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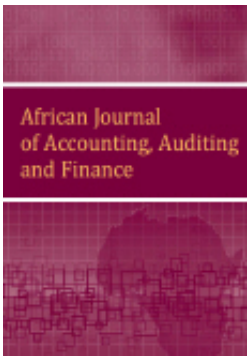

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A sector-wise analysis of the determinants of cash holdings in listed firms in Mauritius

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Abstract: The objective of this study is to investigate the factors that affect cash holdings of selected listed firms in Mauritius. Cash holdings have become more important than ever in this era of uncertainty created by COVID-19 and lockdowns that have affected businesses indiscriminately. Firms having cash holdings are better able to accommodate periods of uncertainty. This study uses data on firms listed on the stock market in Mauritius and covers the 2009–2019 period. The methodology is based on panel data techniques that account for endogeneity among independent variables and potential heterogeneity across observations. The paper finds that several influential factors determine cash holdings, including corporate growth prospects, short-term working capital, leverage, and firm size. The study also finds important sector-wise implications regarding cash holdings.

Keywords: cash holdings; sector-wise analysis; fixed effects; random effects; Mauritius.

JEL codes: G32.

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1 Introduction

Since the global financial crisis of 2008, firms around the world have started accumulating cash and this has an impact on capital structure (D'Amato, 2020). Cash is considered to be a liquid investment that is required to support the firm's working capital needs (Harford et al., 2008). Cash holdings provide money to meet the daily needs of a corporation and decrease financial risk (Shen et al., 2015). In this study, cash holdings is measured as cash and cash equivalents to total assets. According to Acharya et al. (2012), conservative firms prefer to focus on their cash holdings instead of expanding their financial structure. Potential explanations are numerous and range from the trade-off between the marginal costs and benefits of holding cash to corporate governance. Bates et al. (2009) state that a plausible explanation for the secular increase in cash holdings is provided by the precautionary demand for cash theory. Under this theory, firms hold cash as a buffer to protect themselves against adverse cash flow shocks.

Indeed, corporate cash holdings decisions are particularly important financial decisions for the company; it not only reflects the business plan and financial strategy of the company but is also closely related to the internal governance of the company and the external macro environment (Al-Najjar and Clark, 2017; Anand et al., 2018). However, according to Dittmar et al. (2003), holding liquid assets implies an opportunity cost because of the lower return compared with other investments.

Studies that have investigated cash holdings have concentrated on advanced economies or large emerging economies. There is a limited literature from the perspective of small island economies, like Mauritius. Mauritius is an interesting case study as the country is an upper middle income country that briefly achieved the status of a high income economy and due to COVID-19 shock went back to being an upper middle income economy. This study seeks to address a gap in the literature by investigating the determining factors of cash holdings in Mauritius based on market imperfections such as debt maturity structure. The study has three main objectives. First, it analyses the determinants of cash holdings. Second, it studies the sector-wise relationship between the variables influencing cash holdings. Finally, it also empirically investigates the influence of debt maturity structure on a company's cash holdings in the different sectors being considered (García-Teruel and Martínez-Solano, 2008; Harford et al., 2014; Brick and Liao, 2017).

This study uses data on Mauritian firms listed on the stock market and covers the 2009–2019 period. Hence this study is a post-2007 financial crisis study but also uses pre-COVID-19 data. The paper uses Opler et al. (1999) framework to study determinants of cash holdings and finds that several influential factors determine cash holdings, including corporate growth prospects, short-term working capital, leverage, and firm size.

It is becoming increasingly difficult to ignore the importance of economic sectors when investigating cash holdings. Some studies have revealed that contemporary literature in the area of cash management may overlook the industry and institutional

context of firms at sector level. It is important to account for sectoral characteristics and heterogeneity in the financial environment. Moreover, Kayo and Kimura (2011) emphasise that financial structure of firms vary across industries due to the unique nature of each sector. In accordance with arguments and issues presented in prior studies, it is also equally important to understand the environment of the sectors separately while looking into firms' cash holdings mechanism.

The rest of the paper is organised as follows. In Section 2, we review the existing literature. The objectives of the study are emphasised in Section 3. This is followed by the estimation methodology and the empirical specification in Section 4. Section 5 focuses on the data and summary statistics. Section 6 presents the regression results and discussion, and Section 7 concludes.

2 Literature review

Liquidity shocks have been experienced by many economies worldwide and firms have constantly been adjusting their cash holdings (Lian et al., 2011). The global financial crisis is one instance whereby firms' liquidity has been negatively affected, with a spill-over on increases in their probability of debt default and consequently a reduction in their chances of survival (Álvarez et al., 2012). More recently, the ongoing COVID-19 crisis and associated economic shutdowns create a cash gap as firms exhaust their cash holdings (De Vito and Gómez, 2020; Qin et al., 2020).

Investigating the drivers of cash holdings will help in better understanding the dynamics of corporate cash holdings. The different motives advance that firms actively manage their cash capacity level to uphold sufficient internal flexibility to manage negative shocks and welcome positive opportunities. If the level of cash holdings is too high, this may lead to foregone profit from missed investment opportunities (Bates et al., 2009; Mun and Jang, 2015; Koo and Maeng, 2019). On the other hand, if there are insufficient cash holdings, this can impact on the company's liquidity level (Guney et al., 2007).

Keynes (1936) proposed the theory of cash holdings whereby he postulates that companies hold cash mainly based on three motivations, namely trading motivation, prevention motivation and speculative motivation. Alternatively, Al-Najjar (2013) and other related literature summarise several major theoretical perspectives on why firms hold liquid assets, such as growth opportunity, corporate governance, the country's fiscal policy, the companies' financial conditions and self-interests.

2.1 Theories of cash holdings

In a world of perfect capital markets and no transaction cost, cash holdings will not affect the value of the firm. But markets are imperfect and transaction costs are present. Firms therefore regulate the optimal level of cash holdings by trading off its marginal cost with its marginal benefit as proposed by the trade-off theory. The trade-off theory follows the theoretical framework developed by Miller and Orr (1966), which states that firms choose their cash holdings levels by balancing the marginal costs and the marginal benefits of holding cash. Opler et al. (1999) argue that managers that maximise shareholder value would set the firm's cash level such that the marginal benefits of cash equal the marginal costs of holding these assets. The greater the shortage of cash, the

higher cost it will be for firms since they have to raise funds in external markets, resulting in reduction in interesting investment opportunities. The cost of holding liquid assets is the opportunity cost because of the expected lower return on liquid assets.

According to the pecking order theory, there is no optimal level of cash holdings; firms do not have target cash levels. Instead, cash is used as buffer between retained earnings and investment needs. Myers and Majluf (1984) argue how cash and deposits allow firms to manage operations without costly external funding. When internal funds are insufficient, firms start increasing leverage. A firm's financing deficit will thus entail a reduction of cash holdings or an increase in debt, or both. These arguments are based on the pecking order hypothesis, according to which firms have a preference for internal reserves over costly external funding; retained earnings will be used first, followed by debt and lastly, equity.

The agency theory also provides some explanation of cash holdings. Managers' preference for large cash-in-hand is the conventional agency theory, also known as self-interest argument or influence cost hypothesis. The agency theory is concerned with the conflicting interests between managers and external stakeholders. The agency argument for holding large amount of cash within firms has been extensively researched. Jensen (1986), on the basis of agency theory, suggests that managers have incentives to increase assets under their control rather than to pay out cash as dividends to external shareholders. The focus is on managers' fund preference and the abuse of funds. Cash holdings are kept high by entrenched managers, because they tend to build more excess cash balances than to pay out more dividends to shareholders (Pinkowitz et al., 2006). By holding more cash, managers gain more power over the firm investment decision and they also escape from raising capital externally, hence allowing them not to disclose information about investment projects to the outside market (Ferreira and Vilela, 2004).

