Journal of Infrastructure, Policy and Development 2024, 8(14), 9210.
https://doi.org/10.24294/jipd9210

Article

A sectoral perspective on corporate cash holdings

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CITATION

Botha I, Thompson C. (2024). A sectoral perspective on corporate cash holdings. Journal of Infrastructure, Policy and Development. 8(14): 9210.
https://doi.org/10.24294/jipd9210

ARTICLE INFO

Received: 19 September 2024
Accepted: 8 October 2024
Available online: 19 November 2024

Abstract: The main purpose of this research is to investigate the cash holdings behaviour on sectoral level for South African firms listed on the Johannesburg Stock Exchange (JSE). The accounting cash ratio is used to identify abnormal (excess) cash holdings for the firms listed on the JSE. This informed the panel regression analysis to identify cash holdings determinants on a sectoral level. The sample data included 255 firms of which 102 represent Financial Firms and 153 represent Non-Financial Firms for 2005 to 2019. The findings show the significant internal and external determinants of cash holdings. Comparing coefficient sizes, this research finds that financial and non-financial sectors with abnormal (excess) cash holdings exhibit higher coefficient sizes as opposed to sectors without. As a result, the higher coefficient size shows that the internal and external determinants of cash holdings have a greater effect on the cash holding levels of these sectors. The implications of the findings of this study are that each sector operates differently and that each firm within each sector has differing cash management policies and procedures. Therefore, analyzing cash holdings behaviour on an aggregated level and assuming that all sectors and firms within the collective operate the same is an erroneous assumption, as shown by this study. This research firstly contributed by introducing the use of the accounting cash ratio to indicate the presence of abnormal (excess) cash holdings. Most research focus on cash holdings of Non-Financial Firms. Therefore, the second contribution of this research is that both Non-Financial and Financial Firms with and without abnormal (excess) cash holdings were included to identify determinants of cash holdings, this was also done on a sectoral level.

Keywords: accounting cash ratio; cash holdings; abnormal cash holdings; cash management; panel regression; determinants of holding cash

1. Introduction

The cash holdings topic has become important, noticing that various firms, especially in the United States have started to reflect large cash balances (Monga, 2015; Stevens, 2019). These firms seem to apply dividend pay-outs, share repurchases and investment policies, but with little change in the large cash holdings balances being observed (Sparks, 2015; Stevens, 2019). Moreover, South African firms have started to reflect the same trend (Clark, 2013; Gunnion, 2012; Ryan, 2015; van Rensburg, 2017).

Cash management models are used to manage cash holdings levels in order to ensure that cash is optimally used to address daily operational needs, to service debt and to invest in positive net present value investment opportunities (Baumol, 1952; Beranek, 1963; Miller and Orr, 1966; Stone, 1972; Tobin, 1956). Accordingly, the consequences of holding abnormal (excess) cash will result in the loss of investment opportunities, paying too much interest on debt, owing to not using cash to address debt obligations.

Furthermore, the theory indicates that motives, capital structure theories and firm determinants have been developed to explain and substantiate why firms will hold cash, but none of these theories seem to take into consideration what are deemed to be reasons for perpetual cash holdings increases and that even the transfer of value to shareholders via dividends or share buybacks does not seem to have significant decreasing effects on the cash balances of these firms.

The business world is an ever-evolving and dynamic environment and the business environments, regulatory requirements, competition and the economic landscapes of countries are not the same. Accordingly, the task to balance internal and external flexibility requirements would be a daunting task, due to ensuring that the firm meets liquidity requirements to meet daily operational needs, service debt obligations, and invest in opportunities that will yield good returns on the cash investment (Bukvič 2016; Gamba and Triantis 2008). Also, firms are grouped within sectors and operate within these sectoral environments and therefore the internal and external factors influencing firms would be different and as a consequence the cash holdings decisions would also be different. Therefore, to understand these cash holdings decisions the cash holdings behaviour must be investigated on a sectoral level for all sectors within business environments, regulatory requirements, competition, and the economic landscape of a country, to address the cash holdings puzzle.

Past research conducted explains the determinants for holding cash mainly of non-financial firms. Therefore, this research will investigate cash holdings trends and determinants for the financial' and non-financial sectors in South Africa. The accounting cash ratio is used to identify abnormal (excess) cash holdings for the firms listed on the JSE. Panel regression analysis is employed to identify cash holdings determinants on a sectoral level. The sample data included 255 firms of which 102 represent Financial Firms and 153 represent Non-Financial Firms annually from 2005 to 2019. The focus on South African firms, particularly those listed on the Johannesburg Stock Exchange (JSE), fills a gap in the literature since prior research mainly focused on developed markets. The sectoral perspective allows for better understanding of both internal and external determinants of cash holdings for financial and non-financial sectors.

2. Literature

Say's Law, which is proven to be flawed, states that all income is used and therefore the possibility of hoarding cash is not possible (Jonsson, 1995). Consequently, Keynes (1936) postulated the motives of cash holdings i.e., transactional motive, precautionary motive and the speculative motive. The work of Keynes (1936), laid the foundation for cash management principles and models developed by Baumol (1952), Miller and Orr (1966), and Tobin (1956).

The gist of the conceptual work done by Baumol (1952), Keynes (1936), Tobin (1956), and later and Miller and Modigliani (1958, 1963) was that they suggested the irrelevance theorem, which became the very foundation of modern-day corporate finance. Miller and Modigliani (1958, 1963) wrote numerous papers and conceptualised four propositions. The first proposition states that in a perfect marketplace, in the absence of information asymmetries, managerial influences, taxes,

financial distress and leverage, cash holdings levels do not influence the valuation of a firm. The second states that the level of a firm's leverage does not affect its weighted average cost of capital (WACC). The third proposition states that the dividend policy of a firm does not influence the market value of the firm. Lastly, the shareholders of a firm do not pay mind to the financial policies applied by the firm. There was a gap of several years in research before the work of Miller and Modigliani (1958, 1963) gave birth to the capital structure theories recognised by the finance world. Three models were developed and they are the Trade-off Theory (Miller and Modigliani, 1958, 1963), Pecking Order Theory (Majluf and Myers, 1984), and Agency Cost Theory (Jensen, 1986). These models are important as they attempt to explain the financing behaviour of firms and laid the foundation for further research relative to the cash holdings topic. The Trade-off Theory states that a trade-off between transaction, opportunity and holdings costs exist. Allowing the firm to meet financial obligations and to pursue investment opportunities. Therefore, the trade-off model can satisfy all motives for holding cash (Miller and Modigliani, 1958, 1963). The second capital structure theory was created by Majluf and Myers (1984) and is called the Pecking Order Theory. This theory assumes no optimal level of cash and therefore no optimal level of debt. A financial hierarchy is present, where investment opportunities and all other obligations will be funded by internal funds first before external funds will be considered Majluf and Myers (1984). The third contribution to the capital structure theories is the Agency Cost Theory created by Jensen (1986), which stipulates that financially distressed firms will hold more cash, owing to bad investment decisions made. There are two approaches to this theory, first, free cash flow can be used for various financial purposes at the discretion of management. The decision-making process creates conflict between managers and shareholders' interest. Secondly the risk-reduction approach is the direct opposite of the free cash flow approach. It states that managers will accumulate cash to hedge against adverse market conditions. Therefore, in times of financial distress these managers will be able to meet its obligations at the expense of investment opportunities (Daher, 2012).

The next progression in the timeline of cash holdings, and which added tremendous value into the cash holdings behaviour of a firm, are the research conducted by Opler et al. (1998, 1999). Opler saw the importance of gaining a better understanding of cash holdings, by taking the motives, cash holdings models and capital structure theories and postulated the determinants of cash holdings based on the metricises that describes the financial state of a firm, market behaviour, and the economic environment in which these firms operate. The seminal work by Opler et al. (1998, 1999) identified internal (current assets, dividend pay-outs, cash alternatives and substitutes, leverage, firm size, cash flows, and networking capital) and external determinants (economic instability) of cash holdings. Opler et al. (1998, 1999) found that non-financial U.S. firms that perform well seem to accumulate more cash than usual and this study found no evidence that an increase in cash holdings has an effect on the capital expenditure, mergers and acquisitions and pay-outs in the form of dividends and share repurchases.

