |
| 176 | RCL Foods Limited | RCL | Consumer Goods |
| 177 | Resource Generation Limited | RSG | Telecommunications |
| 178 | Reunert Limited | RLO | Industrials |
| 179 | Rex Trueform Clothing Company | RTO | Consumer Services |
| 180 | Rhodes Food Group Holdings Limited | RFG | Consumer Goods |

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|---|---|---|---|
| 181 | Rockwell Diamonds Incorporated | RDI | Basic Materials |
| 182 | Rolfes Holdings Limited | RLF | Basic Materials |
| 183 | Royal Bafokeng Platinum Limited | RBP | Basic Materials |
| 184 | Sabmiller Plc | SAB | Consumer Goods |
| 185 | Sacoil Holdings Limited | SCL | Oil & Gas |
| 186 | Santova Limited | SNV | Industrials |
| 187 | Sappi Limited | SAP | Basic Materials |
| 188 | Sasol Limited | SOL | Oil & Gas |
| 189 | Sentula Mining Limited | SNU | Oil & Gas |
| 190 | Sephaku Holdings Limited | SEP | Industrials |
| 191 | Shoprite Holdings Limited | SHP | Consumer Services |
| 192 | Sibanye Gold Limited | SGL | Basic Materials |
| 193 | Silverbridge Holdings Limited | SVB | Technology |
| 194 | South African Coal Mining Hldgs | SAH | Oil & Gas |
| 195 | South Ocean Holdings Limited | SOH | Industrials |
| 196 | Sovereign Food Investments Limited | SOV | Consumer Goods |
| 197 | Spanjaard Limited | SPA | Basic Materials |
| 198 | Spur Corporation Limited | SUR | Consumer Services |
| 199 | Stefanutti Stocks Holdings | SSK | Industrials |
| 200 | Sun International Limited | SUI | Consumer Services |
| 201 | Super Group Limited | SPG | Consumer Services |
| 202 | Taste Holdings Limited | TAS | Consumer Services |
| 203 | Tawana Resources NL | TAW | Basic Materials |
| 204 | Telemasters Holdings Limited | TLM | Telecommunications |
| 205 | Telkom SA SOC Limited | TKG | Telecommunications |
| 206 | Tharisa Plc | THA | Basic Materials |
| 207 | The Bidvest Group Limited | BVT | Industrials |
| 208 | The Foschini Group Limited | TFG | Consumer Services |
| 209 | The SPAR Group Limited | SPP | Consumer Services |
| 210 | The Waterberg Coal Company | WCC | Basic Materials |
| 211 | Tiger Brands Limited | TBS | Consumer Goods |
| 212 | Tongaat Hulett Limited | TON | Consumer Goods |
| 213 | Torre Industries Limited | TOR | Industrials |
| 214 | Trans Hex Group Limited | TSX | Basic Materials |
| 215 | Transpaco Limited | TPC | Industrials |
| 216 | Trencor Limited | TRE | Industrials |
| 217 | Truworths International Limited | TRU | Consumer Services |
| 218 | Tsogo Sun Holdings Limited | TSH | Consumer Services |
| 219 | Value Group Limited | VLE | Consumer Services |
| 220 | Verimark Holdings Limited | VMK | Consumer Services |
| 221 | Vodacom Group Limited | VOD | Telecommunications |
| 222 | W G Wearne Limited | WEA | Industrials |
| 223 | Wescoal Holdings Limited | WSL | Industrials |
| 224 | Wesizwe Platinum Limited | WEZ | Basic Materials |
| 225 | Wilderness Holdings Limited | WIL | Consumer Services |
| 226 | Wilson Bayly Holmes-Ovcon Limited | WBO | Industrials |

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|---|---|---|---|
| 227 | Winhold Limited | WNH | Industrials |
| 228 | Woolworths Holdings Limited | WHL | Consumer Services |
| 229 | Workforce Holdings Limited | WKF | Industrials |
| 230 | York Timber Holdings Limited | YRK | Basic Materials |
| 231 | ZCI Limited | ZCI | Basic Materials |