Different scholars hold different views towards agency theory of cash holdings. Myers and Majluf (1984) claim that firms hold large cash balance because it contributes to financial flexibility and does not lead to any agency cost. Jensen (1986) argues that there is no need for firms to hold large cash balance because it will increase agency costs and has nothing to do with financial flexibility. In 1986, Jensen proposed the free cash flow hypothesis, suggesting that managers prefer to hold high cash level to enhance the volume of total assets in their control and it implies a bigger discretionary power regarding company investment decisions. Jensen (1986) argues that due to the existence of an agency relationship, the company will still hold additional cash after meeting daily operations and investment needs. Ferreira and Vilela (2004) maintain that firms with strong connection with banks and firms practicing in superior investor protection countries, hold lower cash levels, hence supporting the existence of manager discretion and agency cost issues in liquidity management. According to previous empirical studies, different financial factors have been incorporated to reflect this theory (Kim et al., 2011; Al-Najjar, 2013; Azmat, 2014).

2.2 Empirical review

Early studies by Baumol (1952) and Miller and Orr (1966) developed theoretical models for optimal cash holdings based on the trade-off between the opportunity costs of holding cash and the transaction costs of converting assets into cash. These theories have been supported by various empirical studies. Studies by Kim et al. (1998) and Opler et al. (1999) integrate strategic factors into their models for optimal cash holdings as well as

other factors such as the extent of investment opportunities, volatility of firm cash flows, leverage, information asymmetries, agency costs, capital market constraints and ability to raise cash by cutting dividends or selling assets. Nonetheless, the debate on the importance of corporate cash holdings within the literature has not yet reached consensus.

With regards to the USA, there are a number of studies on the determinants of cash holdings. Baskin (1987), using a sample of large US corporations, contends that firms with ample investment opportunities have an incentive to hold more cash to maintain their competitive positions within an industry. Khurana et al. (2006) evaluate the influence of financial development on firms' sensitivity of cash holdings to their cash flows in US and non-US firms. They use firm-level data for 35 countries covering about 12,782 firms for the years 1994–2002 and find that the sensitivity of cash holdings to cash flows decreases with financial development. Bates et al. (2009) claim that the average cash-asset ratio of industrial companies in the USA between 1980 and 2006 had more than doubled since for the preventive purpose. They state that companies prefer to hold more funds to better cope with the uncertainty risks.

Subramaniam et al. (2011) analyse whether the organisational structure of firms affects their cash holdings using data for US firms for the period 1988 to 2006. Using time-series, cross-sectional, and additional robustness tests they are able to attribute the lower cash holdings among diversified firms to complementary growth opportunities across the different segments of these firms. Kim et al. (2011), by empirically examining a panel dataset of 125 publicly traded US restaurants between 1997 and 2008, show that investment opportunities positively influence the level of cash holdings. They also find that large restaurants are more likely to hold liquid assets other than cash. Erel et al. (2021) use a sample of 47,378 acquisitions from 36 countries, including the USA, European countries and emerging economies, between 1997 and 2014 to study how the relation between firms' cash holdings and their acquisition decisions changes over macroeconomic cycles. They find that larger cash holdings decrease the sensitivity of acquisitions to macroeconomic factors, suggesting that cash holdings lower financing constraints during times when the cost of external finance is high.

The literature on the determinants of corporate cash holdings in other advanced economies is also extensive. García-Teruel and Martínez-Solano (2008) analyse the explanatory factors of the cash holdings of a sample of 860 small and medium-sized firms from Spain during the period 1997–2001. They show that the cash level falls with the use of bank debt and in the presence of substitutes for cash. Al-Najjar (2013) examines the effect of capital structure and dividend policy on cash holdings policy in Brazil, Russia, India, and China by using a sample of 1992 firms over the period 2002–2008. Based on his findings, he argues that the financial determinants of cash holdings in developed and emerging market countries are largely similar.

Martínez-Sola et al. (2018) analyse the influence of financial distress towards the speed of adjustment of small and medium-sized enterprises (SMEs) to their target cash holdings. Through the use of a sample of Spanish SMEs from the period of 1998 to 2012, they show empirically that a positive relationship exists between both of those variables. Cambrea et al. (2021) examine the relationship between the board of directors and cash holdings before and during the global financial crisis by employing a sample of listed Italian industrial firms over the period 2003–2013. Their empirical findings show that in normal periods, in line with the agency theory, a vigilant board reduces cash holdings.

The empirical studies on the determinants of corporate cash holdings in Asia gained a growing interest in recent years. Nanda and Panda (2018), in their work on the

determination of firm-specific and macroeconomic determinants of profitability of Indian manufacturing firms in the pre-crisis and post-crisis period from 2000 to 2015, find that the firm-specific factors such as liquidity play a significant role toward enhancing corporate profitability. Siddiqua et al. (2018) use a sample set of 200 non-financial firms listed on Pakistan Stock Exchange over a ten-year period (2006–2016). From a dynamic panel data model, they find that the firms which hold cash above the optimal level of cash holdings have higher speed of adjustment than the firms which hold cash below the optimal level.

Ranajee and Pathak (2019) examine the cash holdings of firms during the financial crisis of 2008 by employing panel data and Fama-Macbeth regression techniques on publicly listed firms during 2001–2015 in India. They report that cash levels are significantly higher during crisis periods for Indian firms. Zhang et al. (2020) investigate the impact of oil price uncertainty on the cash holdings of firms. Using a sample of firms listed on the Chinese stock market for the period from 2007 to 2016, their empirical results show that cash holdings increase with oil price uncertainty, but after a point, this impact becomes negative. Wang et al. (2021) investigate the heterogeneous effects of geopolitical risk on enterprise cash holdings in Chinese oil sectors using unbalanced panel which includes 115 enterprises during the period from 2001 to 2019. The empirical results confirm that enterprises in oil exploration and exploitation sector and oil equipment sector tend to reserve more cash to confront high geopolitical risk and that the levels of cash holdings in oil refinery and sale sector enterprises are negatively related to geopolitical risk.

With regards to Africa, cash holdings literature has only steadily been developed in recent years. Chireka and Fakoya (2017) investigate the determinants of corporate cash holdings in the South African retail industry for the period 2000 to 2015. Their paper uses panel data analysis to test the relationships between cash holdings level and the identified determinant factors. The authors find evidence that liquid asset substitutes, capital expenditure, dividend payments and cash flow volatility significantly influence the cash holdings levels of retail firms in the South African retail industry. Chireka (2020) seeks to understand the effect of firm's life cycle on corporate cash holdings behaviour. The author uses panel data analysis of a sample of 112 Johannesburg Stock Exchange listed firms from 2011 to 2018 and applies Dickinson's cash flow analysis (2011) to proxy life cycle stages and control other known determinants of corporate cash holdings such as firm size, leverage, profitability, dividend payments, and growth opportunities. The results suggest that corporate cash holdings for South African firms are driven by other factors other than life cycle resource allocations.

Jabbouri and Almustafa (2020) aim to document the impact of corporate cash holdings on firm performance by employing data from non-financial firms listed on the stock markets of 12 Middle East and North Africa (MENA) countries between 2004 and 2018. Their research reports a significant positive relationship between corporate cash holdings and firm performance. The results appear to be more pronounced in countries with strong national governance and more developed institutional settings.