The work of Opler et al. (1998, 1999) became the base for many studies on the topic. The empirical literature can be grouped into four themes and sub-divided into developed and emerging markets. The four themes therefore are as follows:

Determinants of cash holdings, motives of cash holdings, capital structure theories of cash holdings, and the relationship of firm value and performance to cash holdings. The internal and external cash holdings determinants as postulated by Opler et al. (1998, 1999) in a myriad of studies were used to address the cause-and-effect relationship for both developed and emerging markets. The studies focused on developed markets are: Aftab et al. (2018); Al-Najjar (2015); Anagnostopalou (2013); Blondelle (2017); Daher (2010); Ferreira and Vilela (2004); Gill and Shah (2012); He and Wintoki (2016); Kieschnick and Rotenburg (2016); Kim et al. (2011); Lee and Suh (2011); Li and Luo (2020); Lyandres and Palazzo (2016); Nadiri (1969); Naoki (2012); Nason and Patel (2016); Sánchez and Yurdagül (2013); Stone (2015); Stone et al. (2016); Upadhyay and Zeng (2016); Weidemann (2016); Yilmaz (2017) and lastly, Magerakis et al. (2020).

The studies focusing on emerging markets are: Abushammala and Sulaiman (2014); Anand et al. (2018); Arfan et al. (2017); Arora (2019); Azmat and Iqbal (2017); Barasa et al. (2018); Bayyurt and Nizaeva (2016); Chireka and Fakoya (2017); Dang et al. (2018); Das and Goel (2019); Diantimala and Umry (2018); Fernandes et al. (2017); Forti et al. (2015); Gu et al. (2016); Guizani (2017); Hendrawaty (2020); Kasongo (2019); Khan et al. (2019); Khuong and Thu (2018); Labhane and Mahakud (2016); Maleka (2017); Mesfin (2016); Nyamgero (2014); Rehman and Wang (2016); Selcuk and Yilmaz (2017); Shabbir et al. (2016); Shubita (2019); Tambo and Theobald (2017); Thanh (2019); Wang et al. (2014); Wei Ni et al. (2015); Zahid et al. (2017).

These studies focused on addressing the question of why firms hold cash, by making use of the research already done by Opler et al. (1998, 1999). Additionally, cause and effect analyses were conducted via regression analysis, to examine the relationship of cash holdings to financial, market and economic data. Furthermore, the research in developed countries corresponds to the expected relationships postulated by Opler et al. (1998, 1999) in identifying determinants of cash holdings. Emerging markets however, reflected some differences; firstly, Maleka (2017) found that leverage had no influence on whether a firm holds cash or not for Non-Financial Firms investigated in South Africa. Additionally, Jamil et al. (2016) however, found that the debt structure, leverage and return on assets determinants of cash holdings seem to exhibit a negative relationship relative to a positive relationship found by Opler et al. (1999) for Non-Financial Firms in Pakistan. Jamil et al. (2016) showed that an optimal cash holdings level is important, but in the context of the agency problem (Jensen, 1986), whereby if a firm holds enough cash there should not be any conflict between shareholders and managers with regards to the disposal of excess cash holdings. Orlova and Rao (2018) however, found that firms with high cash holdings tend to adjust faster to a target cash holdings level as opposed to firms with less cash. Siddiqua et al. (2019) found that cash levels will decrease much faster when cash holdings are much higher than the target cash level specified, owing to the ability to invest in research and development activities, pay out dividends, or settle debt obligations. However, increases to the target cash holdings levels for the Pakistani firms investigated by Siddiqua et al. (2019), seem to occur at a much slower rate. As a result, the findings of Siddiqua et al. (2019) seem to be consistent with the findings of Rehman et al. (2016), where the agency problem plays a pivotal role in the cash management decision. Furthermore, Powell (2018) investigated the cash holdings of

Indonesian listed firms and found that the Trade-off Theory is a significant reason why these firms hold cash. Moreover, cash is hoarded, owing to the fear of financial distress and the inability to meet the firm's internal and external obligations. Fernandes et al. (2017), also found evidence that does not support the Pecking Order Theory of Miller and Orr (1966), where net working capital is seen an alternative to cash and therefore reflects a negative relationship to cash holdings, but instead a positive relationship was found for the Portuguese firms investigated. Shubita (2019) conducted a study analyzing the working capital management relationship to cash holdings and the size of a firm and found that the larger the firm the less cash is held and the smaller, more cash is held. Shubita (2019) findings seems to correlate with those of Ismal (2012) and Opler et al. (1998, 1999). Furthermore, Shubita (2019) found that good management of net working capital reduces cash holdings and therefore can be seen as a substitute for cash holdings.

Other research conducted in developed and emerging market spheres highlighted the need to understand why firms hold cash and concurs with the motives for holding cash as postulated by Keynes (1936). Additionally, Foley et al. (2007) found a fourth motive, being a Taxation motive for holding cash, but Pinkowitz et al. (2012) found the Taxation motive to be flawed.

The Capital Structure Theory rendition, indicates that all three theories, the Trade-Off Theory by Miller and Modigliani (1958, 1963), the Pecking Order Theory by Maljuf and Myer (1984), and the Agency Cost of Jensen (1986) are applied in alignment with the expected results of the theories. However, Dittmar et al. (2003) found that in countries where there are poor shareholder protection firms will hold more cash, and where there is easy access to funds more cash will also be held. This view contradicts the view that in instances where easy access of funds is possible, a firm will make use of external funds (debt) according to the work done by Maljuf and Myer (1984) as per the Pecking Order Theory.

The value and performance dynamics of a firm to cash holdings cannot be viewed in isolation. As a result, the motives, cash management models, capital structure theories, and cash holdings determinants play a vital role when addressing the concept of firm value and performance as found by the studies conducted by Campello (2006); Hoberg et al. (2014); Kato and Skinner (2017); Martínez-Sola et al. (2013); Mikkelson and Partch (2003); Nguyen et al. (2017); and Zahedi et al. (2015).

In summary, all work discussed in the section above used Opler et al. (1998, 1999) as foundational literature in order to conduct cash holdings analyses. Mixed results were recorded for emerging and developed markets. Most international studies are based on Non-Financial Firm level analyses and similarly the case for studies in South Africa. Nyamgero (2014) investigates the levels of cash holdings by South African firms in the contexts of capital structure theory, macroeconomic connotations and marketplace dynamics. Nyamgero (2014), found no evidence that South African firms are hoarding cash, but concluded that the findings of Opler et al. (1998, 1999) apply. Similarly, Tambo and Theobald (2017) found no excess cash holdings in South African non-financial firms whereas Karwowski (2015) found a significant amount of cash on their statements of financial position in South African mining companies listed on the JSE just as is being reported in the US. Furthermore, Karwowski (2015) states that South African mining firms need large amounts of cash to support their

