**Internal Governance, Subordinate Executives’ Horizon and Cash holdings**

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**Abstract**

Inspired by the notion of internal governance, this study investigates whether key subordinate executives’ horizon affects corporate cash holdings. We find cash holdings increases with subordinate executives’ horizon, supporting the precautionary motive for cash holdings. Controlling for alternative explanations, the positive association between subordinate executives’ horizon and cash holdings is hardly affected by the agency motive, tournament incentives between CEO and subordinate executives or confidence level of executives. Our findings are also robust to alternative measures of executives’ horizon and cash holdings, and are not driven by endogeneity issues. The analysis of cash sources documents that firms with longer subordinate executives’ horizon save a higher proportion of cash proceed through reduced dividend payouts and equity issuance, rather than debt. This study contributes to the literature by shedding light on how the diverse agents with different employment horizon in the top management team influences the liquidity policy of the firm.

Keywords: internal governance; subordinate executives’ horizon; cash holdings

JEL classification: G23, G32

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1. **Introduction**

Cash holdings of US firms has escalated during the last three decades. Dittmar and Mahrt-Smith (2007) point out that cash holdings has increased from 5% in 1990 to 13% in 2003, amounting to 10% of annual GDP. Bates *et al.* (2009) show that average cash holdings at the firm level has climbed from 10.5% in 1980 to 23.2% in 2006. Similarly, non-financial and non-utility firms in the Compustat universe report aggregate cash holdings of over 1.7 trillion dollars in 2006, representing 9.2% of firms’ market value of equity (Duchin 2010). The massive increase in cash have garnered much attention and raised the question of the key drivers of such an increase. A substantial literature stream has evolved linking corporate cash holdings to firm characteristics (Opler *et al.* 1999; Bates *et al.* 2009; Subramaniam *et al.* 2011; Boileau & Moyen 2016; Graham & Leary 2018; Falato *et al.* 2022), industry-sector characteristics (Qiu & Wan 2015), and macro-level characteristics (Javadi *et al.* 2021; Wu *et al.* 2021; Alomran & Alsubaiei 2022). Holding sufficient liquid asset is economically important, but excessive cash holdings is not, especially those associated with agency problems which, in turn, leads to agency conflicts (Kalcheva & Lins 2007; Harford *et al.* 2008; Nikolov & Whited 2014). A large part of the existing literature links cash holdings to the characteristics of sole decision maker, CEO, who decides how to use cash (Chen *et al.* 2020; Deshmukh *et al.* 2021). Furthermore, a negligible research stream shows that other stakeholders, including employees (Ghaly *et al.* 2015; Devos & Rahman 2018), customers (Itzkowitz 2013), and suppliers (Zhang *et al.* 2020) play a role in affecting firms’ cash balances as well. This paper adds to this research stream by investigating the association between corporate cash holdings and a different cohort of stakeholders: key subordinate executives, who are the top management executives inside the firm.

In this paper, we focus on the key subordinate executives, who have the ability and incentive of influencing CEO’s decision through providing checks and balances inside the firms. Acharya *et al.* (2011) posit that subordinate executives have the power to force their CEOs to act in a more public-spirited way, despite the CEOs are self-interested and do not act as faithful servants of the shareholders. They name this process as *internal governance*. Cheng *et al.* (2016) show that key subordinate executives can serve an important monitoring role and that effective internal governance can reduce the extent of the CEOs’ myopic behavior. In our study, we investigate the impact of internal governance initiated by subordinate executives, on corporate cash holdings.

Inspired by Cheng *et al.* (2016), we argue that key subordinate executives with longer horizons are induced to care more about long-term firm value which, in turn, shape firms’ cash holdings decisions. First, subordinate executives are likely to be the next CEO, considering that most new CEOs are internally promoted within the firm (Acharya *et al.* 2011). As a potential CEO in near future, subordinate executives care about their career future as much as the long-term value of their firms, thus, they are reluctant to take (myopic) actions to increase short-term earnings at the expense of long-term value-enhancing opportunities. In line with this view, Mekhaimer *et al.* (2022) show that firms tend to undertake risky investment projects to increase future firm performance when their subordinate executives have longer employment horizon. Considering that firms with more risky investment activities require persistence capital, thus, firms appear to retain a certain level of cash holdings. Second, subordinate executives have more to lose in the event of underperformance or failures (Cheng *et al.* 2016). Subordinate executives’ outside employment opportunities are usually influenced by the success of their firms and the performance of other members of the top management team, including the CEO (Fama 1980). That is to say, younger subordinate executives have more loss if their firms force to give up investment opportunities due to fund shortage, which could make their firms losing market competitive power. Third, subordinate executives have the power to monitor and influence the CEO’s decision, given that their welfare is directly associated with (and affected by) the CEO and firm performance (Acharya *et al.* 2011; Cheng *et al.* 2016). This provides them with opportunities to direct or influence corporate decisions on firm’s liquid asset resources toward high-quality investments. Without cash, firms are likely to give up the investment opportunities, which in turn will lead to lower long-term performance and directly affect their future compensation.

Measuring the effectiveness of internal governance motivated by subordinate executives is challenging, the literature captures this idea by employing subordinate executives’ horizon. We follow Cheng *et al.* (2016) and measure internal governance (*int\_gov*) using the number of expected years to retirement to capture subordinate executives’ horizon incentives and using their compensation relative to CEO compensation to capture their influence within the firm. The idea is that the longer the subordinate executives’ horizon and the higher the relative compensation, the more effective the internal governance will be. We use *int\_gov* as our primary measure to capture effectiveness of internal governance exerted by subordinate executives within the management team.

Using a large sample of US S&P 1500 firms over the period 1992 to 2021, we find that longer employment horizons for subordinate executives in the firm are positively associated with cash holdings after controlling for CEO characteristics, firm-level characteristics, year effects, and firm unobserved heterogeneity. With respect to economic significance, cash holdings increases by 4.23% - 4.57% for a one standard deviation increase in subordinate executives’ horizon, depending on the measure of subordinate executives’ horizon. These findings are in line with the internal governance theory developed by Acharya *et al.* (2011). Subordinate executives, who are long-term oriented and prone to make value-enhancing decisions, are motivated to hold cash and lead their firms to rely more on precautionary cash to smooth the path of long-term investment activities. These results supplement Mekhaimer *et al.* (2022) that subordinate executives with longer employment horizon are prone to undertake risky projects and invest more in long-term assets. The positive relation is robust after a battery of sensitivity checks, including alternative measures of subordinate executives’ horizon and cash holdings.

We conduct identification strategies to mitigate potential endogeneity concerns arising from omitted variable bias and reverse causality issues. First, we incorporate additional controls that are related to both cash holdings and other included variables. Second, following Mekhaimer *et al.* (2022) and Cline and Yore (2016), we use the consumer price index in the year when the subordinate executive is born as an instrumental variable in a two-stage least squares instrumental variable regression. Third, we follow Lewbel (2012) approach to employ generated heteroscedasticity-based instrumental variable(s) in a two-stage least squares regression. Estimated results from these analyses confirm our findings are unlikely to be driven by endogeneity problems.

Having documented a positive association between subordinate executives’ horizon and cash holdings, we next rule out other alternative explanations to our findings. One possible explanation is that a longer horizon of subordinate executives might be related to tournament incentives of subordinate executives which, in turn, affect firms’ cash holding decisions (Phan *et al.* 2017). We follow Kini and Williams (2012) and Mekhaimer *et al.* (2022) to measure tournament-based incentives between the CEO and subordinate executives, and find that our findings of positive relation between subordinate executives’ horizon and corporate cash holdings are robust after controlling for the tournament effect. Another alternative explanation of our findings could be that younger managers tend to be overconfident which could influence firms’ cash holding decisions (Kovalchik *et al.* 2005; Chen *et al.* 2020). To account for this possible explanation, we incorporate the confidence level of both CEO and subordinate executives in our analysis. Our results show that subordinate executives’ horizon is still effective after controlling for both CEO and subordinate executives’ confidence levels. Last but not least, one may argue that the cash accumulation behaviors of subordinate executives’ horizon could be explained by the agency motive. To dismiss this alternative explanation, we adopt several corporate governance measures as inverse proxies of agency problem: board characteristics, institutional ownership and analyst coverage in our analysis. Results show that the positive relation between subordinate executives’ horizon and corporate cash holdings holds after controlling for the corporate governance proxies. Taken together, we provide evidence to confirm our findings are robust to controlling for alternative explanations.

Our cross-sectional analyses reveal that the observed positive association between subordinate executives’ horizon and cash holdings mainly manifests in firms with less long-term investment growth and in firms with lower dividend payouts. These findings are aligned with the implications of Mekhaimer *et al.* (2022) that longer employment horizons for subordinate executives within their firm would encourage their CEOs to undertake more long-term investments and reduce dividend payouts. A lower dividend payout or growth in project investments implies more cash is available within the firm. Furthermore, we also find that subordinate executives’ experiences and knowledge are able to exert effective internal governance that can influence firms’ cash holdings decisions. These results are consistent with Acharya *et al.* (2011) that internal governance is expected to be more effective for firms that rely on intensive human capital with experienced executives. Subordinate executives without required experiences may not be considered for CEO promotion, they are therefore dis-incentivized to monitor the CEO's actions.