3 Objectives

The objective of this study is to investigate the determining factors of cash holdings based on market imperfections such as debt maturity structure. The study has three main

objectives. First, it analyses the determinants of cash holdings. As previously noted, there is limited empirical proof about the determinants of cash holdings in the Mauritian context. With corporate cash holdings on the rise, there is a need to know what informs managers of different firms of the optimal levels to maintain. Hence, this study aims at shedding light on the empirical relationship between cash holdings and specific firm characteristics.

Second, it studies the sector-wise relationship between the variables influencing cash holdings. For instance, financial firms will obviously hold liquidity to facilitate their day-to-day operations, and both financial firms and utilities may hold liquidity to meet regulatory requirements. The findings can be useful for managers, investors and policy makers in helping them design effective cash holdings policies based on industry-specific determinants of cash holdings. Stakeholders and users of financial information need to know what firm specific characteristics justify the level of cash holdings. This study seeks to address this gap in the literature on the determinants of cash holdings in Mauritius.

Finally, it also empirically investigates the influence of debt maturity structure on company's cash holdings by using hypothesis testing design in the different sectors, while controlling for other important variables (García-Teruel and Martínez-Solano, 2008; Harford et al., 2014; Brick and Liao, 2017). This analysis is expected to help policymakers in designing long-run policies to reduce abnormal cash holdings and potentially favour private investment. Therefore, this paper helps in filling a gap between two strands of literature: the determinants of cash and that of debt maturity within a small island economy, like Mauritius.

4 Estimation methodology and empirical specification

Since panel data contains observations on the same cross-sectional units over several time periods, there might be cross-sectional effects on each firm or on a group of firms. Panel methodology allows researchers to control for individual heterogeneity due to hidden factors, which, if neglected in time-series or cross-section estimations leads to biased results (Baltagi, 2008). The papers use the fixed effects and random effects methods and also use the Hausman (1978) specification test to determine which estimation model, either fixed or random effects, best explains the estimation.

By definition, a firm's cash holdings are related to its sources and uses of funds. Researchers have identified key factors that might explain variations in level of cash position of firms, namely, size, growth opportunities, leverage, efficiency of firms, dividend payouts, capital expenditures, net working capital, cash flow, profitability, previous level of cash and firm risk (Opler et al., 1999; Chen, 2008; Alnori, 2020; Fernandes et al., 2021). The following variables act largely as control variables but may have other indicator properties. The variables used are described in more details in the next section.

To examine the interaction between various firm characteristics and cash holdings, the following base cash model is adapted from Opler et al. (1999). Potential determinants of cash are based on the transactional and precautionary theory of cash. Under the transaction motive, firms gain from holding cash because it allows them to decrease transaction costs by making payments with cash rather than raising external capital or liquidating assets (Martínez-Sola et al., 2018). According to the precautionary

motivation, businesses amass cash as a buffer to prepare for unexpected financial shocks. The instability of the economic climate, as well as the nature of an organisation's operation, explains the cautious rationale for keeping cash (Mouline, 2021).

The basic model is as follows:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it},$$

where the subscript i denotes the cross-sectional dimension and t represents the time-series dimension.

- Y_{it} represents the dependent variable in the model, which is firms' cash position.
- X_{it} contains the set of explanatory variables in the estimation model.
- α is the constant and β represents the coefficients.

The following reduced-form model is used to investigate the determinants of cash holdings:

$$\begin{aligned} CHD_{it} = {} & \delta_0 + \delta_1 SIZ_{it} + \delta_2 LEV_{it} + \delta_3 CFA_{it} + \delta_4 GRO_{it} + \delta_5 NWC_{it} \\ & + \delta_6 PRO_{it} + \delta_7 CASH2_{it} + e_{it}, \end{aligned} \tag{1}$$

where *CHD* = cash holdings, *SIZ* = firm size, *LEV* = leverage, *CFA* = cash flow to total assets, *GRO* = growth opportunities, *NWC* = net working capital, *PRO* = profitability, and *CASH*2 = cash holdings to the square.

Table 1 Estimation model and variable definitions

Model (1): $CHD_{it} = \delta_0 + \delta_1 SIZ_{it} + \delta_2 LEV_{it} + \delta_3 CFA_{it} + \delta_4 GRO_{it} + \delta_5 NWC_{it} + \delta_6 PRO_{it} + \delta_7 CASH2_{it} + e_{it}$			
Variable	*Definition*	*Measurement*	*Expected results*
CHD	Cash holdings	Cash and cash equivalents/total assets	(Dependent variable)
SIZ	Firm size	Natural logarithms of total assets	Negative
LEV	Leverage	Total debt divided by total assets	Negative
CFA	Cash flow to total assets	Operating cash flow after tax/total assets	Positive
GRO	Growth opportunities	Year on year change in interest income	Positive
NWC	Net working capital	Short-term assets minus cash and its equivalents divided by total assets	Negative
PRO	Profitability	Earnings before interest and tax/total assets	Positive
*CASH*2	Cash holdings multiplied by cash holdings	CHD multiplied by CHD	Negative

Source: Authors' compilation

Each company's individual differences as well as time-period differences are reflected in the error term e_{it}. Thus, if we start from the presumption that the differences between companies have a certain impact on the cash ratio, as a dependent variable, then the use of the random effect technique is appropriate (Subramaniam et al., 2011). Table 1 summarises the definition of variables (proxies) and expected relationships:

4.1 Definition of cash holdings

Cash is considered to be a liquid investment that is required to support the firm's working capital needs (Harford et al., 2008). Cash holdings provide money to meet the daily needs of a corporation and decrease financial risk (Shen et al., 2015). In the current study, cash holdings are measured as cash and cash equivalents to total assets. It is important to distinguish between cash holdings and cash flow. Cash flow relates to the balance of cash moving in and out of a business at a specific point in time (Edwards, 2014). Firms with large operating cash flows will tend to save excess cash flows into cash (Ozkan and Ozkan, 2004). While cash holdings, in essence, helps avoid the high cost of external financing in case of cash shortfall (Bao et al., 2012), cash flow is more related to the cash effects of transactions and other events relating to operating or trading activities (Garrod Hadi, 1998). In the current study, cash holdings are measured as operating cash flow after tax/total assets.

Factors determining the level of cash holdings have long been debated in the finance literature (Subramaniam et al., 2011; Powell, 2018; Graef et al., 2019; Xu et al., 2021). This section describes the independent and control variables used in this empirical study and their expected relationships with the cash holdings in a firm. These relationships are formulated based on the existing literature. Cash is the key dependent variable. Based on the academic literature, several trends have emerged, namely company characteristics such as size, financial leverage, profitability, cash-flows, and the liquidity to assets ratio, which have been identified as determining factors of cash holdings. To measure cash holdings of a firm, the amount of cash and cash equivalents is divided by the firm's total assets (Almeida et al., 2004; Al-Najjar, 2013; Liu et al., 2021).