speculative investment activities and to meet operational and debt obligations, meaning the Speculative and Precautionary motives of Keynes (1936) play a significant role. These underlying reasons for holding cash were also confirmed by Tambo and Theobald (2017). Similarly, Chireka and Fakoya (2017) investigated Non-Financial Firms listed on the Johannesburg Stock Exchange (JSE) for the period 2000 to 2015 and the findings were in line with the Pecking Order Theory by Maljuf and Myers (1984) and Opler et al. (1998, 1999). They found an insignificant relationship between dividend pay-outs, leverage and cash holdings which was different from the findings of Daher (2010); Ferreira and Vilela (2004); Gill and Shah (2012); Naoki (2012); and Opler et al. (1998, 1999). Another study on South African Non-Financial Firms found that leverage had no effect on cash holdings levels (Maleka, 2017). Moreover, Kasongo (2019) evaluated the cash holdings behaviour of 80 Non-Financial South African firms indicating no abnormal (excess) cash holdings and the overall findings concur with those of Daher (2010); Ferreira and Vilela (2004); Gill and Shah (2012); and Opler et al. (1998, 1999) except for the firm size, dividends payments and inflation rate findings. These findings differ to the findings of Opler et al. (1998, 1999) and the Pecking Order Theory of Maljuf and Myers (1984) where firm size the dividend pay-outs have a significant effect on cash holdings behaviour. Moreover, Chireka and Fakoya (2017) found a negative association between dividend pay-outs and cash holdings for non-financial South African firms, rendering a different result to the findings of Kasongo (2019) and were in agreement with the findings of Opler et al. (1998, 1999). These studies in a South African context indicate conflicting views in terms of determinants, theories as well as whether firms in South Africa hold abnormal (excess) cash. Therefore, there is a need to firstly, ascertain if Financial and Non-Financial Firms in South Africa hold abnormal (excess) cash holdings on a sectoral level and secondly, identify internal and external determinants of cash holdings on a sectoral level.

3. Materials and methods

3.1. Methodology

Panel data analysis is used in this study, which is in line with the methodology of Baltagi (2008); Brooks (2014); Duan et al. (2008); Horbach (2006); Hsiao (2007a; 2007b); Ozkan (2001); and Plümper et al. (2005). Panel data is representative of cross-sectional and time series data, which spans across repeated observations, relative to the same variables (individuals, firms, industries, sectors) observed over several periods. According to Baltagi (2008) the advantages of panel data are firstly, it controls for individual heterogeneity, with specific related individual estimation, which implies that firms are heterogeneous. Secondly, more information is available, owing to cross-section and time series dimensions. As a result, more flexibility and less risk of collinearity between variables are possible. Thirdly, it assists in the ability to analyze change dynamics within the observed dependent and independent variables, and lastly, it supports the ability to formulate and test more advanced behavioural models. Consequently, the data for this research includes cross-sections and time series dimensions for the firms listed on the Johannesburg Stock Exchange (JSE), which makes panel analysis the most appropriate method for this research. Brooks (2014)

also stated that there are two classes of panel estimator approaches—Fixed (FE) and Random (RE) Effects models. The basic panel data model (Brooks 2014) is shown in Equation (1):

$$Y_{it} = \alpha + \beta X_{it} + U_{it} \quad (1)$$

where:

Y_{it} is the dependent variable of each firm (i) for the period (t), X_{it} is the $1 \times k$ vector of observations on the explanatory variables of each firm (i) for the period (t), β is the $k \times 1$ vector of parameters to be estimated on the explanatory variables, α is the intercept term and U_{it} represents the error term of each firm (i) for the period (t).

The FE model allows for the intercept in the regression model to differ or vary across cross-sections, but not over time, while the slope estimate is fixed cross-sectionally and over time. The FE model requires the decomposition of the disturbance term U_{it} to allow for individual specific effects. The FE model has an additional disturbance term V_{it} which is used to explain everything about the dependent variable Y_{it} relationship to the independent variables X_{it} (Baltagi, 2008; Brooks, 2014). The equation of the composition of U_{it} is as follows:

$$U_{it} = U_i + V_{it} \quad (2)$$

As a result, the FE model equation is denoted as follows, Brooks (2014):

$$Y_{it} = \alpha + \beta_{Xit} + U_i + V_{it} \quad (3)$$

A within transformation is required, by means of limiting the number of dummy variables estimates. This within transformation is achieved by subtracting the time-mean of each entity from the values of the variables resulting in Equation (4) below.

$$Y_{it} = \beta X_{it} + \mu_1 D1_i + \mu_2 D2_i + \mu_3 D3_i + \mu_N DN_i + V_{it} \quad (4)$$

The FE and RE models operate on the same premise, where both models assume different intercepts for each entity and assume constant intercepts over time. Consequently, the relationship of the dependent variable to the independent variables is assumed constant over time and cross-sections (Baltagi, 2008; Brooks, 2014). The difference between the FE and RE models is that in the RE model the intercept term for each cross-section is based on a common intercept α. This common intercept α is also constant over cross-sections and time. The RE model also assumes a random variable ε_i which, is expected to vary over time and cross-sections (Brooks, 2014). The RE panel model equation is as follows:

$$Y_{it} = \alpha + \beta X_{it} + \omega_{it} \quad (5)$$

where $\omega_{it} = \varepsilon_i + V_{it}$ and represents the error term of each firm (i) for the period (t).

In summary, the difference between the FE and RE models is the random variable ε_i and the disturbance term V_{it}. The variations cross-sectionally and over time are recorded by using dummy variables V_{it} for the FE model and ε_i for the RE model (Brooks, 2014). However, the RE model requires no within transformation and therefore, fewer parameters are estimated, making it the preferred model (Brooks, 2014). However, the RE model is only appropriate to use when the combined error term ω_{it} is uncorrelated to the independent variable. As a result, if the requirement of the RE model is not met, the FE model becomes the preferred model to use (Brooks,

2014). Therefore, the Hausman Test (1978) is applied to determine if the requirements of the FE and RE models are met, in terms of heterogeneity (redundancy test) and correlation assumptions (Hausman Test).

3.2. Data and specification of the model

Data was of a secondary nature and consists of financial, market, and economic data for all firms listed on the Johannesburg Stock Exchange (JSE). The time period of this analysis is from 2005 to 2019 annually. The sample data is reflective of 255 firms, 28 sectors, of which 153 are Non-Financial Firms and 102 are Financial Firms, listed on the Johannesburg Stock Exchange (JSE). Financial and market data were sourced from IRESS and the economic data from the South African Reserve Bank (SARB) and Statistics South Africa (Stats SA) for the period 2005 to 2019 on an annual basis. The IRESS database is a global market database reporting real time market data for over 100 markets (www.iress.com). The SARB and Stats SA is reputable publicly available data sources in South Africa from the central bank and the statistical services in SA respectively.

The accounting cash ratio is used to identify abnormal (excess) cash holdings, which is used in the financial accounting field to monitor liquidity levels, as found by Alin-Eliodor (2014); Corporate Finance Institute (CFA) (2021); Henry et al. (2011). This ratio is different from other ratio's, which focus mainly on the average cash holdings trends over time compared to the relevant sample mean. For example, the literature cash ratio, which is defined as cash plus cash equivalents divided by total assets do not indicate abnormal (excess) cash holding (Bates et al., 2009; Daher, 2010; Dittmar et al., 2003; Ferreira and Vilela 2004; Kim et al., 2011; Nyamgero, 2014; Opler et al., 1998, 1999).

$$\text{Accounting Cash Ratio} = \text{Cash} + \text{Short term marketable securities}/\text{current liabilities} \quad (6)$$

The accounting cash ratio is an accounting liquidity function to indicate if a firm is able to meet its obligations, and based on a benchmark, identify abnormal (excess) cash holdings. The abnormal (excess) cash holdings will be identified for each firm and grouped into the various sectors. This will then be categorized according to financial and non-financial sectors, with or without abnormal (excess) cash holding. The results from the accounting cash ratio, will inform the groups in the panel regression analysis to identify the determinants of cash holdings focusing on the sectors with abnormal (excess) cash holdings and sectors without abnormal (excess) cash holdings.

Variables

The dependent variable specified for this study is cash and defined by Bates et al. (2009); Daher (2010); Dittmar et al. (2003); Ferreira and Vilela (2004); Kim et al. (2011); Nyamgero (2014); and Opler et al. (1998, 1999) as total cash and cash equivalents to total assets expressed as a ratio.

The independent variables are the following, and grouped as follows—financial data (FD), market (MD) and economic data (ED).