Finally, we adopt the model of Chang *et al.* (2014) to explore the sources of cash, which allows us to provide insight of understanding the underlying cash saving source(s) through which subordinate executives’ horizon influences change in cash. We find evidence that the positive impact of subordinate executives’ horizon on cash saving arises predominantly through equity issuance and reduced dividend payouts. These findings are consistent with Brown *et al.* (2009) and Blass and Yosha (2003). The former shows that long-term value creation activities are largely financed from internal cash flow and stock issues, while the latter reports that research and development intensive firms use highly equity-based sources of financing.

This paper contributes to the literature in several ways. First, to the best of our knowledge, this is the first study to examine the role of subordinate executives’ horizon in shaping a firm’s cash holdings. This examination is crucial as it sheds light on how diverse agents with different employment horizons shape firms’ liquidity decisions. We show evidence that the horizon of subordinate executives is highly significant in shaping a firm’s cash holdings due to their incentive and ability of influencing the corporate decision-making process. Second, our study contributes to the literature on managerial incentives. This study amplifies and compliments the discussion on the effects of managerial (CEO/CFO) characteristics and incentives on corporate cash holdings by focusing on subordinate executives within the management team. Our research supports the view that the sole decision maker, CEO does not portray a complete picture of the contribution of top management team and does not necessarily reflect the perspective of other members, including the subordinate executives. Our findings point out that the horizon of subordinate executives within the team matters for corporate financial decisions. Third, our study also contributes to the literature of corporate governance (i.e., institutional shareholders horizon or board independence) on corporate decisions. Our work highlights the importance of studying internal governance by showing that the horizon of subordinate executives can influence corporate decision-making process, particularly cash holdings decision. Subordinate executives are effective monitors on CEO’s myopic behaviors, hence agency problem of excess cash holdings is extenuated.

The remainder of our paper is structured as follows: Section 2 discusses related literature and develops our main hypothesis. Sections 3 and 4 describe our sample and research model. Section 5 discusses empirical findings with robustness checks, and Section 6 concludes.

1. **Literature review and hypothesis development**

Existing studies document that cash accumulation is driven by the motives based on the trade-off and agency theories. The trade-off theory proposes that firms are incentivized to build up cash for two motives, transactional motive and precautionary motive. The former suggests that firms save cash to meet their daily needs and fulfill obligations, such as interest expenses and employees’ salaries (i.e., Miller & Orr 1966; Myers & Majluf 1984; Faulkender & Petersen 2005), while the latter documents that large cash holdings allow firms’ business operations would not be interrupted and meet unforeseen events or unexpected contingencies. For instances, firms are prevented from undertaking valuable projects due to shortage of cash or restricted access to external financing. Ample studies support the precautionary motive of cash holdings. Opler *et al.* (1999) and Bates *et al.* (2009) show evidence that firms hold more cash if the industry average cash flow volatility is higher. Similarly, Han and Qiu (2007) extend the theoretic model by Almeida *et al.* (2004) and find that the impact of cash flow volatility on cash holdings are related to firms’ financial constraints. Financially constrained firms heighten their cash balances in response to an increase in cash flow volatility. Harford *et al.* (2014) show that large cash holdings enables firms to mitigate underinvestment problems. Hanlon *et al.* (2017) find that both domestic and multinational firms hold larger cash balances when subject to greater tax uncertainty. Recent studies also find that managerial risk-taking incentives (Canil & Karpavičius 2022) and tournament-based incentives (Phan *et al.* 2017) are positively associated with corporate liquidity policy for precautionary savings purposes.

Considering the nature of cash is easily accessible by management with little scrutiny, the agency theory suggests that managers are incentivized to keep cash on hand for their own purposes (Jensen 1986; Dittmar & Mahrt-Smith 2007). Self-interested managers are likely to use excess cash holdings for personal benefits, such as empire building. Thus, cash is associated with agency problems which, in turn, leads to agency conflicts. Harford (1999) find that firms with excessive cash holdings tend to make acquisitions, which are more likely to be value-decreasing. Dittmar *et al.* (2003) find that firms with weak shareholder protection hold 25% more cash than those with better shareholder protection. Harford *et al.* (2008) show that firms with weaker corporate governance have lower level of cash reserves due to greater capital expenditures and acquisitions. Gao *et al.* (2013) document that greater agency conflicts in public firms lead managers to hold more cash on average than private firms. Further studies explore managerial compensation incentives, such as Cheng *et al.* (2022), Liu *et al.* (2014) and Liu and Mauer (2011), document that CEO compensation incentives and inside debt are associated with higher cash balances.

Ample studies show evidence documenting the importance of shareholder and managerial horizon on shaping corporate policies. Scholars have long theorized the monitoring role of institutional shareholders, and institutional shareholders’ horizon within the firm, long- vs. short-term, play a significant role in determining the intensity of agency and information asymmetry problems which, in turn, affects firms’ overall creditworthiness (Driss *et al.* 2021), corporate policies (Gaspar *et al.* 2012; Derrien *et al.* 2013; Döring *et al.* 2021), managerial misbehaviors (Harford *et al.* 2018) and labor investment choices (Ghaly *et al.* 2020). With respect to managerial horizon, prior work mainly focuses on the CEO’s expected length of employment or horizon and show that they are important determinants of corporate policies. Extant work has developed two competing views on how CEO horizon shapes corporate policies. On the one hand, managers with short-horizon become less concerned with their long-term career prospects and more interested in extracting personal benefits. Thus, CEOs with short-horizon are prone to myopic behaviors and engage in opportunistic behaviors (Dechow & Sloan 1991; Gopalan *et al.* 2014; Chi *et al.* 2020). On the other hand, managers with less expected time in office are inclined to undertake value-enhancing choices, such as improving corporate governance or eliminating pet projects. Jenter and Lewellen (2015) show CEOs with shorter horizon are inclined to sell their firms, reflecting that a shorter career horizon enhances shareholder returns by lowering the costs associated with forgone employment at the firm. These studies and many other studies explicitly or implicitly assume the management team as a whole or solely rely on the CEO as the sole decision maker, but such assumption is vague. It is important to recognize that managing an organisation is a shared effort among the top management executives including the CEO (Jensen 2000). As such, Acharya *et al.* (2011) contend that the top management team consists of diverse stakeholders, particularly subordinate executives with different horizons, interests, and opportunities, who care about their futures in the firm. Our study adds to this line of research by exploring how subordinate executives’ horizon influences corporate cash holdings, which is yet answered in the literature.

Acharya *et al.* (2011) develop a theoretical model to argue that subordinate executives are important stakeholders in the firm that act as an internal governance mechanism to ensure the CEO to act in a more public-spirited way. Their model considers a partnership run by two parties: an old CEO (who is about to retire) and a young manager (i.e., subordinate executives who is likely to be the future CEO), and CEO’s compensation is determined by firm’s capital stock, their ability of managing the firm as well as young manager’s effort. This implies the importance of young manager’s effort in generating firms’ cash flow. If the young managers foresee the CEO will leave nothing behind, undoubtedly incentive of exerting effort will be halted and cash flow will reduce. To prevent, the CEO is willing to invest some fraction of current cash flow to undertake long-term value-adding investments, which would strengthen the firm’s capital stock and preserve firm value for young managers. By investing, the CEO improves the franchise value that the young manager inherits, despite the CEO is myopic and self-interested. This also motivates the young managers to exert greater effort in the firm which, in turn, would enhance CEO compensation. Acharya *et al.* (2011) name this mechanism as *internal governance*. Recent empirical studies support the effectiveness of internal governance, motivated by the subordinate executives’ horizon. Cheng *et al.* (2016) show that earning management reduces with subordinate executives’ horizon. Mekhaimer *et al.* (2022) document that firms tend to undertake risky projects and invest more in long-term assets when subordinate executives have longer horizon. Jain *et al.* (2016) find that longer employment horizons for subordinate executives improves firms’ stock market liquidity. Considering subordinate executives possess important source of firm-specific information due to their expertise, they are likely to improve the information-production process inside the firm (Landier *et al.* 2009). However, how subordinate executives’ horizon affect corporate cash holdings remains unexplored.

We argue that subordinate executives, compared with CEO, are more concerned with maximizing firm value on behalf of shareholders for several important reasons. First, subordinate executives have desire to be the next CEO in the firm, given that most new CEOs are insiders (Acharya *et al.* 2011; Cremers & Grinstein 2013). Cheng *et al.* (2016) document that key subordinate executives with longer horizons are induced to care more about firms’ long-term commitment to value creation. Subordinate executives are likely to be the next CEO if the CEO leaves the firm. As the potential CEO in near future, subordinate executives are reluctant to take actions to increase short-term earnings at the expense of long-term value-enhancing opportunities. Mekhaimer *et al.* (2022) document that subordinate executives’ horizon is positively associated with firm’s risk-taking, long-term investments growth, and research and development productivity. To financially support the long-term value creation activities, such as innovation and research and development expenditure, which are intrinsically difficult to finance using external funds due to its intangible nature, uncertain outcome, and potentially severe asymmetric information problems, we expect that the cash available for their value pursuing investments would benefit their shareholders as well. Second, considering subordinate executives are usually younger with longer employment horizon, they are therefore exposed to higher level of labor market risk exposure (Cheng *et al.* 2016). Compared to the CEO, subordinate executives face greater loss of income for failing to find a comparable job in the future if they switch jobs. Third, subordinate executives have the power to monitor and influence the CEO’s decision, given that their welfare is associated with CEO and firm performance (Acharya *et al.* 2011; Cheng *et al.* 2016). This provides them with opportunities to direct or influence the decisions on firm’s liquid asset resources toward high-quality investments. In sum, subordinate executives, who have the ability and incentive to possess an influence on firms’ decision-making process, are likely to motivate cash accumulation and lead their firms to rely more on precautionary cash to smooth the path of long-term investment activities.