Firm size (*SIZ*) is a variable which is extensively used in the literature as one of the determinants of cash holdings, but the expected relationship is ambiguous (Drobetz and Grüninger, 2007; Jadiyappa et al., 2021). It is measured as the logarithm of total assets (Ramirez and Tadesse, 2009; Salamaa and Putnamb, 2013). Traditional models to assess the optimal cash levels demonstrate that there are economies of scale associated with the cash levels required to tackle the normal transactions of the firm, so that larger firms can keep lower cash holdings (Baumol, 1952; Miller and Orr, 1966; Mulligan, 1997; Bates et al., 2009). Smaller firms generally have less access to, and face a higher cost of, external finance, and so are likely to hold more cash. The empirical findings of Opler et al. (1999) and Ferreira and Vilela (2004) confirm evidence in favour of the trade-off theory, that is, raising funds is relative more expensive for smaller firms than for larger firms encouraging small firms to hold more cash. On the contrary, both the pecking order and free cash flow theories predict a positive association between cash levels and firm size.

Leverage (*LEV*) is a measure of financial risk and is considered to have an impact on company cash holdings. Leverage relates to the amount of debt a firm holds. Prior research on cash holdings have identified that leverage plays a significant role in determining how much cash firms choose to hold (Guney et al., 2007). It is predicted that as financial leverage increases, cash levels will fall (Opler et al., 1999; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004). Chen et al. (2020) also observe a negative relationship between leverage and cash holdings in their studies on a sample of Chinese listed firms over the period of 2004–2015. This hypothesis is explained by the three main theories: the static trade-off theory, the pecking order theory and the free cash flow theory. Chipeta and Deressa (2016) confirm the existence of the pecking order theory in

their work on firm and country specific determinants of capital structure in Sub Saharan Africa. Based on the previous empirical findings and on both the pecking order and free cash flow theories, a negative relation between cash holdings and leverage ratio is expected. For the purpose of this analysis, we also use two stock measures of leverage – short-term debt and long-term debt to represent debt servicing by firms. Martínez-Sola et al. (2013) suggest that the firm's debt maturity structure can have a significant impact on cash holdings. It is measured as short-term debt divided by total assets and long-term debt divided by total assets respectively (Pinkowitz et al., 2006; Salamaa and Putnamb, 2013).

There are multiple opinions about the relationship between the cash flow (*CFA*) of a company and its cash holdings (Opler et al., 1999; Hardin et al., 2009). Kim et al. (1998) argue that under the trade-off theory, cash flows serve as a substitute for cash. According to this view, companies with larger cash flows tend to keep less cash. If a company has an adequate cash flow, the requirement to retain cash is decreased. Having a steady flow of cash offers a quick stock of liquidity (Ferreira and Vilela, 2004). Depending on what it signifies, cash flow may act as either a control variable or an indicator of financial constraint. There may be a positive relationship between cash flow and cash holdings because firms that have a high cash flow may accumulate cash faster than they spend it. The relationship may also be negative, as found by Cleary (1999), if those with the lowest cash flow (the weakest firms) hold cash because they are financially constrained. Under the pecking order theory, companies that have higher cash flows are expected to hold larger amounts of cash as a source of internal funds. The free cash flow theory of Jensen (1986) for example suggests that managers like to build up the level of cash holdings from the cash flow to have control over a greater amount of assets. The cash flow ratio is defined as the ratio of the operating cash flow after tax and the total assets of the firm (Ozkan and Ozkan, 2004).

The existence of growth opportunities (*GRO*) in firms is an important factor that affects cash levels, as has been shown in various empirical studies (Kim et al., 1998; Opler et al., 1999; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004). As Myers and Majluf (1984) point out, firms whose value are largely determined by their growth opportunities have larger information asymmetry. Consequently, firms with greater growth opportunities incur higher external financing costs. Hence, it is expected that companies with greater opportunities to invest will keep higher levels of cash. This association is in accordance with the trade-off and pecking order theories. The first highlights a transaction cost perspective while the second theory emphasises a precautionary perspective. We expect a positive relationship between growth opportunities and cash holdings. The proxy for growth opportunities is the intangible asset to total asset ratio.

Net working capital (*NWC*) concerns the liquidity of a firm and can therefore be considered as an alternative to cash holdings. The net working capital to assets ratio is often used as the proxy for liquid asset substitutes. The trade-off theory predicts that companies with more liquid assets are expected to hold less cash (Uyar and Kuzey, 2014). In a period with cash shortage, these substitutes can easily be converted to cash with little or no transaction costs. Companies with more non-cash liquid substitutes will hold less cash because the costs of converting these non-cash liquid assets are lower relatively to the costs of conversion of the other assets. A negative relation is expected between net working capital and cash holdings. It is measured as current assets minus

current liabilities minus cash holdings and then divided by total assets (Dittmar et al., 2003; Ramirez and Tadesse, 2009).

Profit (*PRO*) is a source of cash flow for firms. More profitable firms have the ability to stockpile cash, whereas less profitable firms are more dependent on external financing. As per Salehi et al. (2019), to preserve and sustain profitability of their firm's operations, financial managers should pay greater attention to keeping cash to finance and control working capital. The amount of profit made by a firm is either retained for funding future investment opportunities or distributed to shareholders as dividends. Loss-making firms are more likely to be financially constrained and require cash to meet day-to-day obligations, which would imply a negative relationship between profitability and cash (Cleary, 1999). However, loss-making firms are likely to generate less cash, so there may be a positive relationship between the two variables. PRO is measured as earnings before interest and tax (*EBIT*) divided by total assets (Dittmar and Mahrt-Smith, 2007; Al-Najjar, 2013).

Cash holdings multiplied by cash holdings (*CASH*2) is used to determine the turning point and should capture the transitory cash (Opler et al., 1999). *CASH*2 (cash square) is added to test both transactional and precautionary motives for holding cash, and test whether the optimal level of cash holdings exists. Optimal cash model is a criterion which shows optimal level of cash for each company with regard to the specific characteristics of that company. Kim et al.'s (1998) research reveals the existence of an optimum cash level.

5 Data and summary statistics

To investigate the relationship between firm-specific factors and cash holdings, data for financial and non-financial firms is drawn from secondary sources. These include the annual financial reports of the firms in the sample, Bank of Mauritius published reports and Stock Exchange of Mauritius Handbooks. Firms' level data for 21 listed firms are categorised into the four different sectors comprising

1 banks, insurance and other finance

2 commerce and industry

3 investments and property development

4 leisure and hotels.

The time period considered is 2009–2019 to include recent output with the firm selection criterion based on data availability of firms (Al-Najjar, 2013).

In general, a firm's cash holdings will depend both on its degree and cost of financial constraint and its sources and uses of cash. The nature of the business being different, the next section investigates the 'industry effect' of the trend in cash holdings ratio. Movement towards cash from other current assets likely reflects improvements in firms' financial management capabilities over time. Firms in financial difficulty are less likely to be able to obtain loans, so a higher proportion of financially distressed firms may have high cash holdings.