Financial data

- Current assets: Current assets (CA) is expressed as current assets minus cash and cash equivalents to total assets expressed as a ratio, according to Bates et al. (2009); Daher (2010); Dittmar et al. (2003); Ferreira and Vilela (2004); and Opler et al. (1998, 1999). If current assets increase, it is assumed that cash levels increased. If current assets decrease, it is assumed that cash level decreased. Therefore, a positive relationship is expected to exist between the current assets and cash holdings (Opler et al., 1998, 1999).
- Investment Opportunity: Investment opportunities is defined as the ratio of market value of a firm's assets to book value of its assets, as defined by Bates et al. (2009); Daher (2010); Dittmar et al. (2003); and Opler et al. (1998, 1999). The Trade-Off Theory of and Modigliani (1958, 1963) stated that a positive relationship between investment opportunities and cash holdings is expected. The underlying reason being, if a firm has cash readily available to pursue investment opportunities, the likelihood of having to rely on expensive external funds is less depending on capital market conditions. In these cases, firms with higher growth opportunities are expected to hold more cash to meet debt obligations and avoid financial distress (Opler et al., 1998, 1999). Furthermore, the Pecking Order Theory of Maljuf and Myers (1984) states that to participate in investment opportunities internal funds will need to be readily available, therefore a positive relationship between firms holding large amounts of cash and investment opportunities is expected to exist. However, a negative relationship of cash holdings to investment opportunity can be expected according to the Agency Cost Theory of Jensen (1986) and was found to be so by research conducted by Bates et al. (2009); Daher (2010); Dittmar et al. (2003); Ferreira and Vilela (2004); and Opler et al. (1998, 1999). This negative relationship exists due to conflict between managers and shareholders.
- Leverage: Leverage (LEV) is defined by Daher (2010); Dittmar et al. (2003); Ferreira and Vilela (2004); and Opler et al. (1998, 1999) as total debt divided by total assets minus cash excluding cash alternatives. The Trade-Off Theory of Miller and Modigliani (1958, 1963) states that firms that have easy access to capital markets and are highly leveraged have a positive relationship to cash holdings. Firms that have less access to capital markets and are not highly leveraged hold more internal funds to service debt, therefore a negative relationship is expected to exist to cash holdings (Opler et al., 1998, 1999). The Pecking Order Theory of Maljuf and Myers (1984) suggests that firms that have easy access to capital markets and are highly leveraged have a negative relationship to cash holdings (Opler et al., 1998, 1999). A negative relationship is expected to exist between leverage and cash holdings, based on the study conducted by Tong (2006), which states that cash is a negative asset. Therefore, for every one Rand held in cash the firm's value decreases by an equivalent one Rand.
- Capital expenditure: Capital expenditure (CAPEX) is defined as capital expenditure divided by total assets by Daher (2010); Dittmar et al. (2003); Ferreira and Vilela (2004); and Opler et al. (1998, 1999). According to Ferreira and Vilela (2004) and Kim et al. (1998), capital expenditure has a negative effect on cash holdings. Cash holdings are expected to decrease as they are used for

research and development opportunities, as Opler et al. (1998, 1999) found during their study.

- Net Working Capital: Net working Capital (NWC) is defined firstly as current assets, excluding cash and cash equivalents minus current liabilities divided by total assets. Net working capital is used to evaluate how much cash is required for daily operational purposes of the business and to invest in short-term investments. According to the work done by Daher (2010); Dittmar et al. (2003); Ferreira and Vilela (2004); and Opler et al. (1998, 1999) a positive relationship is expected to exist between net working capital and cash holdings.
- Firm Size: Furthermore, firm size (SIZE) is issued as a control variable where SIZE is defined as the natural logarithm of total assets (Daher 2010; Dittmar et al. 2003; Ferreira and Vilela 2004; Opler et al., 1998,1999). According to the Trade-Off Theory the cost incurred by small firms to obtain external funding is higher as opposed to larger firms, which can absorb financial shocks; this view is supported by the research conducted by Miller and Orr (1966) model of demand for money by firms, which states that economies of scale exists. Hence, smaller firms are, expected to hold more cash than larger firms do. According to the Pecking Order Theory, Opler et al. (1999), it is assumed that larger firms have been operating for much longer and therefore, are more established and will hold more cash than smaller firms will.

The second set of independent variables is discussed below.

Market data

- Dividend Pay-outs dummy: A dummy variable for Dividend Pay-outs is created. Therefore, Dividend Pay-outs dummy (DIV) is set to equal 1 for the periods (years) where firms paid dividends, or set to 0 where no dividends were paid as stated by research conducted by Bates et al. (2009); Daher (2010); Dittmar et al. (2003); Ferreira and Vilela (2004); and Opler et al. (1998, 1999). Firms that pay out dividends are considered to be large, established firms that are profitable, relative to smaller firms that are not as established. When a firm pays dividends it can decrease cost by paying fewer dividends, hence it accumulates more cash. That being said firms that pay more dividends, hold less cash as opposed to firms that do not. Therefore, it is assumed that firms that pay out dividends will hold less cash than firms that do not pay out dividends, according to the Trade-Off Theory. As a result, a negative relationship exists between cash holdings and dividends according to the Trade-Off Theory (Opler et al., 1998, 1999). The Pecking Order Theory reflects a positive relationship to dividend payments and cash holdings (Opler et al., 1998, 1999).
- Share buy-backs dummy: Dummy variables are created for share buy-back (SHAREB). Therefore, share buy-backs (SHAREB) dummy variables are created and are set to equal 1 for the periods (years) where firms were buying back shares or set to 0 where no shares were bought back occurred. According, to Lee and Suh (2011) share buy-backs is a mechanism to decrease cash holding levels and to manage agency conflict. As a result, the more shares bought back the more cash holdings is, expected to decrease, according to Lee and Suh (2011). As a

result, a negative relationship of cash holdings to share buy-backs is, expected to exist, according to Lee and Suh (2011).

The third set of independent variables is discussed below.

Economic data

- Inflation Rate: The Inflation Rate (INFR) is the yearly historical CPI inflation rate data sourced from Statistics South Africa (Stats SA) and South African Reserve Bank (SARB). According to Wang et al. (2014), on a micro and macro-economic level, firms hold cash to guard against adverse market conditions, in order to meet obligations. Therefore, cash holdings levels are expected to increase as the inflation rate increases; a positive relationship is expected to exist. Therefore, a positive relationship of cash holdings to inflation rate (INFR) is expected to exist according to Wang et al. (2014).
- Interest Rate: Interest Rate (INTR) is the yearly historical prime interest rate data sourced from Statistics South Africa (Stats SA) and the South African Reserve Bank (SARB). When external funding becomes costly, owing to increased interest rates, firms will start to hold more cash, and use internal funds to meet obligations, according to the Trade-Off Theory of Miller and Modigliani (1958, 1963). Therefore, a positive relationship of cash holdings to inflation rate (INTR) is expected to exist according to Miller and Modigliani (1958, 1963).
- Gross Domestic Product: Gross Domestic Product (GDP) is the yearly historical gross domestic data sourced from the South African Reserve Bank (SARB). If poor economic conditions exist and as well as poor governance, then firms are expected to hold more cash, according to Jensen (1986) and Keynes (1936). The motives for holding cash as postulated by Keynes (1936) stated that cash is held for precautionary, transaction, and investment reasons. In the case of poor economic conditions, and poor governance, firms are expected to hold more cash to meet daily operational and debt obligations. Therefore, if a country reflects good economic growth (GDP) then firms are expected to hold less cash, and if economic growth is not favourable firms are expected to hold more cash. Therefore, a negative relationship of cash holdings to gross domestic product (GDP) is expected where economic growth is good and where economic growth is poor, according to Keynes (1936).