*Hypothesis 1: subordinate executives’ horizon is associated positively with corporate cash holdings.*

1. **Data and key variables**
   1. Data

Data are collected from Compustat ExecuComp database, through Wharton Research Data Services (WRDS) for the period 1992 - 2021. ExecuComp database provides executives-level data (including the CEO), such as ages, compensation package and tenure. Firms’ accounting information and stock data are obtained from the Compustat and Center for Research in Stock Prices (CRSP) database, respectively. Firms operating in the financial sector (SIC codes 6000 – 6999), and firms in the utility sector (SIC codes 4900 – 4999) are excluded from the sample. Furthermore, observations with missing variables for the baseline regression model are excluded. All variables are winsorized at their 1st and 99th percentiles to minimise the potential impact of outliers. Variable definition and sources are reported in the Appendix.

Panel A in Table 1 reports the sample distribution and statistics for internal governance proxies (*int\_gov*, *ln\_horizon* and *ind\_horizon*) by year. The number of firm-year observations increases monotonically from 1992 to 2007 and then slowly reduces. We find similar pattern in both *int\_gov* (ability and incentive of subordinate executives to monitor CEO) and *ln\_horizon* (number of years before retirement). That is, the averages of *ln\_horizon (int\_gov*)increase from 2.3640 (0.0099) in 1993 to 2.5983 (0.2395) in 2007 and then gradually decrease afterwards. In general, there is no significant variation in the averages of *ln\_horizon* and *int\_gov* except for the period 2007–2010, which is consistent with Mekhaimer *et al.* (2022).

Panel B presents the sample distribution and statistics by industry using the Fama and French (1997) 48-sector classifications. The sample covers 44 industries and the industries that are most represented in the sample are business services (12.72%), retail (7.77%), and electronic equipment (6.91%).[[1]](#footnote-1) Overall, the distribution of our final sample across industries is consistent with Jory et al. (2020) and Chen et al. (2017). On average, the agriculture industry has strongest internal governance (*int\_gov* = 0.3098 and *ln\_horizon* = 2.4815), followed by fabricated products (*int\_gov* = 0.1774 and *ln\_horizon* = 2.7038) and business services (*int\_gov* = 0.1261 and *ln\_horizon* = 2.5967), while the shipping containers has the lowest (*int\_gov* = -0.1886 and *ln\_horizon* = 2.1294).

[Table 1 here]

In Figure 1, we plot the average *int\_gov* and *cash1* over the sample period. We find that the peaks of *int\_gov* are 0.1720 in 2002 (about when the dotcom bubble burst) and 0.2395 in 2007 (global financial crisis). In general, we observe an upward trend prior to the dotcom bubble burst (before 2002) and a downward slope after the global financial crisis. In sum, a clear positive relation between *int\_gov* and *cash1* is visualized in Figure 1.

[Figure 1 here]

* 1. Key variables
     1. *Measure of subordinate executives’ horizon*

Following the literature (Matějka *et al.* 2009; Cheng *et al.* 2016; Jain *et al.* 2016), we employ a number of different measures for subordinate executives’ horizon. Cheng *et al.* (2016) posit the effectiveness of internal governance increases with the decision horizon of subordinate executives and the influence they have on the CEO. We follow Cheng *et al.* (2016) and measure firms’ internal governance as our primary measure, denoted as *int\_gov*. Cheng *et al.* (2016) use the number of years until retirement age (assumed to be 65) to capture subordinate executives’ decision horizon:

*horizoni,t = 65 – average age of subordinate executivesi,t*

Cheng *et al.* (2016) use the level of subordinate executives’ compensation relative to the CEO’s to capture their influence on the firm:

*pay\_ratioi,t =*

We then calculate an aggregate measure of a firm’s overall internal governance based on both subordinate executives’ incentive (*horizon*) and ability (*pay\_ratio*) of monitoring their CEOs. That is, we standardize both *horizon* and *pay\_ratio* by deducting the sample mean and then dividing the difference by the sample standard deviation. After that, we sum the standardized measures as the proxy for the firm’s overall internal governance effectiveness (*int\_gov*).

Next, we construct another two measures of subordinate executives’ horizon following Mekhaimer *et al.* (2022). First, we calculate the natural logarithm of the difference between average age of subordinate executives in firm *i* and retirement age, denoted as *ln\_horizon*. Mekhaimer *et al.* (2022) posit that the longer the expected number of years remaining in the firm, the longer the horizon of the subordinate executives. *ln\_horizon* is a forward-looking nature of the variable capturing subordinate executives’ monitoring incentives on achieving long-term goals of the firm, including risk-taking orientation and long-term investment. Second, to account for changes in age structure across different industries, we measure the industry-adjusted subordinate executives’ remaining horizon, denoted as *ind\_horizon*. *ind\_horizon* is calculated as the difference between the average age of subordinate executives in the firm’s industry and the firm’s average age of subordinate executives:

*ind\_horizoni,t = average age of subordinate executivesind,t - average age of subordinate executivesi,t*

Moreover, we employ two alternative measures of subordinate executives’ horizon: (1) the age difference between the CEO and subordinate executives (*diff\_horizon*) following Jain *et al.* (2016). The instinct of *diff\_horizon* captures subordinate executives’ incentive of monitoring on firm’s long-term objectives through their desire of becoming the next CEO (Acharya *et al.* 2011). (2) the industry-adjusted age difference between the CEO and the subordinate executives (*diff\_ind\_horizon*) following Mekhaimer *et al.* (2022).[[2]](#footnote-2) *diff\_ind\_horizon* compares the remaining horizon of subordinate executives, relative to their industry peers, with the remaining horizon of the CEO. A positive value of *diff\_ind\_horizon* reflects that subordinates’ industry-adjusted remaining horizon exceeds the industry adjusted horizon of the CEO.

* + 1. *Measure of cash holdings*

Following prior literature (Opler *et al.* 1999; Bates *et al.* 2009; Subramaniam *et al.* 2011; Cheung 2016), we use the ratio of cash and marketable securities to net assets (*cash1*) and the ratio of cash and marketable securities to sales (*cash2*) as our primary measures of cash holdings. We also use three different measures of cash holdings as alternative measures of cash holdings for robustness check: the natural logarithm of cash to net assets (*ln\_cash1*), the natural logarithm of cash to sales (*ln\_cash2*), and the natural logarithm of one plus raw cash holdings (*cash3*). Note that these alternative measures of cash holdings are also widely used in the literature (for example, Beuselinck *et al.* (2021)). In summary, we expect these proxies of cash holdings capture the intensity of cash holdings for firm. Definitions of cash holdings proxies are presented in the Appendix.

1. **Empirical model**

To test the main hypothesis, we use fixed effects regression model to investigate the relation between firms’ internal governance and corporate cash holdings. The model is specified as follows:

(1)

where subscripts *i* and *t* represent firm *i* and year *t*, respectively. The dependent variable is *cash* (proxied by *cash1* and *cash2*), and the key independent variable is internal governance (proxied by *int\_gov*, *ln\_horizon* and *ind\_horizon*). represents a set of control variables. Following the literature (Opler *et al.* 1999; Almeida *et al.* 2004; Ozkan & Ozkan 2004; Harford *et al.* 2008; Harford *et al.* 2014), we employ a set of firm-specific control variables shown to affect corporate cash holdings: firm size (*fsize*), leverage ratio (*lev*), profitability (*roa*), net working capital (*nwc*), capital expenditure (*cap*), market to book ratio (*mb*), cash flow (*cfo*), cash flow volatility (*vol*), acquisition expenditure (*acq*), research and development expenditure (*rd*), credit rating (*rating*) and dividend payer (*payer*). We also include CEO stock ownership (*ceo\_share*) and CEO compensation (*ceo\_comp*) to control for the agency costs associated with managerial discretion and for any potential incentive effects on cash holdings (Deshmukh *et al.* 2021). In addition, we follow Cheng *et al.* (2016) to include CEO horizon (*ceo\_horizon*) to control for its impact on the extent of corporate cash holdings. and indicate firm and year fixed effects, respectively, while signifies the idiosyncratic error term. Firm fixed effects control for unobserved firm-level time invariant heterogeneity, and year fixed effects to account for any time trends in cash holdings. We employ heteroscedasticity-robust standard errors clustered at the firm level in all regressions to draw statistical inferences.