Table 2 Level of cash holdings by sector over the period 2009–2019

	2009	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*
Leisure and hotels	0.029	0.017	0.023	0.020	0.022	0.020	0.018	0.017	0.028	0.042	0.043
Investments and property development	0.024	0.011	0.019	0.011	0.009	0.030	0.018	0.028	0.022	0.017	0.023
Commerce and industry	0.031	0.030	0.061	0.027	0.034	0.041	0.037	0.035	0.042	0.052	0.045
Banks, insurance and other finance	0.069	0.076	0.062	0.087	0.084	0.091	0.077	0.072	0.071	0.045	0.064
All sectors	0.038	0.034	0.041	0.036	0.037	0.046	0.037	0.038	0.041	0.039	0.044

Table 3 Descriptive statistics

	CHD	*SIZ*	*LEV*	*CFA*	*GRO*	*NWC*	*PRO*	*CASH2*
				All sectors				
Obs.	231	231	231	231	231	231	231	231
Mean	0.039	6.843	1.654	0.047	0.059	0.019	0.046	0.003
Std. dev.	0.040	0.750	3.428	0.084	0.156	0.169	0.077	0.006
Min	0.000	4.778	0.002	–0.142	-	–0.531	–0.179	0.000
Max	0.243	8.673	36.060	0.706	1.224	0.700	0.561	0.059
				Leisure and hotels				
Obs.	44	44	44	44	44	44	44	44
Mean	0.027	6.693	1.395	0.116	0.239	–0.145	0.079	0.001
Std. dev.	0.018	0.979	0.368	0.154	0.292	0.130	0.139	0.002
Min	0.008	4.778	0.850	–0.013	0.014	–0.531	–0.082	0.000
Max	0.089	7.566	2.399	0.706	1.224	0.075	0.561	0.008
				Banks, insurance and other finance				
Obs.	55	55	55	55	55	55	55	55
Mean	0.073	7.512	3.217	0.024	0.014	0.138	0.023	0.008
Std. dev.	0.048	0.716	2.910	0.040	0.021	0.143	0.014	0.008
Min	0.004	6.270	0.118	–0.142	0.000	–0.185	0.002	0.000
Max	0.173	8.673	9.624	0.104	0.074	0.369	0.062	0.030
				Commerce and industry				
Obs.	66	66	66	66	66	66	66	66
Mean	0.039	6.651	1.049	0.040	0.030	0.053	0.043	0.003
Std. dev.	0.035	0.430	0.647	0.048	0.045	0.192	0.042	0.007
Min	0.003	5.901	0.144	–0.114	0.000	–0.216	–0.179	0.000
Max	0.243	7.781	2.812	0.153	0.179	0.700	0.116	0.059

Notes: Variables definition: *CHD* = cash holdings, *SIZ* = firm size, *LEV* = leverage, *CFA* = cash flow to total assets, *GRO* = growth opportunities, *NWC* = net working capital, *PRO* = profitability, and *CASH*2 = cash holdings to the square.

Table 3 Descriptive statistics (continued)

	CHD	*SIZ*	*LEV*	*CFA*	*GRO*	*NWC*	*PRO*	*CASH2*
				Investments and property dev.				
Obs.	66	66	66	66	66	66	66	66
Mean	0.019	6.576	1.130	0.025	0.006	–0.006	0.045	0.001
Std. dev.	0.030	0.494	5.593	0.036	0.014	0.060	0.072	0.003
Min	0.000	5.797	0.002	–0.003	-	–0.119	–0.088	0.000
Max	0.123	7.332	36.060	0.266	0.084	0.272	0.333	0.015

Notes: Variables definition: *CHD* = cash holdings, *SIZ* = firm size, *LEV* = leverage, *CFA* = cash flow to total assets, *GRO* = growth opportunities, *NWC* = net working capital, *PRO* = profitability, and *CASH*2 = cash holdings to the square.

In Table 2, we find, on average, that the 'banks, insurance and finance' sector has higher cash holdings ratio compared to the other sectors, due to the nature of their transactions and the central bank's cash ratio requirements. Table 3 presents the descriptive statistics for the firm-level variables used in the analysis for the sample period (2009–2019) for each sector. The table shows the mean, median, minimum, maximum and standard deviation of the variables and provides a general overview of the characteristics of the data.

The descriptive statistics show that the mean cash holdings (*CHD*) level over the period considered in this study is 3.9% for 'all sectors', 2.7% for 'leisure and hotels', 7.3% for 'banks, insurance and other finance', 4.0% for 'commerce and industry' and 1.9% for 'investments and property development'. The mean cash holdings ratio for 'banks, insurance and other finance' sector is highest. And the lowest cash holdings ratio is within 'investments and property development' sector. Comparing these numbers with prior studies, Opler et al. (1999) report that the average cash-to-assets ratio (assets net of cash) for their sample of US publicly traded firms was 17%. Ozkan and Ozkan (2004) report a cash-to-assets ratio of 10% for publicly traded UK firms. Bigelli and Sánchez-Vidal (2012) find cash-to-assets ratio of 10% for privately held Italian firms.

Ferreira and Vilela (2004) report 14.8% of cash-to-assets ratio for European firms. On the other hand, with regards to emerging markets, Shubita (2019) finds a mean calculated value of 6% for the cash ratio of Jordanian companies and Alim and Khan (2016) report an average cash to asset ratio of 6% for firms in Pakistan. These descriptive statistics imply that Mauritian firms have lower cash holdings compared to the emerging markets like Pakistan and Vietnam and even lower cash holdings when compared to the USA and European firms. During times of financial or economic crises, such as the current crisis caused by the COVID-19 epidemic, the precautionary motive for corporate cash holdings becomes crucial. As the crisis unfolds, liquidity shortage in times of crisis is seen to be detrimental to firms' survival; firms with low cash holdings are at a disadvantage. Cash holdings and a robust financial structure serve as insurance, allowing firms to hedge global risks that would otherwise be impossible to manage (Crespí-Cladera et al., 2021).

With regards to size (*SIZ*), on average, the log of the total assets is 6.84% for 'all sectors', with a minimum of 4.8 and a maximum of 8.7. The minimum and maximum values for the sectors are not far off from each other. With a mean value of 1.65, there is a high dispersion rate between the minimum and maximum values for 'all sectors' for the

variable leverage (*LEV*). This is mainly the impact of the sector 'investments and property development'.

For 'all sectors' as well as the individual ones, the minimum values for the variables cash flow to assets (*CFA*) and net working capital (*NWC*) are negative. The net working capital ratio is represented by the ratio of net working capital (less cash and cash equivalents) to total assets. The average is 1.88%. Some firms have a ratio of less than zero which indicates that they have more debt than assets. The minimum growth rate (*GRO*) is zero and is specific to the sector 'investments and property development' sector. The mean profitability ratio (*PRO*) is 4.6%, with a minimum value of –17.9%. The minimum value for cash holdings to the square (*CASH*2) is zero for all sectors.

There are noticeable differences in the link between cash holdings and cash flow for different sectors. A priori, the link between indebtedness and cash holdings is ambiguous: on the one hand, more indebted firms have a higher opportunity cost of holding cash; on the other, higher leverage increases the probability of bankruptcy and firms might try to reduce the probability of experiencing financial distress by holding more cash. The descriptive evidence seems to indicate that the second effect dominates for 'all sectors', 'banks, insurance and other finance' and 'commerce and industry' as there seems to be a positive relationship between these variables for the sectors. Finally, there is an ambiguous relationship between cash holdings and the ratio of net working capital to assets (short-term assets other than cash and its equivalents).

6 Regression results and discussion

In this section we examine the determinants of cash holdings in a multiple regression setting. The section is divided into three different subsections. Firstly, we analyse the results of the empirical model for all sectors. Secondly, we present an analysis concerning the subsamples. A debt structure analysis is thereafter performed and lastly a check with regards to reverse causality between cash holdings and debt structure is done.

6.1 Modelling all sectors

The regression results for the full sample are shown in Table 4. The table reports the results of regression equation (1) using the pooled OLS, fixed effects and random effects models. The dependent variable is cash holdings (*CHD*). The estimation contains data regarding the time between 2009 and 2019.