The specification of the model to identify cash holdings determinants in the South African context are based on the studies by Bates et al. (2009); Daher (2010); Dittmar et al. (2003); Ferreira and Vilela (2004); Kim et al. (2011); Nyamgero (2014); Opler et al. (1998, 1999); and Ozkian and Ozkian (2004).

Table 1 represents all the variables in this study.

The financial variables are: Current assets (CA), investment opportunity (INV), leverage (LEV), networking capital (NWC), capital expenditure (CAPEX), and firm size (SIZE).

Market data in the equation below is represented by dividend pay-outs (DIV) and share buy backs (SHAREB), which did not previously receive much attention in the South African determinants of cash holdings context, Lee and Suh (2011) and Martínez-Sola et al. (2013).

The economic data in the equation is reflective of inflation (INFR), interest rates (INTR), and gross domestic product (GDP), and is in relation to the research studies conducted by Keynes (1936); Miller and Modigliani (1958, 1963); Opler et al. (1998, 1999); and Wang et al. (2014).

The specification of the model is below with cash holdings as the dependent variable.

$$Cash_{it} = \alpha + \beta_1 CA + \beta_2 LEV + \beta_3 INV + \beta_4 CAPEX + \beta_5 NWC + \beta 6 SIZE + \beta_7 SHAREB + \beta_8 DIV + \beta_9 INFR + \beta_{10} INTR + \beta 11_{GDP} + Uit \quad (7)$$

where:

CASH = the dependent variable of each firm (*i*) for the time (*t*)

$\beta = 1 \times k$ vector of observations on the explanatory variables (X_{it}) of each firm (*i*) for the time (*t*) (CA, LEV, INV, CAPEX, NWC, SIZE, SHAREB, DIV, INFR, INTR, and GDP).

Table 1. Research variables.

Data Type	Variables	Variable Code	Definition
Financial Statement Data (FD)	Cash Holdings	CASH	Total cash and cash equivalent to total.
	Current Assets	CA	Current assets minus cash and cash equivalents to total assets expressed as a ratio.
	Leverage	LEV	Total debt to total assets expressed as a ratio.
	Investment Opportunity	INV	Book value of total assets minus book value of equity plus market value of equity to total assets expressed as a ratio.
	Capital Expenditure	CAPEX	Capital expenditure to total assets.
	Networking Capital	NWC	Current assets, excluding cash and cash equivalents minus current liabilities to total assets expressed as a ratio.
Market Data (MD)	Share Buy Backs	SHAREB	Share buyback =1 and no share buy = 0 (Dummy variable).
	Dividend Payout	DIV	Dividend paid =1 and no dividends paid=0 (Dummy variable).
Economic Data (ED)	Gross Domestic Product	GDP	Yearly historical real gross domestic data.
	Interest Rate	INTR	Yearly historical prime interest rate data.
	Inflation Rate	INFR	Yearly historical CPI inflation rate data.
Control Variable	Firm Size	Size	Natural logarithm of total assets.

Source: Complied by Author.

4. Results and discussion

The accounting cash ratio is used to categorise the firms into sectors with and without abnormal (excess) cash for financial and non-financial sectors. The dissemination of financial and non-financial sectors with and without abnormal (excess) cash holdings provides another dimension to gain an understanding of the cash holdings behaviour of South African firms listed on the JSE.

Table 2 below shows the groupings and the underlying sectors that represent the groupings mentioned above.

The accounting cash ratio results showed that abnormal (excess) cash holdings trends are present in certain sectors. The reasons (deducted from financial statements)

for these abnormal (excess) cash holdings were dividend pay-outs, mergers and acquisitions, share repurchases, impeding strike actions, debt provisioning, Black Economic Empowerment (BEE) incentive schemes, and a share appreciation bonus plan, and not only as a result of external factors such as poor economic growth, interest rate and inflation rate changes. Dividend pay-outs, mergers and acquisition and share repurchases were the prominent reasons for the financial sector.

Table 2. Sector list.

Sectors With Abnormal (Excess) Cash Holdings	**Sectors without Abnormal (Excess) Cash Holdings**	**Financial Sectors with Abnormal (Excess) Cash Holdings**	**Non-Financial Sectors with Abnormal (Excess) Cash Holdings**	**Financial Sectors without Abnormal (Excess) Cash Holdings**	**Non-Financial Sectors without Abnormal (Excess) Cash Holdings**
Financial Services	Banking	Financial Services	Chemicals	Banking	Electronics & Electric Equipment
Life Insurance	Non-Life Insurance	Life Insurance	Construction & Materials	Non-Life Insurance	Industrial Transportation
Real Estate Investment & Services	Real Estate Investment Trust	Real Estate Investment & Services	Fixed Line Telecommunications	Real Estate Investment Trust	Personal Goods
Chemicals	Electronics & Electric Equipment		Media		Support Services
Construction & Materials	Industrial Transportation		Health Care Equipment & Services		Food & Drug Retailers
Fixed Line Telecommunications	Personal Goods		Software & Computer Services		Food Producers
Media	Support Services		Industrial Metals and Mining		Forestry & Paper
Health Care Equipment & Services	Food & Drug Retailers		General Retailers		General Industrials
Software & Computer Services	Food Producers		Mining		Pharmaceuticals & Biotechnology
Industrial Metals and Mining	Forestry & Paper		Oil & Gas Producers		Technology & Hardware Equipment
General Retailers	General Industrials		Travel & Leisure		Mobile Telecommunications
Mining	Pharmaceuticals & Biotechnology				
Oil & Gas Producers	Technology & Hardware Equipment				
Travel & Leisure	Mobile Telecommunications				

Source: Compiled by author.

Table 3 below depicts the panel data set for all the firms in the data set firstly categorised in financial and non-financial firms and then on sectoral level where the data is grouped with or without abnormal (excess) cash holdings according to the accounting cash ratio.

Table 3. Panel dataset summary.

Panel Datasets: Period 2005–2019	Cross Sections	Unbalanced Observations
All Firm	255	2900
Financial Firms	102	1016
Non-Financial Firms	153	1884
Sectors With Abnormal (Excess) Cash Holdings	150	1783
Sectors Without Abnormal (Excess) Cash Holdings	105	1117
Financial Sectors With Abnormal (Excess) Cash Holdings	62	688
Financial Sectors Without Abnormal (Excess) Cash Holdings	40	392
Non-Financial Sectors With Abnormal (Excess) Cash Holdings	88	1095
Non-Financial Sectors Without Abnormal (Excess) Cash Holdings	65	725

Source: Compiled by Author based on accounting cash results.

4.1. Diagnostic testing

The results of the Redundancy Test and the Hausman Test are presented in order to determine which model (Fixed Effects or Random Effects) is the most appropriate model for each dataset. The Redundancy Test determine if the cross-sections are heterogenous in the FE against the pooled model. The Hausman Test is used to determine if the conditions of the RE and FE models are met. The Hausman Test therefore, determines whether the independent variables are exogenous, and can explain the relationship to other variables in the FE model and endogenous in RE models; it therefore test if the unique errors U_{it} correlate with the independent variables X_{it} (Baltagi et al., 2003; Brooks, 2014). The null hypothesis assumes that the unique errors U_{it} are not correlated with the independent variables X_{it} and in such a case, the RE model is appropriate to use. Furthermore, the alternative hypothesis states that correlation exists between U_{it} and X_{it}., and then the appropriate model is the FE.

The Redundancy Test results are presented in **Table 4**. The *p*-values of the *F* and Chi-square test statistics sectors with abnormal (excess) cash holdings and sectors without abnormal (excess) cash holdings are less than 0.05. Hence, the null hypothesis of redundant fixed effects can be rejected. This indicates that the cross-sections and period effects are heterogeneous and the FE model is better than the pooled model which assumes homogenous cross-sections and time effects.

Table 4. Redundancy test results.