1. **Empirical results**
   1. Summary statistics

We report the summary statistics of the key variables in Panel A of Table 2. The average of *cash1* is 0.2751, with a standard deviation of 0.4805, while the average of *cash2* is 0.2456 with standard deviation of 0.4410. These are consistent with those of Beuselinck *et al.* (2021) and Deshmukh *et al.* (2021). In line with Cheng *et al.* (2016) and Mekhaimer *et al.* (2022), *int\_gov* and *ln\_horizon*, on average, are -0.0147 and 2.4398, respectively. The summary statistics for control variables show that the sample firms, on average, hold some debt (*lev* = 0.2353) with moderate growth opportunities (*mb* = 2.1269). Panel B shows the univariate test of difference in means of the variables between firms with strong and weak internal governance. We find that firms with strong internal governance hold significantly more cash, which supports our main hypothesis that internal governance is associated positively with corporate cash holdings. Consistent with Mekhaimer *et al.* (2022), firms with strong internal governance spend more in long-term investments, such as capital expenditure or acquisition.

[Table 2 here]

Table 3 reports the correlation matrix of the key variables used in the study. First, we find that the correlations between internal governance (*int\_gov*, *ln\_horizon* and *ind\_horizon*) and proxies for corporate cash holdings (*cash1* and *cash2*) are positive and statistically significant at the 1% level, suggesting that internal governance plays a role in determining corporate cash holdings. Table 3 also shows that internal governance is positively correlated and statistically significant with market-to-book ratio (*mb*), volatility (*vol*), research and development (*rd*) and CEO horizon (*ceo\_horizon*), whereas it is negatively correlated and statistically significant with the other control variables. These results imply the integration of these control variables are important to validate our conclusion.

[Table 3 here]

* 1. Baseline regression

Table 4 reports the fixed effects estimation results of Equation (1). When dependent variable is *cash1*, the estimated coefficients on *int\_gov*, *ln\_horizon* and *ind\_horizon* are positive (0.0086 in Column 1, 0.0243 in Column 2 and 0.0029 in Column 3) and statistically significant at the 1% level, suggesting that the corporate cash holdings increases with stronger internal governance or when subordinate executives have a longer employment horizon.[[3]](#footnote-3) To gauge economic significance, these coefficients reveal that a one standard deviation increase in *int\_gov*, *ln\_horizon* and *ind\_horizon* induces the firm to hold more cash by 4.23%, and 4.57% and 4.46% relative to the mean, respectively.[[4]](#footnote-4) We find supportive results when the dependent variable is *cash2*, the estimated coefficients on internal governance proxies are positive and statistically significant at the 1% level (0.0063 in Column 4, 0.0184 in Column 5 and 0.0021 in Column 6). The results are not only statistically significant but also have significant economic importance.[[5]](#footnote-5) These results highlight the importance of subordinate managers in internal corporate governance. Subordinate executives, who are long-term oriented and prone to make value-enhancing decisions, are motivated to hold cash and lead their firms to rely more on precautionary cash to smooth the path of long-term investment activities.

[Table 4 here]

* 1. Controlling for endogeneity
     1. *Omitted variables*

One may argue that our estimated results may be susceptible to misspecification owing to omitted variables that are related to both cash holdings. Several studies (Liu & Mauer 2011; Feng & Rao 2018; Canil & Karpavičius 2022) show CEO risk taking is associated with cash holdings. Thus, we include Delta and Vega of both CEO and executive obtained from Coles *et al.* (2006). Gan and Park (2017) find that managerial ability is linked to cash holdings, Faff *et al.* (2016) highlight that firm life cycle plays a role in influencing corporate cash holdings, and Opler *et al.* (1999) suggest to incorporate the cash conversion cycle to control for both liquidity and time the inventory takes to be converted to cash. Therefore, we also include managerial ability scores developed by Demerjian *et al.* (2012), retained earnings (*re*) and cash conversion cycle (*ccc*) as additional control variables in the regression model (Equation (1)). In Column (1) – (3) of Table 5, when dependent variable is *cash1*, the estimated coefficients on internal governance are positive and significant (*int\_gov* = 0.0115, *ln\_horizon* = 0.0225 and *ind\_horizon* = 0.0027) after incorporating the additional control variables. As expected, the coefficients on internal governance remain positive and significant in Columns (4) – (6) when the dependent variable is *cash2*. In sum, we show supportive evidence that our main finding is not driven by omitted variable bias.

[Table 5 here]

* + 1. *Two-stage least squares (2sls) regression*

We use instrumental variables estimation to alleviate the problem of reverse causality. Inspired by Serfling (2014), Cline and Yore (2016) and Mekhaimer *et al.* (2022), we use the consumer price index (*cpi*) in the year when the executive was born as an instrumental variable (*IV*). This *IV* meets both the relevance and exclusion requirement of a valid instrument. First, *cpi* is highly correlated with age, and higher *cpi* corresponds to later years. Thus, it is expected that *cpi* of executives’ birth year increases with subordinate executives’ horizon. Second, it is unlikely that *cpi* in the year when executives were born to be correlated with corporate cash holdings, other than through the role of subordinate executives in determining firms’ decisions. Results from the first stage regression are consistent with our expectation that the association between *cpi* at the executives’ birth years and subordinate executives’ horizon is positive and statistically significant. Estimated results from the second-stage regression results, where we regress the cash holdings on the fitted value for internal governance, are reported in Panel A of Table 6. When dependent variable is *cash1*, the estimated coefficients on internal governance are positive and significant (*int\_gov* = 0.0146, *ln\_horizon* = 0.0300 and *ind\_horizon* = 0.0036). Supportive findings emerge when the dependent variable is *cash2.* In the weak identification tests, the Kleibergen-Paap rk Wald F statistic are far larger than the Stock and Yogo (2005) critical value, indicating rejection of the null hypothesis that the chosen instrument is weak.

[Table 6 here]

To further mitigate endogeneity concerns, we also perform two-stage least squares (*2sls*) analyses using the Lewbel (2012) approach, which exploits model heteroscedasticity to construct instruments using the available regressors.[[6]](#footnote-6) This method is developed to address the endogeneity concern in the absence of traditional identifying information, such as external instruments. Several studies, such as Khoo and Cheung (2021) and Hasan *et al.* (2021), employ this technique and show supportive evidence that the generated instruments from Lewbel (2012) perform well. Panel B of Table 6 reports the estimated results of second-stage regression results using Lewbel (2012)’s approach. The estimated coefficients on internal governance are statistically significant and positive, no matter whether the dependent variable is *cash1* or *cash2*. In addition, the under-identification test results show that the selected *IV*s are relevant, as the Kleibergen-Paap rk LM statistics are significant at the 1% level. Results obtained from weak identification tests shows that the *IV*s are correlated with our endogenous regressors, given that the Kleibergen-Paap rk Wald F statistics are greater than the Stock and Yogo (2005) critical values. The p-value of Hansen’s J over-identification test statistics are large, indicating that chosen *IV*s are uncorrelated with the error term. These statistics confirm the validity of the chosen *IV*s. Taken together, the estimated results obtained from Lewbel (2012) analyses do not suffer from weak instrument, over-identification or under-identification problems. Taken together, we continue to find results supporting our baseline results. That is, firms hold more cash as internal governance becomes stronger or subordinate executives’ horizon increases.

* 1. Sensitivity checks
     1. *Alternative measures*

To ensure the documented negative relation is not sensitive to alternative measurements, we employ two alternative measures of internal governance: *diff\_horizon* and *diff\_ind\_horizon* and three alternative measure of cash holdings: *ln\_cash1*, *ln\_cash2* and *cash3*. The measurements of these proxies are discussed in Section 3.2. Table 7 presents the estimated results obtained from these alternative measures. Columns (1) - (2) show estimated results when the dependent variable is *ln\_cash1*. The coefficients on *diff\_horizon* (0.008) and *diff\_ind\_horizon* (0.0071) are positive and statistically significant at the 1% level. In Columns (3) - (6), the estimated results remain positive and statistically significant at the 1% level, regardless of whether the dependent variable is *ln\_cash2* or *cash3*. In sum, we show robust empirical evidence that the positive association between internal governance and corporate cash holdings are not sensitive to the variants of measures used in prior literature.

[Table 7 here]

* + 1. *Alternative explanations*

Our main hypothesis is consistent with the precautionary motive of cash holdings. However, this does not preclude the possibilities that alternative explanations are at work. We are therefore explore whether our results can be interpreted by three possible alternative explanations and report the estimated results in Table 8.

Kini and Williams (2012) show that tournament-based incentives induce managers to pursier corporate financing and investment activities which, in turn, are associated with strengthening corporate value (Kale *et al.* 2009). In addition, Phan *et al.* (2017) find that risk-increasing motivations induced by tournament-based incentives positively affect firms’ cash holdings decision. . Based on these views, the positive relation could be driven by executives’ tournament-based incentives. We therefore investigate whether the main findings still hold if managerial tournament-based incentives are controlled for. Following Kini and Williams (2012) and Mekhaimer *et al.* (2022), we measure tournament-based incentives (*pay\_gap*) as the natural logarithm of the difference between a CEO’s total compensation package and the average compensation of subordinate executives. Incorporating *pay\_gap* as an additional control, estimated results are reported in Panel A of Table 8. As expected, the relation between *pay\_gap* and cash holdings is positive and significant, which is line with Phan *et al.* (2017). The coefficients on internal governance remain positive and statistically significant (0.0114 in Column (1); 0.024 in Column (2); 0.0028 in Column (3)), no matter whether the dependent variable is *cash1* or *cash2*. These findings suggest that the documented positive result is not driven by tournament incentives in the top management team.