The results from column 1 which show the pooled OLS results indicate that size (*SIZ*) has a positive association with cash levels. This result contradicts the results of several researchers such as Kim et al. (1998), Opler et al. (1999), Almeida et al. (2004), Ferreira and Vilela (2004) and Ozkan and Ozkan (2004) who find that there is a negative association between size and cash levels. Large corporations are presumably more successful than smaller enterprises and, as a result, should have higher levels of cash after adjusting for investment (Ferreira and Vilela, 2004). The pecking order hypothesis predicts a positive connection between size and cash holdings. However, the variable is insignificant in explaining cash holdings for Mauritian firms. The variable leverage (*LEV*) is statistically significant in the pooled OLS models. The finding that leverage is decreasing in cash holdings is in line with findings of other prior studies (Opler et al., 1999; Ferreira and Vilela, 2004; Bigelli and Sánchez-Vidal, 2012). The higher the

amount of total debt, the less cash a firm holds. The high debt level brings the creditor in a good position to control the credit quality of the debtor and the financial policies of the debtor. This cuts down the agency costs between the two parties and results in a lower financing cost for the debtor.

Table 4 Regression results: all sectors

	Pooled OLS	*Fixed effect*	*Random effect*
	1	*2*	*3*
SIZ_{it}	0.000 (0.002)	0.001 (0.004)	0.001 (0.003)
LEV_{it}	0.001*** (0.000)	–0.001*** (0.000)	0.000 (0.000)
CFA_{it}	0.047** (0.021)	0.032** (0.014)	0.037** (0.015)
GRO_{it}	0.038*** (0.012)	–0.010 (0.013)	0.004 (0.012)
NWC_{it}	0.042*** (0.006)	–0.003 (0.008)	0.012 (0.007)
PRO_{it}	–0.070*** (0.020)	–0.016 (0.015)	–0.033* (0.016)
$CASH2_{it}$	5.704*** (0.152)	4.433*** (0.135)	4.738*** (0.141)
Constant	0.0210* (0.011)	0.017 (0.030)	0.016 (0.018)
R-squared	0.876	0.854	0.849
Sample size	231	231	231
Rho		0.787	0.443

Notes: We report asymptotic standard errors in parentheses. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Variables definition: *CHD* = cash holdings, *SIZ* = firm size, *LEV* = leverage, *CFA* = cash flow to total assets, *GRO* = growth opportunities, *NWC* = net working capital, *PRO* = profitability, and *CASH*2 = cash holdings to the square.

The cash flow (*CFA*) generated by the firm is statistically significant and positive in the OLS model. The positive relationship could be explained by the free cash flow theory of Jensen (1986) who states that managers prefer to build up the level of cash holdings to have control over a greater amount of assets. Firms that can accumulate substantial cash reserves through consistent cash flows might make less financially risky investments. According to Opler et al. (1999), there is a positive connection between cash flow and cash holdings. Growth (*GRO*) is positively related to cash holdings in the OLS model, in line with precautionary motive (to avoid financial distress) and transaction motive (to avoid cash shortfalls when needed) (Wasiuzzaman, 2014). The net working capital (*NWC*) hypothesis is confirmed in OLS regression model. The positive relationship between net working capital (*NWC*) and cash holdings (*CHD*) can be explained by a short cash conversion cycle which frees up cash from the working capital cycle and so increases the amount of cash held (Wasiuzzaman, 2014).

The results also indicate that cash holdings (*CHD*) is negatively related to firms' profitability (*PRO*); profitable firms depend more on internal financing, especially if there is an asymmetrical flow of information between firms and investors. This result is consistent with the result of Abbas et al. (2019). Holding liquid assets increases agency costs and results in inefficient resource management and ultimately in poor business performance. Cash holdings to the square (*CASH*2), which captures for the existence of an optimal cash level, is significant and positive in the OLS model. This is in line with previous studies (Magerakis, 2020).

Regarding the results from column 2, which shows the fixed effect model results, the results reveal that cash holdings (*CHD*) are increasing in size (*SIZ*), implying that smaller firms are likely to hold smaller cash reserves, in synergy with former studies (Al-Najjar and Clark, 2017). The results further show that there is a negative relationship between the leverage ratio (*LEV*) of the firm and the level of cash holdings (*CHD*) for fixed effect model. In that situation, debt is more attractive, and firms see debt as a substitute of cash. This induces a negative relationship as in Lian et al. (2011). The pecking order theory also suggests a negative relationship between the leverage ratio and the level of cash holdings. This result is consistent with the results of several researchers such as Kim et al. (1998), Ferreira and Vilela (2004) and Ozkan and Ozkan (2004).

The cash flow (*CFA*) generated by the firm is statistically significant and positive. The literature is not consistent about the relationship between cash flows and cash holdings. However, the results obtained in this study are supported by the pecking order theory which states that firms prefer internal financing over external financing. Firms will hold the cash flow as a source of liquidity so higher cash flows result in a higher level of cash holdings. According to Lins et al. (2010), cash holdings are held to cushion bad times when cash flows are inadequate. In the fixed effect model, a negative relationship between cash holdings (*CHD*) and growth opportunities (*GRO*) is reported. The findings are contrary to the expectation that firms with better investment opportunities keep higher levels of cash to avoid financial distress and bankruptcy as well as using it as a hedging instrument to fund investments during low cash states (Acharya et al., 2007; Drobetz and Grüninger, 2007). However, this result is not significant.

The net working capital ratio (*NWC*) yields a negative relationship in the fixed effect model. The argument that the net working capital is a liquid substitute for cash and cash equivalents is supported in this case. Net working capital being negatively related with optimal level of cash holdings is consistent with Simutin (2010) and is in contradiction with Opler et al. (1999) findings. Similar to the OLS model, in the fixed effect model, cash holdings (*CHD*) is negatively related to firms' profitability (*PRO*). But, contrary to the OLS model, in the fixed effect model, the result is not significant. There is a positive relationship between *CASH*2 and cash holdings (*CHD*). This confirms the findings of Kim et al. (1998) which reveals that there is an optimum cash level.

The findings from column 3 of Table 4, which show the random effect model results, demonstrate that cash holdings (*CHD*) are rising in size (*SIZ*). Similar to the OLS and fixed effect model, the coefficient is not significant. Although there is a positive relationship between leverage (*LEV*) and cash holdings (*CHD*), the relationship is not a significant one. The cash flow (*CFA*) generated by the firm is statistically significant and positive in the random effect model. In line with the pecking order model, internally generated finances are preferred over the costly external funds for fulfilling financial obligations of the company. Numerous empirical works find a positive relationship between cash holdings and cash flows (Ferreira and Vilela, 2004; Ozkan and Ozkan 2004). Growth (*GRO*) is positively related to cash holdings (*CHD*) in the random effect model in line with precautionary and speculative motives of cash holding. However, the result is not significant. The net working capital hypothesis is not confirmed in the random effect model. In line with the OLS result, the net working capital (*NWC*) has a positive relationship in the random effect model. But the coefficient is not significant in explaining cash holdings. Cash holdings (*CHD*) is negatively related to firms' profitability (*PRO*). With regards to *CASH*2, consistent with the OLS and fixed effect

models, the significance of the variable again confirms the existence of an optimal cash holdings level.

As Table 4 shows, the R-squared (overall) value is higher in the case of the fixed effect model than the random effect model. So, in this case, the fixed effect model is the most suitable model among pooled ordinary least square, fixed effect and random effect models as suggested by the Hausman test. The Hausman specification test reveals that the coefficients of the random effects model are not far away from those of the fixed effects model (prob. > $chi^2 = 0.0000$).