	Effects Test	Crosssection *F*	Cross (Chi-square)	Period *F*	Period (Chi-square)	CrossSection/Period
Sectors With Abnormal (Excess) Cash Holdings	Statistic	3.57	391.26	23.39	105.20	4.5
	df	(149 015)	149	(14 015)	14	(163 015)
	p-value	0.00	0.00	0.00	0.00	0.00
Sectors Without Abnormal (Excess) Cash Holdings	Statistic	2.49	208.00	13.31	45.73	3.44
	df	(104 141)	104	(14 141)	14	(118 141)
	p-value	0.00	0.00	0.00	0.00	0.00
Financial Sectors With Abnormal (Excess) Cash Holdings	Statistic	2.18	122.14	8.8	27.82	3.16
	df	(61 153)	61	(14 153)	14	(75 153)
	p-value	0.00	0.00	0.00	0.00	0.00

Table 4. (*Continued*).

	Effects Test	Crosssection *F*	Cross (Chi-square)	Period *F*	Period (Chi-square)	CrossSection/Period
Non-Financial Sectors With Abnormal (Excess) Cash Holdings	Statistic	2.93	403.22	12.85	38.27	2.98
	df	(87 134)	87	(14 134)	14	(101 134)
	p-value	0.00	0.00	0.00	0.00	0.00
Financial Sectors Without Abnormal (Excess) Cash Holdings	Statistic	3.31	76.21	5.86	15.24	2.6
	df	(38 156)	38	(14 156)	14	(52 166)
	p-value	0.00	0.00	0.00	0.00	0.00
Non-Financial Sectors With Abnormal (Excess) Cash Holdings	Statistic	2.74	128.22	9.61	28.14	2.93
	df	(64 196)	64	(14 196)	14	(78 196)
	p-value	0.00	0.00	0.00	0.00	0.00

Source: Eviews Results.

The results for the Hausman test for all categories are presented in **Table 5**. The *p*-values in **Table 5** are smaller than 0.05 which indicates a rejection of the null hypothesis (i.e., the RE the preferred model—no correlation between U_{it} and X_{it}) and therefore, the alternative hypothesis is accepted. This means the FE model with cross-sections and time effects is therefore suitable to use for all the specified models. This means that there is heterogeneity between cross-sections and across time in this panel.

Table 5. Hausman test.

	Chi-Sq Statistic	Chi-Sq d.f.	*p*-value
Sectors With Abnormal (Excess) Cash Holdings	69.97	12	0.0016
Sectors Without Abnormal (Excess) Cash Holdings	46.14	12	0.0003
Financial Sectors With Abnormal (Excess) Cash Holdings	48.02	12	0.0023
Non-Financial Sectors With Abnormal (Excass) Cash Holdings	38.46	12	0.0010
Financial Sectors Without Abnormal (Excass) Cash Holdings	62.24	12	0.0022
Non-Financial Sectors Without Abnormal (Excass) Cash Holdings	26.14	12	0.0033

Source: Eviews results

4.2. Sectoral results

The sectoral panel regression analysis results are presented in **Table 6**. The models were diagnostically adjusted with the Newey West test to account for heteroscedasticity and autocorrelation (HAC standard errors). The adjusted R^2 for all the models are above 0.79, showing the independent variables explain nearly 80% or more of the variation in cash holdings. The probability of the *F*-statistics for all the models are 0, therefore the null hypothesis of no explanatory power can be rejected, corroborating the goodness of fit of the model.

The discussion in this section is based on the following categories of the panel regression analysis findings: Firstly, results of all firms per sector, with and without abnormal (excess) cash holdings are presented and discussed; secondly, results of firms with and without abnormal (excess) cash are shown for financial and non-financial sectors. The dissemination of financial and non-financial sectors with and without abnormal (excess) cash holdings provides another dimension to gain an understanding of the cash holdings behaviour of South African firms listed on the JSE.

The positive and negative significant relationships observed for the financial and non-financial sectors reported in **Table 6** concur mostly with the sectoral results (first two columns) and with expectations. Both positive and negative significant relationships for firms in sectors with abnormal (excess) cash holdings are indicative of higher coefficient sizes for internal determinants of cash holdings identified (CA, LEV, INV, CAPEX, NWC, DIV, and SIZE) and external significant determinants of cash holdings (GDP, INTR, and INFR).

Table 6. Sectoral fixed effects model results.

	Sectors With Abnormal (Excess) Cash Holdings		**Sectors without Abnormal (Excess) Cash Holdings**		**Financial Sectors with Abnormal (Excess) Cash Holdings**		**Financial Sectors without Abnormal (Excess) Cash Holdings**		**Non-Financial Sectors with Abnormal (Excess) Cash Holdings**		**Non-Financial Sectors without Abnormal (Excess) Cash Holdings**	
Variable	Coefficient		Coefficient		Coefficient		Coefficient		Coefficient		Coefficient	
C	108.249		185.115		110.477		201.814		95.677		135.488	
CA	0.957	***	0.651	*	0.351	***	0.229	*	0.367	**	0.146	*
LEV	−3.203	***	−1.067	**	−1.299	***	−0.277	**	−0.903	***	−0.3	**
INV	0.992	***	0.498	**	0.517	***	0.024	**	0.342	***	0.034	*
CAPEX	−0.973	***	−0.396	**	−0.802	***	−0.212	**	−0.609	**	−0.031	**
NWC	0.562	***	0.257	*	0.124	***	0.048	*	0.301	**	0.019	**
SİZE	−2.722	**	−0.867		−3.885	***	−1.154		−0.067		0.18	
SHAREB	−1.534		−0.819		−2.607		−0.891		−0.726		−0.583	
DIV	4.331	**	1.044	*	4.732	***	1.036	*	2.711	**	1.016	*
GDP	−0.747	*	−0.528	*	−0.089	*	−0.033	*	−0.39	*	−0.05	*
INTR	1.523	*	1.086	*	0.389	*	0.349	*	0.911	*	0.785	*
INFR	1.202	**	0.902	*	1.653	**	−0.839	*	1.51	**	0.647	*
R-squared	0.86		0.87		0.832		0.838		0.85		0.808	
Adjusted *R*-squared	0.815		0.825		0.799		0.819		0.811		0.79	
F-statistic	29.117		32.787		31.353		24.506		28.428		20.895	
Prob(*F*-statistic)	0.000		0.000		0.000		0.000		0.000		0.000	
Durbin-Watson stat	2.704		2.429		2.849		2.213		2.939		2.490	

*, **, ** 10,5 and 1% significance level respectively.
Source: Eviews results.

For the firms according to sector, (first two columns), the CA variable, shows a higher coefficient for firms in sectors with abnormal (excess) cash holdings, 0.957 compared to 0.651 for sectors without. Furthermore, financial sectors also recorded a higher coefficient size of 0.351 compared to 0.229 for financial sectors without (column 3 and 4). Similarly, non-financial sectors with abnormal (excess) cash holdings observed a higher coefficient size of 0.367 versus 0.146 recorded for non-financial sectors without (column 5 and 6). The reason would be for higher cash holdings to be able to meet daily operational needs and to service debt obligations.

INV recorded a higher coefficient size of 0.992 for firms in sectors with abnormal (excess) cash holdings compared to 0.498 for sectors without. Additionally, financial sectors with abnormal (excess) cash holdings showed a coefficient size of 0.517 compared to those without, of 0.024. Non-financial sectors with abnormal (excess) cash holdings showed the same view of a higher coefficient size of 0.342 versus 0.034 as non-financial sectors without. These coefficient sizes indicate that higher cash holdings levels are observed, tying back to the descriptive analysis where reasons for holding abnormal (excess) cash was found to be for investment purposes.