[Table 8 here]

A recent study, Chen *et al.* (2020) document that executive (especially CEO) overconfidence is positively related to corporate cash holdings due to the (uncertain) investment environments faced by firms. Kovalchik *et al.* (2005) argue that younger managers tend to be overconfident. Put these views together, one may argue that younger subordinate executives are likely to be overconfident which, in turn, could influence firms’ cash holding decisions. To dismiss this possible explanation, we incorporate the confidence level of both CEO and subordinate executives in our analysis. Following Mekhaimer *et al.* (2022), we collect data on options grant information from Execucomp. CEO’s overconfidence (*CEO\_confidence*) is measured as the value of all unexercised exercisable options scaled by the number of options vested, divided by the firm’s share price at the end of the fiscal year. To measure the confidence level of subordinate executives at the firm level, we calculate the confidence level for individual subordinate executives within a firm and then take an average of them. The results are reported in Panel B of Table 8. We find that our main finding is not sensitive to executives’ confidence level, including the CEO’s one, because the coefficients on internal governance remain positive and statistically significant at the 1% level (0.0118 in Column (1); 0.0259 in Column (2); 0.0031 in Column (3)) after controlling for executives’ overconfidence.

The agency motives suggest CEOs are inclined to keep cash on hand because substantial cash allows them with higher discretion and avoid under monitoring by investors. Self-interested CEOs are likely to consume excess cash holdings for personal benefits, such as empire building. Harford (1999) show that cash-rich firms tend to undertake bad acquisitions. Dittmar and Mahrt-Smith (2007) and Harford *et al.* (2008) show that firms with fewer shareholder protection or poor corporate governance dissipate excess cash on investments and mergers quickly. Following this agency view, we would expect a positive relation between internal governance and cash holdings, which is the same as the evidence of the precautionary motive in explaining cash holdings. Furthermore, Acharya *et al.* (2011) argue that internal and external governance within a firm are typically complements. In other words, when external governance becomes weak, internal governance can be effective. To rule out the alternative explanation of agency motive as well as to ensure our results are not driven by the (weak) external governance, we adopt several external corporate governance proxies in our analysis: board characteristics (number of director, number of independent director and g-index following Atif *et al.* (2019)), institutional ownership and analyst coverage following Jain *et al.* (2016), and examine whether corporate governance influences the positive effect of horizon on cash holdings. After incorporating these additional controls, the positive coefficients on internal governance remain statistically significant for all dependent variables, which imply that the impact of internal governance is not driven by agency motive or weak external corporate governance.

* 1. Further analyses
     1. *The role of long-term investment growth*

Mekhaimer *et al.* (2022) find that subordinate executives who have expected a long-term horizon within the firm are likely to undertake long-term investments. A high rate of growth in project investments demand significant cash commitments, thus, a low level of cash holdings is available or maintained inside the firm. As such, we hypothesize that the positive association between executive horizon and cash holdings is weaker for firms with high level of long-term investment growth. We split the sample to separately estimate the effect of internal governance on cash holdings for firms with high level of long-term investment growth and for firms with low level of long-term investment growth. To proxy the growth in long-term investment, we follow Mekhaimer *et al.* (2022) and (Edmans *et al.* 2017). We calculate the change in property, plant and equipment expenditure (capital expenditure) over the past two years, and then allocate a unity to those who have experienced an increase in property, plant and equipment expenditure (capital expenditure) over two consecutive years and zero if otherwise, denoted as *growth\_ppe* (*growth\_cap*). Table 9 report the empirical results.

[Table 9 here]

We find consistent results in Panel A, where the results obtained from the proxy of *growth\_ppe* are shown. Regardless of whether the dependent variable is *cash1* or *cash2*, the estimated coefficients on internal governance are positive and statistically significant at the 1% level (*int\_gov* = 0.0155 in Column (1); *ln\_horizon* = 0.0294 in Column (2); *ind\_horizon* = 0.0034in Column (3)), and the coefficients on interaction terms are negative and statistically significant at the 1% level (for example, *int\_gov × growth\_ppe* = -0.02 in Column (1); *ln\_horizon × growth\_ppe* = -0.0307 in Column (2); *ind\_horizon × growth\_ppe* = -0.0033 in Column (3)). The negative coefficients are aligned with our expectation that substantial amount of cash is consumed accommodating these firms with high growth rate in their long-term investments, thus, the effect of internal governance is weaker for these firms. The empirical results from *growth\_cap* (in Panel B) are qualitatively similar. In sum, our findings highlight the significant role of growth in long-term investment in lessening the direct linkage between firms’ internal governance and corporate cash policies.

* + 1. *The role of dividend*

Mekhaimer *et al.* (2022) also provide evidence that longer employment horizons for subordinate executives within their firm would encourage their CEOs to reduce dividend payouts. Such finding is also consistent with Acharya *et al.* (2011) that firms’ CEO are inclined to invest in the future of the firm rather than directing firms’ resources to distributing dividends to shareholders, when their subordinate executives have a long-term expected horizon within the firm. A lower dividend payout implies more cash is available within the firm. Hence, we would expect the incentives of cash accumulation to be weaker for those distributing dividends. Table 10 report the empirical results.

[Table 10 here]

We adopt two measures of dividends and report the results in Panels A and B, respectively. Panel A presents the results from dividend payout (*div*), which is defined as the ratio of total dividend scaled by firms’ total asset. Across different measures of internal governance or cash holdings, the coefficients on interaction terms are negative and statistically significant (*int\_gov × div* = -0.0141 in Column (4), *ln\_horizon × div* = -0.0266 in Column (5) and *ind\_horizon × div* = -0.0039 in Column (6)), while the coefficients on internal governance remain positive and also highly significant at the 1% (*int\_gov* = 0.0107 in Column (4), *ln\_horizon* = 0.0339 in Column (5) and *ind\_horizon × div* = 0.004 in Column (6)). In Panel B, we observe qualitatively similar results using the proxy of dividend dummy (*payer*), which is a dummy variable taking a value of one if the firm pays dividend and zero if otherwise. Taken together, the negative coefficients on interactive terms support Mekhaimer *et al.* (2022) as well as reverberate our argument that dividend payout adversely affects the association between internal governance and cash holdings.

* 1. Additional analysis: internal governance, cash holdings and firm-specific knowledge

Acharya *et al.* (2011) propose that the effectiveness of internal governance is related to the level of subordinate executives’ firm-specific knowledge. Supportively, Jain *et al.* (2016) show that internal governance is merely effective in improving firms’ liquidity for those strongly relying on human capital for daily operations. These findings motivate us to explore whether subordinate executives’ firm-specific knowledge, which plays a significant role in preparing for their promotion, affects the effectiveness of internal governance on cash holding decisions. To this end, we adopt the excess value of human capital industrial rank proposed by Pantzalis and Park (2009), denoted as *knowledge*. Pantzalis and Park (2009) rank Fama and French (1997)’s 48-industry classification based on the industry's median market value of equity per employee, which differentiates between industries that require intensive human capital and those with low level of reliance on human capital. We split our sample firms into high and low *knowledge* subsamples by median. Table 11 reports the results from regression analysis. As *knowledge* is constant across the sample period for each industry, this variable is omitted from the regression analysis as its effect on cash holdings is entirely absorbed by the inclusion of firm-fixed effects. We find that the coefficients on interaction terms are positive and statistically significant across different measures of internal governance and cash holdings (*int\_gov × knowledge* =0.0228 in Column (1); *ln\_horizon × knowledge* = 0.0545 and *ind\_horizon × knowledge* = 0.0047 in Column (3)). The positive coefficients imply the important role of subordinate executives’ experiences and knowledge in affecting decisions of accumulating cash. Collectively, the findings suggest that the effectiveness of internal governance are not only related to subordinate executives’ remaining horizon, but also the job nature of executives, in particular, those in need of industry-specific skills.

[Table 11 here]

* 1. Additional analysis: sources of cash saving

Despite our findings show a positive relation between internal governance and cash holdings, we have not understood how firms build up ample cash holdings. To examine the influence of internal governance on the sources of cash, we follow the model of Chang *et al.* (2014) to decompose net cash inflows into five components, as shown in the following model:

(2)

Equation (2) indicates that the change in cash (*Δcash*) can be driven by different components (or sources): internal cash flows (*cashflow*), debt issuance (*Δdebt*), equity issuance (*Δequity*), investments (*invest*) and dividends (*div*).[[7]](#footnote-7) Thoroughly, an increase in internal cash flows, debt issuance or equity issuance (investments and dividend) is expected to generate cash proceeds (reduce cash available). We conduct two empirical analyses helping us to provide insight the underlying cash saving source(s) through which internal governance influences change in cash.