6.2 Sector-wise analysis

Cash holdings can vary widely across sectors and industries (Dittmar et al., 2003). Consequently, the industry adjustment for cash holdings at the segment level is a necessary requirement for reliably estimating the impact of firm structure on cash holdings. The relationship between cash and debt capacity across different industries is analysed to determine

1 whether trade-off between the two instruments is evident across industries and, if so, how different is the degree of substitution

2 whether other cash determinants affect cash holdings equally across industries.

Table 5 shows the determinants of cash holdings at the sector level of the sample.

The comparison between the common variables among the estimation's outputs of 1, 2, 3 and 4 in Table 5 show that the variable cash holdings to the square (*CASH*2) maintains equal statistical significance and coefficient sign across the three models.

Conversely, the negative relationship between cash (*CHD*) and debt capacity (*LEV*) is observed in 'leisure and hotels' and 'commerce and industry' sectors only. According to the trade-off hypothesis, the substitution effect should be apparent in all industries. This supports the hypothesis that industries define the nature of assets held by businesses, and the nature of assets determines the amount of debt capacity held by enterprises, therefore directly controlling the amount of cash held (Lei et al., 2018). The relationship between capital structure and cash position is significant only for 'commerce and industry' sector.

As for cash flow (*CFA*), unlike the results in Pál and Ferrando (2010), this variable seems to influence the cash holdings policies of firms. Cash flow is insignificant in about half the industries ('banks, insurance and other finance' and 'investment and property development'); while the interaction term is significant in 'leisure and hotels' and 'commerce and industry' sectors. With regards to 'banks, insurance and other finance' sector, if firms hold cash for potential growth opportunities (*GRO*) as in Opler et al. (1999), the positive correlation above implies that diversified firms would need more cash in hand to meet their investment demands at any one point in time.

Net working capital (*NWC*) is significant in 'leisure and hotels' and 'commerce and industry'. The negative value of net working capital in 'commerce and industry', which represents the liquidity variable, supports the hypothesis that companies with more liquid assets tend to reduce their cash levels. This result is similar to the findings of Megginson et al. (2014). The obtained result is in accordance with the trade-off theory. On the other hand, with regards to 'leisure and hotels', the result suggests that companies with higher net working capital hold much higher cash holdings (Opler et al., 1999).

Table 5 Results of the fixed effects model

	1	*2*	*3*	*4*
	Leisure and hotels	*Banks, insurance and other finance*	*Commerce and industry*	*Investments and property dev.*
SIZit	0.005	–0.014	–0.013	–0.013
	(0.006)	(0.008)	(0.010)	(0.009)
LEVit	–0.001	0.000	–0.015***	0.000
	(0.002)	(0.001)	(0.003)	(0.000)
CFAit	0.027**	0.001	0.061**	0.004
	(0.012)	(0.026)	(0.025)	(0.025)
GROit	–0.003	0.188**	0.013	0.194
	(0.008)	(0.092)	(0.035)	(0.137)
NWCit	0.013**	0.014	–0.052***	–0.029
	(0.006)	(0.021)	(0.013)	(0.021)
PROit	–0.031*	–0.124	–0.010	0.006
	(0.018)	(0.099)	(0.039)	(0.013)
$CASH2_{it}$	8.801***	5.030***	3.697***	7.789***
	(0.470)	(0.193)	(0.167)	(0.419)
Constant	–0.009	0.134**	0.131*	0.095
	(0.044)	(0.060)	(0.067)	(0.058)
R-squared	0.945	0.961	0.924	0.909
Sample size	44	55	66	66
Rho	0.928	0.907	0.787	0.707

Notes: We report asymptotic standard errors in parentheses. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Variables definition: *CHD* = cash holdings, *SIZ* = firm size, *LEV* = leverage, *CFA* = cash flow to total assets, *GRO* = growth opportunities, *NWC* = net working capital, *PRO* = profitability, and *CASH*2 = cash holdings to the square.

Profitability (*PRO*) is significant for 'leisure and hotels' only. Loss-making firms are more likely to be financially constrained and require cash to meet day-to-day obligations, which would imply a negative relationship (Cleary, 1999). The coefficients for cash holdings to the square (*CASH*2) are positive and significant across all sectors and point to the existence of an optimal level of cash holdings. Like Magerakis (2020), the findings of this research indicate that there is a positive relationship between cash holdings and optimal level of cash holdings. Firstly, the results indicate that there exists an optimal level of cash holdings since cash holdings to the square (*CASH*2) represents a turning point. Secondly, the result also indicates that the level of cash holdings increases when there are positive adjustments in the optimal level of cash holdings.

6.3 Accounting for debt structure

In Table 6, an additional explanatory variable is added that consist of debt maturity. The theories of corporate debt maturity structure were first proposed during the 1980's and

early 1990's (Flannery, 1986; Diamond, 1991). Specifically, debt maturity is analysed as a trade-off between the costs of under-investment and mispricing of long-term debt against the liquidity/refinancing risk and monitoring effect of short-term debt (Diamond, 1991). Debt maturity is measured as a timing of cash flows. Short-term debt matures before the cash flows arrive from a firm's investments and must be refinanced at terms that depend on its future credit rating while long-term debt has maturity matching the timing of the cash flows (Diamond, 1991).

Table 6 Regression results (fixed effects)

	1	*2*	*3*	*4*
	Leisure and hotels	*Banks, insurance and other finance*	*Commerce and industry*	*Investments and property dev.*
SIZ_{it}	0.013	–0.014	0.087***	–0.013
	(0.012)	(0.008)	(0.023)	(0.009)
LEV_{it}		0.000		0.000
		(0.001)		(0.000)
STD_{it}	–0.001		–0.031***	
	(0.003)		(0.009)	
LTD_{it}	–0.003		–0.009***	
	(0.003)		(0.003)	
CFA_{it}	0.027**	0.001	0.050*	0.004
	(0.011)	(0.026)	(0.027)	(0.025)
GRO_{it}	–0.003	0.188**	0.015	0.194
	(0.008)	(0.092)	(0.037)	(0.137)
NWC_{it}	0.019**	0.014	–0.101***	–0.029
	(0.008)	(0.021)	(0.023)	(0.021)
PRO_{it}	–0.027	–0.124	–0.013	0.006
	(0.017)	(0.099)	(0.045)	(0.013)
$CASH2_{it}$	8.794***	5.030***	3.701***	7.789***
	(0.468)	(0.193)	(0.172)	(0.419)
Constant	–0.018	0.134**	0.014	0.095
	(0.046)	(0.060)	(0.070)	(0.058)
R-squared	0.946	0.961	0.921	0.909
Sample size	44	55	66	66
Rho	0.856	0.907	0.783	0.707

Notes: We report asymptotic standard errors in parentheses. * indicates significance at the 10% level. ** indicates significance at the 5% level. *** indicates significance at the 1% level. Variables definition: *CHD* = cash holdings, *SIZ* = firm size, *LEV* = leverage, *CFA* = cash flow to total assets, *GRO* = growth opportunities, *NWC* = net working capital, *PRO* = profitability, and *CASH2* = cash holdings to the square.

It is important to control for debt maturity for several reasons. Firms can signal the quality of their earnings by choosing a specific maturity mix (Datta et al., 2019). The theories of debt structure that are based on signalling (Flannery, 1986) and agency costs (Myers, 1977) favour the use of short-term debt. In the face of favourable private information, managers are expected to avoid locking in debt financing with long-maturity

debt (García-Teruel and Martínez-Solano, 2010). On the other hand, the tax-based theories show the benefit of long-term debt (Cai et al., 2008).