NWC showed a higher coefficient size (0.562) for firms in sectors with abnormal (excess) cash holdings versus sectors without (0.257), is observed. Financial and non-financial sectors recorded the same trend, where financial sectors with abnormal (excess) cash holdings reflect a higher coefficient size equal to 0.124 as opposed to 0.048 for financial sectors without. Also, non-financial sectors with abnormal (excess) cash holdings showed a higher coefficient size (0.301) compared to non-financial sectors without (0.019). The reason for the positive significant relationship observed for NWC is found to be the same as for CA, which is to be able to meet daily operational needs and service debt obligations. Therefore, an increase in cash holdings is observed.

A positive significant relationship identified for DIV showed higher coefficient sizes for the sectoral categories. Sectors with abnormal (excess) cash holdings reported a coefficient size of 4.331 versus 1.044 for sectors without. Similarly financial and non-financial sectors with abnormal (excess) cash holdings showed coefficient sizes of 4.732 and 2.711 compared to 1.036 and 1.016 respectively. Additionally, in a South African context not much research has been done with regards to the relationship between DIV and CASH, the finding of this research however, compares to that of Opler et al. (1998, 1999) and Kim et al. (2011).

The internal determinant showing a negative significant relationship with cash was LEV, which also showed a higher coefficient size (3.203) for sectors with abnormal (excess) cash holdings versus sectors without (1.067). Financial and non-financial sectors recorded the same, where, financial sectors with abnormal (excess) cash holdings reflected a higher coefficient size equal to 1.299 as opposed to 0.277 for financial sectors without. Also, non-financial sectors with abnormal (excess) cash holdings show a higher coefficient size (0.903) compared to non-financial sectors without (0.300). Here cash holdings were impacted owing to these firms using internal funds to address business operational expenses, and for investment opportunities.

CAPEX recorded a higher coefficient size of 0.973 for sectors with abnormal (excess) cash holdings compared to 0.396 for sectors without. Additionally, financial sectors with abnormal (excess) cash holdings showed a coefficient size of 0.802 compared to those without, of 0.212. Non-financial sectors with abnormal (excess) cash holdings showed the same view—a higher coefficient size of 0.609 versus 0.031 for non-financial sectors without.

SIZE shows higher coefficient sizes for the sectoral categories displayed in **Table 6**, but a negative significant relationship is recorded for sectors with abnormal (excess) cash holdings and financial sectors with abnormal (excess) cash holdings, but an insignificant relationship is reported for the rest of the categories. This agrees with the findings of Daher (2010); Ferreira and Vilela (2004); and Opler et al. (1998, 1999),

owing to larger firms being more established and having easier access to capital markets as opposed to smaller firms. Therefore, larger firms are expected to hold less cash as opposed to smaller firms. Smaller firms will hold more cash for Precautionary and Transactional motives in order to address daily operational needs and to service debt obligations when market conditions are unfavourable (Keynes, 1936).

The external significant determinants also indicated higher coefficients when there are abnormal (excess) cash holdings. INTR recorded a higher coefficient size of 1.523 for sectors with abnormal (excess) cash holdings compared to 1.086 for sectors without. Additionally, financial sectors with abnormal (excess) cash holdings show a coefficient size of 0.389 compared to those without, of 0.349. Non-financial sectors with abnormal (excess) cash holdings showed the same view, of a higher coefficient size of 0.911 versus 0.785 for non-financial sectors without. These coefficient sizes indicate how cash levels are influenced by changes in INTR. Secondly, INFR showed a higher coefficient size of 1.202 for sectors with abnormal (excess) cash holdings compared to 0.902 for sectors without. Additionally, financial sectors with abnormal (excess) cash holdings showed a coefficient size of 1.653 compared to those without, of 0.839. Non-financial sectors with abnormal (excess) cash holdings showed the same view of a higher coefficient size of 1.510 versus 0.647 for non-financial sectors without. Thirdly, a higher coefficient size for GDP is observed for sectors with abnormal (excess) cash holdings of 0.747 compared to 0.528 for sectors without. Additionally, financial sectors with abnormal (excess) cash holdings showed a coefficient size of 0.089 compared to those without, of 0.033. Non-financial sectors with abnormal (excess) cash holdings showed the same view, a higher coefficient size of 0.390 versus 0.050 for non-financial sectors without. As a result, poor economic growth translates into lower GDP and higher INTR and INFR and as a consequence cash holdings levels will increase. Furthermore, these relationships address the economic conditions of South Africa, where poor economic growth is present and interest rate change impacts the financing cost and makes access to external funds difficult and costly (Statistics South Africa, 2020). Consequently, when interest rates increase, cash holdings levels will increase in order to ensure that a firm is able to address daily operational needs and meet debt obligations as a consequence.

The significant determinants showed consistency across all categories in terms of excess cash holdings per sector. The higher coefficients for abnormal (excess) cash holdings across all categories confirmed the importance of these significant determinants for cash holdings and show the pronounced importance and additional effect when there are abnormal (excess) cash holdings.

Internal (financial and market data) positive and negative significant determinants of cash holdings are CA, LEV, INV, CAPEX, NWC, DIV, and SIZE and external (economic data) positive and negative significant determinants of cash holdings are GDP, INTR, and INFR. Furthermore, the reasons for the positive significant relationships identified for CA and NWC are due to the Precautionary and Transaction motives of Keynes (1936), which would imply that these firms hold cash because of uncertain economic conditions, as found in South Africa at present (Statistics South Africa, 2020). For INV and DIV the reasons for the positive significant relationships are internal funds being used to pay out dividends and invest in positive net present value prospects, which concurs with the findings of the Pecking

Order Theory of Maljuf and Myer (1984) and Opler et al. (1998, 1999). Additionally, the relationship of DIV to CASH in a South African context was found to be lacking and this study found that the relationship concurs with that of theory and past research, of the Pecking Order Theory of Maljuf and Myer (1984) and Opler et al. (1998, 1999). The negative significant relationship of LEV to CASH concurs with that of the findings of the Pecking Order Theory of Maljuf and Myer (1984). This study observed a negative significant relationship for SIZE in line with the findings of the Trade-Off Theory by Miller and Modigliani (1958, 1963), the Pecking Order Theory of Maljuf and Myer (1984), and Opler et al. (1998, 1999). Accordingly, a negative relationship is reflective of smaller firms holding more cash than larger firms for Precautionary and Transactional reasons (Keynes, 1936). Moreover, the relationship between SHAREB and CASH shows an insignificant relationship and concurs with the findings of Lee and Suh (2011).

The external (economic data) determinants of cash holdings are as follows: A positive significant relationship between INFR, INTR and CASH, and a negative significant relationship between GDP and CASH, implying the need to hold more cash due to poor economic conditions and uncertainty as recently being experienced by South Africa. Moreover, this translates into the premise of the Trade-Off Theory by Miller and Modigliani (1958, 1963) where the INFR, INTR and CASH association becomes important in terms of the Precautionary motive of Keynes (1936), whereby firms will hold more cash when poor market conditions (Statistics South Africa, 2020) are not favourable to meet operational obligations and service debt.

The findings of past research done focused only on an aggregated view for Non-Financial Firms, where the South African Reserve Bank reported abnormal (excess) cash holdings in 2012 (Gunnion, 2012; Johnson, 2013), Karwowski (2015), as did the Centre for Competition, Regulation and Economic Development (CCRED) in 2017. Additionally, Tambo and Theobald (2017) found no hoarding of cash holdings for Non-Financial Firms listed on the JSE. The results of this research show that an aggregated view creates a two-fold misconception, where abnormal (excess) cash holdings are present and where they are not. Moreover, these studies were done on an aggregated Non-Financial Firm level and provide contradicting views, where this research showed abnormal (excess) cash holdings for Non-Financial Firms as well, but a financial and non-financial sectoral analysis revealed that the aggregated view does not hold true for the underlying sectors. This research therefore shows, that it is important to determine if excess cash holdings does exist, using the accounting cash ratio and that the determinants of cash holdings differ where excess cash is held and where normal cash holdings prevail. Furthermore, the determinants also differ across sectors in terms of excess cash holdings and normal cash holdings.