First, we regress each component on internal governance to understand the effects of internal governance on each source that generate cash inflows, and report the estimated results in Panel A of Table 12.[[8]](#footnote-8) When dependent variable is change in cash (*Δcash*), the coefficients on internal governance remain positive and statistically significant, which are consistent with our baseline findings (see Columns (1) to (3), Panel A). We find that internal governance significantly (at the 5% level or lower) heightens firms’ investment expenditures (*invest*) and reduces dividend payments (*div*) (see Columns (4) to (9)). These results are in line with Mekhaimer *et al.* (2022) that subordinate executives with longer horizon undertake more investments in long-term assets and reduce their payouts to free up cash for investments. Furthermore, internal governance exhibits a positive effect on both internal cash flows (Columns (10) to (12)) and equity issuance (Columns (16) to (18)), implying that firms increase cash proceeds from internal cash flows and equity issuance when subordinate executives have longer horizon in the firm. Such findings are in tune with Jain *et al.* (2016) that subordinate executives with longer horizon are able to keep their firms liquid and attractive to stock market investors through mitigating information asymmetry. Similarly, they are also consistent with Cheng *et al.* (2016) that subordinate executives with longer horizon provide the market with better financial reporting quality.

[Table 12 here]

Second, to capture the magnitude of cash saving from each source, we examine the mediating effects using structural equation model (*sem*), comprising of a system of linear simultaneous equations that represents the relations between the key variables. We employ *sem* and jointly estimate the following equations:

(3)

(4)

In these *sem*, is a set of control variables discussed in Section 4. In particular, 𝛽1 is the coefficient of the internal governance on cash source (i.e., internal cash flows, debt issuance, equity issuance, investment or dividend) in Equation (3), 𝛽2 is the coefficient of cash source on cash holding in Equation (4). Hence, the product of 𝛽1 and 𝛽2 captures the mediating effect of the internal governance on cash holdings through its impact on cash source. We use the bootstrapping method suggested by MacKinnon *et al.* (2004) to improve the accuracy of our estimates, and report the regression results in Panel B of Table 12. Columns (1) and (2) show the estimated results obtained from firms’ investment expenditures (*invest*), Columns (3) and (4) are for dividend payments (*div*), Columns (5) and (6) are for internal cash flows (*cashflow*), Columns (7) and (8) are for debt issuance (*Δdebt*), and Columns (9) and (10) are for equity issuance (*Δequity*). We discuss the sources through which internal governance affects cash holdings by focusing on the positive and statistically significant effects by dividend (0.00062) and equity issuance (0.00173). The effect of the equity is 0.00173, which is the product of the coefficient (𝛽1), 0.5362, in Column (9) and the coefficient (𝛽2), 0.0032, in Column (10). That is, internal governance induces an increase in cash by 0.173% through equity issuance, and 0.062% through reducing dividend payouts. Overall, we find evidence that the positive impact of internal governance on cash saving arises predominantly through equity issuance and reduced dividend payouts.

1. **Conclusion**

Prior work pay attention on the impacts of CEO’s horizon on corporate policies (Gopalan *et al.* 2014) and leave trivial discussion on the role of non-CEO executives – subordinate executives, which consists of diverse agents with different career horizons. Acharya *et al.* (2011) propose an *internal governance* theory where subordinate executives have the power to pressurize the CEO to undertake more investment due to their incentives and ability of influencing the CEO’s decision-making. Our contribution focuses on the impacts of subordinate executives’ horizon on corporate cash policies. In this study, we hypothesis the precautionary motive in explaining the relation between cash holdings and subordinate executives’ horizon. That is, firms tend to accumulate cash when subordinate executives have longer horizon in the firm.

Following Cheng *et al.* (2016), we use the number of years to retirement age to capture subordinate executives’ decision horizon and the level of their compensation relative to the CEO to capture their influence, as our main proxy of subordinate executives’ horizon. We find strong results supporting our hypothesis and our results are robust to alternative measures of subordinate executives’ horizon or cash holdings. We conduct additional analyses to ensure that our results are not driven by alternative explanations, such as the difference in compensation between the CEO and the subordinate executives in the firm, the confidence of both CEO and subordinate executives, and the agency motive. In addition, we rule out the possibility that our findings are driven by potential endogeneity concerns, such as accounting for omitted variables bias and different estimation techniques (two-stages least squares regressions).

We also find that the positive effect of subordinate executives’ horizon on cash holdings are weaker for firms with high level of long-term investment growth or those distributing dividends. These findings are aligned with precautionary motives that firms with younger subordinate executives (longer employment horizon) accumulate cash to have the ability to meet unexpected contingencies. Also, these findings are consistent with the view that these firms reduce their payouts to free up cash for long-term investments (Mekhaimer *et al.* 2022). To understand how firms with younger subordinate executives build up cash holdings, we conduct an analysis on the sources of cash. The analysis of cash sources documents that firms with longer subordinate executives’ horizon save a higher proportion of cash proceed through reduced dividend payouts and equity issuance, rather than debt. This study contributes to the literature by shedding light on how subordinate executives with different employment horizon in the top management team influences the liquidity policy of the firm.

**Appendix**

Details of the variables constructed for analyses.

|  |  |  |
| --- | --- | --- |
| **Variable** | **Definition** | **Source** |
| Dependent variables: | |  |
| *cash1* | Cash and market securities (item CHE) scaled by net assets, which is the difference between total assets (item AT) and cash and market securities. | Compustat |
| *cash2* | Cash and market securities scaled by sales (item SALE). |
| *ln\_cash1* | Natural logarithm of one plus *cash1.* |
| *ln\_cash2* | Natural logarithm of one plus *cash2.* |
| *cash3* | Natural logarithm of cash and market securities. |
| Independent variables: | |  |
| *int\_gov* | Standardise both *ln\_horizon* and *payratio* and sum the standardised measures following Cheng *et al.* (2016). | Execucomp |
| *payratio* | Average compensation of top subordinate executives scaled by CEO compensation (item TOTAL\_CURR). |
| *ln\_horizon* | Age difference between 65 and average age of top subordinate executives. |
| *ind\_horizon* | Age difference between average age of subordinate executives at the industry level and average age of subordinate executives at the firm level. Industry classification is based on 3-digit sic codes. |
| *diff\_horizon* | Age difference between the CEO’s age and the average age of top subordinate executives. |
| *diff\_ind\_horizon* | Age difference calculated as *ind\_horizon* – (age difference between average age of CEOs at the industry level and CEO age). |
| Control variables: | |  |
| *fsize* | Natural logarithm of total assets. | Compustat |
| *lev* | The sum of debt in current liabilities (item DLC) and total long-term debt (item DLTT), scaled by total assets. |
| *roa* | Operating income before depreciation (item OIBDP), scaled by total assets. |
| *nwc* | Working capital (item WCAP) minus cash and marketable securities (item CHE), scaled by net assets. |
| *cap* | Capital expenditure (item CAPX), scaled by total assets. |
| *mb* | Market value of assets [(item PRCC\_F × item CSHO) + item AT - item CEQ], scaled by total assets. |
| *cfo* | Operating cash flows (item OANCF), scaled by total assets. |
| *vol* | Standard deviation of *cfo* over past three years. |
| *acq* | Acquisition expenditure (item AQC), scaled by total assets. |
| *rd* | Research and development expenses (item XRD, scaled by total assets. Missing *xrd* is replaced by zero. |
| *rating* | A dummy variable taking a value of one if the firm has an S&P credit rating (item SPLTICRM) on long term debt, and zero otherwise. |
| *payer* | A dummy variable taking a value of one if the firm pays dividend (item DVC), and zero otherwise. |
| *ceo\_share* | Natural logarithm of CEO shares owned (item SHROWN\_EXCL\_OPTS). | Execucomp |
| *ceo\_comp* | Natural logarithm of CEO compensation. |
| *ceo\_horizon* | Age difference between 65 and CEO age. |
| Additional analyses: | |  |
| *ceo\_delta* | Natural logarithm of one plus CEO delta. | Coles *et al.* (2006) |
| *ceo\_vega* | Natural logarithm of one plus CEO vega. |
| *sub\_delta* | Natural logarithm of one plus average delta of subordinate executives. |
| *sub\_vega* | Natural logarithm of one plus average vega of subordinate executives. |
| *ma* | Residual of firm efficiency score estimated by Demerjian *et al.* (2012). | Demerjian *et al.* (2012) |
| *re* | Retained earnings (item RE), scaled by total assets. |  |
| *ccc* | The ratio of inventory (item INVT) plus accounts receivable (item RECT) minus account payable (item AP), scaled by sale. | Compustat |
| *cpi* | The average of consumer price index in the year each subordinate executive was born. | Compustat |
| *pay gap* | Natural logarithm of the difference between CEO’s total compensation and average subordinate executives’ total compensation. | Execucomp |
| *ceo\_confidence* | The value of all unexercised exercisable options (item OPT\_UNEX\_EXER\_EST\_VAL), scaled by the number of options (item OPT\_UNEX\_EXER\_NUM). It is then scaled by the share price at the end of the fiscal year as reported in Compustat (item PRCC\_F). | Execucomp & Compustat |
| *sub\_confidence* | As per described in *ceo\_confidence.* |
| *number\_director* | Number of directors on the board. | BoardEx |
| *number\_ind\_director* | Number of independent directors on the board. |
| *gindex* | The sum of 24 anti-takeover provisions following Gompers *et al.* (2003). | Institutional  Shareholder Services |
| *io* | Shares held by institutional investors as a fraction of shares outstanding. | Thomson 13f-filing |
| *number\_analyst* | Natural logarithm of the average numbers of earnings forecasts over a fiscal year. | IBES summary |
| *growth\_ppe* | A dummy variable taking a value of one if the firm experience increase in plant, property and equipment expenditure (item PPENT) over two consecutive years. | Compustat |
| *growth\_cap* | A dummy variable taking a value of one if the firm experience increase in capital expenditure over two consecutive years. |
| *div* | Cash dividends, scaled by total assets. |
| *knowledge* | Excess value of human capital industrial rank proposed by Pantzalis and Park (2009). | Pantzalis and Park (2009) |
| *Δcash* | Change in cash and market securities, scaled by total assets | Compustat |
| *invest* | Capital expenditure + increase in investment (item IVCH) + acquisition (item AQC) – sale of PPE (item SPPE) – sale of investment (item SIV) – change in short-term investment (item IVSTCH) – other investing activities (item IVACO), scaled by lagged total assets. |
| *ΔWC* | Change in account receivable (item RECCH) – change in inventory (item INVCH) – change in account payable (item APALCH) – accrued income taxes (item TXACH) – other changes in assets and liabilities (item AOLOCH) – other financing activities (item FIAO), scaled by lagged total assets. |
| *cashflow* | Income before extra items (item IBC) + extra items & discontinued operation (item XIDOC) + depreciation & amortization (item DPC) + deferred taxes (item TXDC) + equity in net loss (item ESUBC) + gains in sale of PPE & investment (item SPPIV) + other funds from operation (item FOPO) + exchange rate effect (item EXRE) – ΔWC, scaled by lagged total assets. |
| *Δdebt* | Long-term debt issuance (item DLTIS) – long-term debt reduction (item DLTR) + changes in current debt (item DLCCH), scaled by lagged total assets. |
| *Δequity* | Sale of common and preferred stock (item SSTK) – purchase of common and preferred stock (item PRSTKC), scaled by lagged total assets. |