Surprisingly, there is rather little empirical evidence on how corporate debt maturity structure affect cash holdings. Research covers mainly US firms (Barclay and Smith, 1996) and there is a limited research focusing on emerging countries (Cai et al., 2008). Hence, it is important to control for debt maturity in the current analysis within the Mauritian context.

The following model is be used to investigate the impact of debt structure on cash holdings:

$$\begin{aligned} CHD_{it} = {} & \theta_0 + \theta_1 SIZ_{it} + \theta_2 STD_{it} + \theta_3 LTD_{it} + \theta_4 CFA_{it} + \theta_5 GRO_{it} \\ & + \theta_6 NWC_{it} + \theta_7 PRO_{it} + \theta_8 CASH2_{it} + e_{it} \end{aligned} \tag{2}$$

where *CHD* = cash holding, *SIZ* = firm size, *STD* = short-term debt, *LTD* = long-term debt, *CFA* = cash flow to total assets, *GRO* = growth opportunities, *NWC* = net working capital, *PRO* = profitability, and *CASH*2 = cash holdings to the square.

Table 6 shows the results for the regression that has cash holdings as dependent variable and debt maturity as part of the independent variables. With lack of data for 'banks, insurance and other finance' and 'investments and property development' sectors, the estimation of debt structure impact on cash holdings for these sectors could not be performed.

As shown in Table 6, short-term debt (*STD*) and long-term debt (*LTD*) both have a negative effect on cash holdings. The negative effect of short-term debt (*STD*) is more pronounced compared to long-term debt (*LTD*) for 'commerce and industry' as opposed to 'leisure and hotels'.

Because we split the debt ratio to encompass the debt maturity, we can assess if the maturity of debt magnifies or reduces the impact of debt on cash holdings. The findings resonate with the assertion by Gao et al. (2013) that the use of short-term debt forces firms to periodically renew and negotiate the conditions of loans with the risk of no refinancing, hence resulting in a negative relationship between debt maturity and cash holdings. If we assume that short-term debt is more likely to be used to finance immediate cash shortages, such as working capital necessities, and that long-term debt is more likely to be used to finance investments, this result makes some sense; cash holdings are liquid assets that firms can use in case of an immediate need to cover working capital shortage, while short-term debt is quite expensive money.

The findings imply that debt maturity structure influences cash holdings in this research. This result is in line with the research conducted by Ferreira and Vilela (2004), García-Teruel and Martínez-Solano (2008) and Harford et al. (2014) who find that, empirically, long-term debt (*LTD*) has a negative and significant relationship with cash holdings (*CHD*). The result in this study supports the hypothesis that firms with large amount of long-term debt will keep smaller amount of cash because they will not face financial pressure since there are not many loans that need to be renewed. Also, companies with larger proportion of short-term debt will maintain higher cash to avoid financial pressure in case their loans fail to be renewed (García-Teruel and Martínez-Solano, 2008). Short-term debt obliges firms to periodically negotiate the renewal of this debt, and this causes the risk associated with refinancing (García-Teruel and Martínez-Solano, 2008). Firms also face the risk that changes in market conditions and capital market imperfections result in refinancing their debt at a higher interest cost (Froot et al.,

1993). Consequently, the results show negative relation among debt maturity and cash holdings.

After examining the importance of debt capacity on cash holdings and assessing their relationship, a reverse causality test is performed using a series of debt capacity models to confirm the substitution effect (negative relationship) between cash and debt capacity reported in Campello et al. (2011). Very few studies, so far, have investigated this causal linkage between cash holdings and leverage.

The findings suggest that the link between cash holdings and debt capacity is a 'reverse-causality story' for the 'Leisure and Hotels' sector (Campello et al., 2011). The Granger test reveals a large unidirectional link between debt capacity and cash holdings, with changes in debt capacity causing changes in cash holdings.

7 Conclusions

This paper contributes to the cash holdings and the firm structure literatures in different and significant ways. The main contribution of this study comes from the fact that there is limited empirical proof about the determinants of cash holdings in Mauritian firms, with the implications of this paper being applicable to firm owners, managers, banks and other relevant parties. Second, this paper develops a methodology similar to that used in Berger and Ofek (1995) to control for the industry effects on cash holdings, while previous literature uses industry dummy variables to control for the industry effects. More specifically, we use independent regressions for cash holdings in each sector. In line with the previous strand of empirical literature review, most of the studies show the significance of cash holdings theories in corporate behaviour at firm level only. Nevertheless, this cash holdings mechanism could be different across sectors because each specific sector provides a strong financial framework which is essential for sound cash management policies. Furthermore, the distinctive nature of each sector may differently control the firm's cash level.

The findings conclude that growth opportunities, leverage and debt structure, cash flow, net working capital and profitability are all important drivers of corporate cash holdings in Mauritius. The significance of these variables is more pronounced when each sector is considered individually. The relationship between cash and debt capacity is important because it contributes to the dynamics of internal financial flexibility. Debt capacity is dependent on the nature of firms' assets and considered a more stable and predictable characteristic of a firm. Both short-term debt and long-term debt are negatively related to the level of cash holdings. Interestingly, our study shows that there is a positive and significant association between cash holdings and growth opportunities. Net working capital is positively related with cash holdings which is inconsistent with the findings of Wasiuzzaman (2014) for Malaysia but in line with the findings of Rizwan and Javed (2011) for Pakistan. The negative value of net working capital, which represents the liquidity variable, supports the hypothesis that companies with more liquid assets tend to reduce their cash levels. The obtained result is in accordance with the trade-off theory.

This study provides additional literature in the Mauritian setting which can pave the way to opportunities for future research into cash holdings of companies. Both cash and debt capacity provide reliable sources of liquidity for firms but the relationship between them is 'neither simple nor mechanical' (Lins et al., 2010). Based on the results of the regression analysis, it confirms that debt maturity structure influence company's cash

holdings for 'commerce and industry' and 'leisure and hotels' sectors. These findings are in accordance with the developed hypotheses. Therefore, it proves that when companies have a larger proportion of long-term debt, they hold lower amounts of cash.

Research in these areas can aid managers and thus firms, in general, to work on their cash holdings policy and to reach an optimal amount of cash holdings for the firm. The results of this study are interesting for firms to have a deeper understanding and appreciation of the role and the importance of the firm characteristics on the level of cash holdings. It can improve the knowledge of decision makers such as shareholders, managers, and investors about what motivates firms to hold a certain level of cash holdings. This knowledge may be useful in defining a liquidity policy in their firms.

Regarding the limitations of this study, the results of this paper cannot be generalised over all firms in Mauritius, since small firms may have other factors influencing the level of cash holdings. One has to be aware of the fact that small firms have to report less, and this could lead to a lack of data when conducting research on these types of firms. Furthermore, another variable that we failed to conciliate in our study is the role of taxes in both cash holdings and leverage determinants.

For further research, it would be interesting to investigate some macro-economic factors such as inflation, unemployment rate or capital market developments. Flaws in management rule, legal system and market condition, will also have a significant impact on the company's decisions of the cash holdings. So, we must pay attention to the analysis of national conditions in the future research, and continuously modify the cash holdings decision model. It will also be interesting to extend the period of time and perhaps include the changes in cash holdings over time, to see if a trend exists. This could include data from the pre-crisis and post-crisis years to provide insight into company's cash management around those periods. Finally, expanding the scope of this study and exploring the major differences in cash holdings ratios between firms in advanced economies and Mauritius can also be interesting.

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