The gist is that Financial Firms showed smaller coefficient sizes for CA, LEV, INV, NWC, DIV, and GDP when compared to Non-Financial Firms. Furthermore, sectors with abnormal (excess) cash holdings and financial and non-financial sectors with abnormal (excess) cash holdings showed higher coefficient sizes and therefore the internal and external determinants of cash holdings CA, LEV, INV, CAPEX, NWC, DIV, INTR, INFR, and GDP have a higher influence on cash holdings levels as opposed to sectors without abnormal excess cash holdings.

5. Conclusion

The accounting cash ratio was used to identify abnormal (excess) cash holdings for all the firms per sector. Consequently, this informed the panel regression analysis to investigate the determinants of cash holdings. Firms were firstly grouped in terms of sectors, with abnormal (excess) cash holdings and without and secondly grouped in terms of financial and non-financial sectors, with abnormal (excess) cash holdings and without. The significant internal (financial and market data) and external (eco-nomic data) determinants of cash holdings were found to be in line with previous re-search. Consequently, the findings corroborate the transaction, precautionary, and speculative reasons to hold cash as postulated by Keynes (1936), which lead to the findings concurring with the Trade-Off and Pecking Order Theories as well. Further-more, this research found when comparing coefficient sizes that financial and non-financial sectors with abnormal (excess) cash holdings exhibit higher coefficient sizes as opposed to sectors without. As a result, the higher coefficients size shows that the internal and external determinants of cash holdings have a greater effect on the cash holding levels of these sectors. However, what is prevalent is the significant relationships of the economic variables (INTR, INFR, and GDP) and cash holdings for all cate-gories. It was found that owing to recent poor economic conditions these sectors will apply the Precautionary motive of Keynes (1936) in order to meet daily needs of the firms and as a result hold onto cash. Financial Firms and Financial sectors with abnor-mal (excess) cash holdings are the only models that reflected a negative significant re-lationship between SIZE and CASH. Accordingly, the negative significant relationship observed shows that smaller Financial Firms and Financial sectors with abnormal (excess) cash holdings will hold more cash and as a result corresponds with the findings of the trade-off and pecking order theory as well as the findings of Opler et al. (1998, 1999). The findings indicate a positive relationship if a firm is large and would therefore hold more cash compared to small firms, and a negative relationship where if a firm is small, more cash will be held as opposed to larger firms. As a consequence, this finding indicates that smaller firms will therefore hold more cash due to the Transaction and Pre-cautionary motives of Keynes (1936) to address daily operational needs and to service debt obligations when market conditions are unfavourable and external funding be-comes too costly. Additionally, this study also found that there is a lack of research regarding the relationship of DIV to CASH in a South African context, and as a consequence this study found a positive significant relationship between DIV and CASH concurring with the international research findings of Kim et al. (2011), and Opler et al. (1998, 1999).

The implications of the findings of this study are that each sector operates differ-ently and that each firm within each sector has differing cash management policies and procedures. Furthermore, the laws and regulations and strategic intent that govern how these sectors conduct business is also not the same. Moreover, considering strategic intent of the firm will ultimately inform the cash management process and policies, which required a qualitative analysis as well, whereby further investigations of the Agency Cost Theory by Jensen (1986) would be required. Therefore, analysing cash holdings behaviour on an aggregated level and assuming that all sectors and firms within the collective operate the same is an erroneous assumption, as shown by this

study. As a result, this study recommends that the laws and regulations governing these sectors should be documented and reviewed regularly and published with a view to gaining a better understanding of operational fundamentals of these sectors. Furthermore, it is recommended to begin creating collaborative discussions amongst the various sectors in order to share knowledge and build centers of excellence in this regard. Also, businesses must record their accounting cash ratios to use as a way of managing their cash holding levels and ensure business is conducted within the prescribed policies of the firm and the laws and regulations of the governing bodies of the country. Thereby, good cash management processes are enforced that will ensure that cash is used optimally and there is a good balance between the liquidity requirement of the business and performance (Mungal, 2014). As a consequence, good cash management leads to firm value increases and heightened financial performance (Mungal, 2014).

Good governance (governance and compliance rules and regulations) is a sign of a well-regulated business environment and therefore leads to better management of cash holdings levels (Maleka, 2017). Also, the governance and compliance rules and regulations will differ across sectors as these sectors' operating environments are not similar. Therefore, good corporate governance will lead to a better cash management process, whereby cash holdings levels can be measured in terms of what an optimal cash holding level is and therefore cash holdings levels can be controlled and this also leads to positively influencing the performance of a firm (Maleka, 2017). However, literature provides conflicting views where it is found that owing to poor corporate governance, cash holdings will increase and thus have a negative effect on the performance of a firm (Ammanna et al., 2011; Chung et al., 2015; Tong, 2006). As a result, the governance implication needs to be addressed in terms of the financial and non-financial sectoral view, as noted above, the policies, laws and regulations governing these sectors will differ as these sectors operate in very different business spheres. Therefore, irrespective of whether a poor or a good governance environment is present, cash holdings levels need to be managed and within an optimal level as observed by the Trade-Off Theory by Miller and Modigliani (1958, 1963) and the findings of Martínez-Sola et al. (2013). Management of cash holdings using an optimal cash holdings level, will ensure that cash holdings do not increase perpetually regardless of dividend pay-outs and share repurchases, therefore ensuring that cash is used for the purpose of addressing daily operational needs, servicing debt and growing a firm and not to hoard cash. Tong (2006) states that holding too much cash has a negative effect on the performance of a firm where cash is seen as a liability and not as an asset.

In summary, corporate governance policies are prescribed by the King IV code PWC (2016), which comprises governance policies and regulations, and all firms listed on JSE are required to adhere to the King IV code PWC (2016). The aim of the King IV code PWC (2016) is to provide principles and practices that are linked to a framework in order to promote good corporate governance. Furthermore, corporate governance is the responsibility of business, whereby an understanding between shareholders, board of directors, and employees of the firm is enforced, in order to promote participation, accountability, transparency, and responsiveness in the decisions that influence the performance of a firm. Therefore, it is recommended by

this study that in order to promote good corporate governance, South African firms must begin recording their cash holdings trends by using the accounting cash ratio introduced by this study, and also to use this mechanism to set optimal levels of cash holdings. Hereby, the cash management process can be managed efficiently, and cash can be employed optimally to achieve a good balance between liquidity and performance of the firm, which leads to firm value appreciation and better financial performance. This will ensure that there is transparency and accountability in terms of the cash holdings levels and the cash holdings decisions made by shareholders, board of directors and at managerial firm level. The cash holdings level reporting process could possibly become an added compliance measure for a firm and as a consequence form part of the accounting internal and external audit framework of the firm.

This research firstly contributed by introducing the use of the accounting cash ratio to indicate the presence of abnormal (excess) cash holdings. Previous research on the determinants of cash holdings focused on the cash holdings behaviour of Non-Financial Firms mainly, as a result Financial Firms and sectoral analyses have not been receiving equal attention. Therefore, the second contribution of this research is that both Non-Financial and Financial Firms with and without abnormal (excess) cash holdings were included to identify determinants of cash holdings, this was also done on a sectoral level.

Future research studies should focus more on sectoral analyses to identify internal and external determinants of cash holdings with regards to sectors with and without abnormal (excess) cash holdings. Furthermore, to address the lack of research regarding the dividend pay-out and cash holdings relationship, this relationship needs to be investigated more in terms of a South African perspective. The cash holdings topic is complex and therefore all research done thus far aids in gaining a better understanding of this topic. Endogeneity adds to the complexity and is an underdeveloped area in cash holding research (Khatib, 2024).

Author contributions: Conceptualization, IB and CT; methodology, IB and CT; validation, IB; formal analysis, CT; writing—original draft preparation, CT; writing—review and editing, IB; supervision, IB. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest: The authors declare no conflicts of interest.

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