**Figure 1**

**Internal governance and cash holdings over the sample period**

**Table 1**

**Sample distribution**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Panel A: year distribution* | | | | |
| **Year** | *int\_gov* | *ln\_horizon* | *ind\_horizon* | *n* |
| 1992 | 0.1642 | 2.4496 | -0.6774 | 31 |
| 1993 | 0.0099 | 2.3640 | 0.3970 | 486 |
| 1994 | 0.0844 | 2.4297 | 0.1857 | 686 |
| 1995 | 0.1060 | 2.4192 | 0.4245 | 697 |
| 1996 | 0.1009 | 2.4002 | 0.1053 | 707 |
| 1997 | 0.0035 | 2.3584 | 0.0110 | 707 |
| 1998 | 0.1225 | 2.3796 | 0.0934 | 750 |
| 1999 | 0.0769 | 2.4126 | 0.0973 | 763 |
| 2000 | 0.1158 | 2.4101 | 0.0334 | 749 |
| 2001 | 0.0933 | 2.4239 | 0.0346 | 688 |
| 2002 | 0.1720 | 2.4402 | 0.1334 | 674 |
| 2003 | 0.0708 | 2.4395 | 0.0340 | 677 |
| 2004 | -0.0292 | 2.4552 | 0.0632 | 691 |
| 2005 | 0.0680 | 2.4480 | 0.0295 | 656 |
| 2006 | -0.0304 | 2.4519 | 0.0666 | 668 |
| 2007 | 0.2395 | 2.5983 | -0.0129 | 1,430 |
| 2008 | 0.2175 | 2.5797 | -0.0125 | 1,411 |
| 2009 | 0.1928 | 2.5704 | 0.0636 | 1,400 |
| 2010 | 0.1202 | 2.5316 | 0.0586 | 1,390 |
| 2011 | 0.0348 | 2.4973 | 0.0580 | 1,362 |
| 2012 | 0.0186 | 2.4689 | 0.0414 | 1,326 |
| 2013 | -0.0301 | 2.4431 | 0.0038 | 1,312 |
| 2014 | -0.0828 | 2.4301 | 0.0403 | 1,291 |
| 2015 | -0.0802 | 2.4137 | 0.0327 | 1,275 |
| 2016 | -0.1327 | 2.3927 | -0.0078 | 1,262 |
| 2017 | -0.1668 | 2.3693 | 0.0324 | 1,242 |
| 2018 | -0.1382 | 2.3557 | 0.0755 | 1,210 |
| 2019 | -0.1563 | 2.3549 | 0.0303 | 1,165 |
| 2020 | -0.1864 | 2.3179 | 0.1373 | 1,126 |
| 2021 | -0.2964 | 2.3003 | 0.2111 | 768 |
|  |  |  | **Total** | 28,600 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Panel B: industry distribution* | | | | |
| **Industry** | *int\_gov* | *ln\_horizon* | *ind\_horizon* | *n* |
| 1 Agriculture | 0.3098 | 2.4815 | 1.2128 | 85 |
| 2 Food Products | -0.0537 | 2.2905 | 0.2394 | 714 |
| 3 Candy & Soda | -0.1240 | 2.2208 | 0.3769 | 103 |
| 4 Beer & Liquor | -0.0661 | 2.2130 | 0.5038 | 156 |
| 5 Tobacco Products | 0.0714 | 2.3584 | -0.3039 | 48 |
| 6 Recreation | 0.0978 | 2.3638 | 0.0126 | 183 |
| 7 Entertainment | 0.1455 | 2.5650 | 0.2208 | 413 |
| 8 Printing and Publishing | 0.0058 | 2.2252 | -0.2592 | 233 |
| 9 Consumer Goods | -0.0156 | 2.3877 | 0.4695 | 572 |
| 10 Apparel | -0.0251 | 2.4897 | 0.1174 | 538 |
| 11 Healthcare | -0.0179 | 2.5071 | -0.0327 | 647 |
| 12 Medical Equipment | 0.0338 | 2.4968 | -0.0893 | 1,070 |
| 13 Pharmaceutical Products | -0.0028 | 2.4804 | 0.0094 | 1,584 |
| 14 Chemicals | -0.0571 | 2.3463 | -0.1282 | 1,007 |
| 15 Rubber and Plastic Products | -0.0134 | 2.4637 | 0.7393 | 163 |
| 16 Textiles | -0.0891 | 2.2932 | -0.1304 | 177 |
| 17 Construction Materials | -0.1270 | 2.2507 | 0.0651 | 726 |
| 18 Construction | 0.0511 | 2.3248 | 0.0303 | 238 |
| 19 Steel Works | -0.0208 | 2.2792 | 0.0553 | 539 |
| 20 Fabricated Products | 0.1774 | 2.7038 | -0.0006 | 19 |
| 21 Machinery | -0.0274 | 2.3840 | -0.0782 | 1,225 |
| 22 Electrical Equipment | -0.0206 | 2.4776 | 0.1941 | 367 |
| 23 Automobiles and Trucks | -0.0106 | 2.4672 | 0.4473 | 603 |
| 24 Aircraft | -0.0717 | 2.1266 | 0.3884 | 235 |
| 25 Shipbuilding, Railroad Equipment | 0.0000 | 2.2997 | -0.2738 | 47 |
| 26 Defence | -0.0418 | 2.1104 | 0.3953 | 140 |
| 27 Precious Metals | 0.1427 | 2.4452 | 1.5001 | 104 |
| 28 Non-Metallic and Industrial Metal Mining | -0.0686 | 2.3074 | -0.0108 | 115 |
| 29 Coal | -0.1066 | 2.5505 | -0.0754 | 78 |
| 30 Petroleum and Natural Gas | 0.0144 | 2.3980 | -0.1563 | 1,598 |
| 32 Communication | -0.0133 | 2.3862 | -0.0954 | 909 |
| 33 Personal Services | 0.0188 | 2.4603 | 0.2824 | 471 |
| 34 Business Services | 0.1261 | 2.5967 | 0.1296 | 3,639 |
| 35 Computers | 0.0380 | 2.5029 | -0.5884 | 1,087 |
| 36 Electronic Equipment | -0.0225 | 2.4007 | 0.1995 | 1,977 |
| 37 Measuring and Control Equipment | -0.0557 | 2.3995 | 0.0779 | 695 |
| 38 Business Supplies | -0.1178 | 2.2895 | 0.1926 | 469 |
| 39 Shipping Containers | -0.1886 | 2.1294 | 0.1305 | 196 |
| 40 Transportation | 0.0458 | 2.4742 | 0.0646 | 1,080 |
| 41 Wholesale | 0.0258 | 2.4787 | 0.0262 | 1,189 |
| 42 Retail | 0.0524 | 2.4525 | 0.0959 | 2,221 |
| 43 Restaurants, Hotels, Motels | 0.0709 | 2.5868 | -0.0077 | 723 |
| Other | 0.1393 | 2.5712 | 0.9704 | 217 |
|  |  |  | **Total** | 28,600 |

**Table 2**

**Summary statistics**

Panel A of this table reports the summary statistics of the key variables used in this study, and Panel B presents a mean difference test for some key variables between strong and weak internal governance. The definitions of the variables used in this table are presented in the Appendix. ⁎ indicates significance at the 10% level. ⁎⁎ indicates significance at the 5% level. ⁎⁎⁎ indicates significance at the 1% level.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Panel A: overall sample* | | | | | | |
| **Variable** | **N** | **Mean** | **Median** | **S.D.** | **25%** | **75%** |
| *cash1* | 28,600 | 0.2751 | 0.1060 | 0.4805 | 0.0328 | 0.2920 |
| *cash2* | 28,579 | 0.2456 | 0.0976 | 0.4410 | 0.0304 | 0.2638 |
| *int\_gov* | 28,600 | -0.0147 | -0.1487 | 1.3547 | -0.8108 | 0.5789 |
| *ln\_horizon* | 28,600 | 2.4398 | 2.5337 | 0.5172 | 2.2513 | 2.7726 |
| *ind\_horizon* | 28,600 | 0.0676 | 0 | 4.2274 | -2.4685 | 2.6593 |
| *fsize* | 28,600 | 7.4059 | 7.2967 | 1.6341 | 6.2295 | 8.4752 |
| *lev* | 28,600 | 0.2353 | 0.2165 | 0.1970 | 0.0637 | 0.3495 |
| *roa* | 28,600 | 0.1307 | 0.1319 | 0.1079 | 0.0869 | 0.1836 |
| *nwc* | 28,600 | 0.0675 | 0.0679 | 0.1951 | -0.0309 | 0.1851 |
| *cap* | 28,600 | 0.0525 | 0.0360 | 0.0518 | 0.0192 | 0.0659 |
| *mb* | 28,600 | 2.1269 | 1.6697 | 1.4325 | 1.2501 | 2.4408 |
| *cfo* | 28,600 | 0.0987 | 0.1001 | 0.0921 | 0.0584 | 0.1471 |
| *vol* | 28,600 | 0.0416 | 0.0289 | 0.0421 | 0.0158 | 0.0509 |
| *acq* | 28,600 | 0.0286 | 0 | 0.0629 | 0 | 0.0229 |
| *rd* | 28,600 | 0.0341 | 0.0028 | 0.0619 | 0 | 0.0423 |
| *rating* | 28,600 | 0.3708 | 0 | 0.4830 | 0 | 1 |
| *payer* | 28,600 | 0.4943 | 0 | 0.5000 | 0 | 1 |
| *ceo\_share* | 27,264 | 5.6869 | 5.6249 | 1.8207 | 4.6265 | 6.7415 |
| *ceo\_comp* | 28,600 | 6.6376 | 6.7304 | 1.1777 | 6.3279 | 7.0519 |
| *ceo\_horizon* | 25,317 | 10.2218 | 10 | 6.0258 | 6 | 14 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Panel B: strong versus weak internal governance* | | | | | |
|  | Strong *int\_gov*  (*int\_gov* > median) | | Weak *int\_gov*  (*int\_gov* < median) | |  |
| **Variable** | **Mean** | **S.D.** | **Mean** | **S.D.** | **Difference** |
| *cash1* | 0.3250 | 0.5202 | 0.2253 | 0.4315 | -0.0997⁎⁎⁎ |
| *cash2* | 0.2861 | 0.4765 | 0.2051 | 0.3984 | -0.0810⁎⁎⁎ |
| *int\_gov* | 0.9109 | 1.2672 | -0.9403 | 0.5926 | -1.8512⁎⁎⁎ |
| *ln\_horizon* | 2.7744 | 0.2244 | 2.1051 | 0.5106 | -0.6693⁎⁎⁎ |
| *ind\_horizon* | 2.6955 | 3.2919 | -2.5604 | 3.3307 | -5.2559⁎⁎⁎ |
| *fsize* | 7.0943 | 1.5955 | 7.7174 | 1.6128 | 0.6231⁎⁎⁎ |
| *lev* | 0.2225 | 0.2042 | 0.2480 | 0.1886 | 0.0255⁎⁎⁎ |
| *roa* | 0.1253 | 0.1167 | 0.1360 | 0.0980 | 0.0107⁎⁎⁎ |
| *nwc* | 0.0545 | 0.2088 | 0.0806 | 0.1795 | 0.0262⁎⁎⁎ |
| *cap* | 0.0536 | 0.0544 | 0.0514 | 0.0490 | -0.0022⁎⁎⁎ |
| *mb* | 2.1995 | 1.5259 | 2.0542 | 1.3287 | -0.1452⁎⁎⁎ |
| *cfo* | 0.0960 | 0.1001 | 0.1015 | 0.0831 | 0.0055⁎⁎⁎ |
| *vol* | 0.0455 | 0.0451 | 0.0377 | 0.0384 | -0.0078⁎⁎⁎ |
| *acq* | 0.0299 | 0.0647 | 0.0274 | 0.0609 | -0.0026⁎⁎⁎ |
| *rd* | 0.0397 | 0.0674 | 0.0285 | 0.0552 | -0.0112⁎⁎⁎ |
| *rating* | 0.3259 | 0.4687 | 0.4157 | 0.4929 | 0.0897⁎⁎⁎ |
| *payer* | 0.3899 | 0.4878 | 0.5987 | 0.4902 | 0.2087⁎⁎⁎ |
| *ceo\_share* | 5.7143 | 1.9083 | 5.6602 | 1.7304 | -0.0541⁎⁎ |
| *ceo\_comp* | 6.3908 | 1.5166 | 6.8845 | 0.5932 | 0.4937⁎⁎⁎ |
| *ceo\_horizon* | 11.4575 | 6.2512 | 8.9515 | 5.5033 | -2.5060⁎⁎⁎ |

**Table 3**

**Correlation**

This table presents the Pearson’s pair-wise correlation matrix between the variables used in the regressions. Definitions of the variables used in this table are presented in the Appendix. \*, ͭ and × indicates statistical significance at the 1%, 5% and 10%, respectively.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| 1. *cash1* | 1 |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. *cash2* | 0.8207\* | 1 |  |  |  |  |  |  |  |  |  |  |  |
| 1. *int\_gov* | 0.1282\* | 0.1076\* | 1 |  |  |  |  |  |  |  |  |  |  |
| 1. *ln\_horizon* | 0.0911\* | 0.0786 | 0.6909\* | 1 |  |  |  |  |  |  |  |  |  |
| 1. *ind\_horizon* | 0.0497\* | 0.0433\* | 0.6335\* | 0.7713\* | 1 |  |  |  |  |  |  |  |  |
| 1. *fsize* | -0.3171\* | -0.2120\* | -0.1679 | -0.1528\* | -0.1235\* | 1 |  |  |  |  |  |  |  |
| 1. *lev* | -0.2582\* | -0.1542\* | -0.0640 | -0.0374\* | 0.0094ͭ | 0.3097\* | 1 |  |  |  |  |  |  |
| 1. *roa* | -0.2671\* | -0.4005\* | -0.0738\* | -0.0379ͭ | -0.0431\* | 0.1526\* | -0.0395\* | 1 |  |  |  |  |  |
| 1. *nwc* | -0.2790\* | -0.2955\* | -0.0886\* | -0.0689\* | -0.0237ͭ | -0.1759\* | -0.1938\* | 0.1600\* | 1 |  |  |  |  |
| 1. *cap* | -0.1739\* | -0.1558\* | 0.0176\* | 0.0122\* | 0.0167ͭ | -0.0236\* | 0.0309\* | 0.1955\* | -0.0779\* | 1 |  |  |  |
| 1. *mb* | 0.3229\* | 0.2319\* | 0.0731\* | 0.0451\* | 0.0229\* | -0.1277\* | -0.1396\* | 0.2739\* | -0.1438\* | 0.0065\* | 1 |  |  |
| 1. *cfo* | -0.1527\* | -0.2869\* | -0.0439\* | -0.0226\* | -0.0390\* | 0.1425\* | -0.1161\* | 0.7886\* | 0.0184\* | 0.2458\* | 0.2679\* | 1 |  |
| 1. *vol* | 0.3527\* | 0.3064\* | 0.1131\* | 0.0948 | 0.0767 | -0.3627\* | -0.1111\* | -0.2270\* | -0.0761\* | -0.0208\* | 0.1638\* | -0.2082\* | 1 |
| 1. *acq* | -0.1137\* | -0.0710\* | 0.0042\* | 0.0288 | 0.0277 | 0.0083\* | 0.0917\* | 0.0093\* | 0.0121\* | -0.1402\* | -0.0264\* | -0.0194\* | -0.0474\* |
| 1. *rd* | 0.5356\* | 0.5134\* | 0.0982\* | 0.0787 | 0.0299× | -0.2695\* | -0.2069\* | -0.3494\* | -0.1969\* | -0.1464\* | 0.3223\* | -0.2634\* | 0.3313\* |
| 1. *rating* | -0.2308\* | -0.1818\* | -0.0953\* | -0.0679ͭ | -0.0689\* | 0.4675\* | 0.2843\* | 0.0731\* | -0.0677\* | 0.0793\* | -0.1774\* | 0.0216\* | -0.1722\* |
| 1. *payer* | -0.2413\* | -0.2424\* | -0.2115\* | -0.1847\* | -0.1262\* | 0.3563\* | 0.0517\* | 0.2368\* | 0.0685\* | -0.0043\* | -0.0539\* | 0.1791\* | -0.2289\* |
| 1. *ceo\_share* | -0.0002 | -0.0007\* | 0.0665\* | 0.0037\* | -0.0148\* | 0.0910\* | -0.0018\* | 0.0288\* | -0.0334\* | 0.0709\* | 0.0570\* | 0.0364\* | -0.0228\* |
| 1. *ceo\_comp* | -0.1524 | -0.1217\* | -0.5622\* | -0.1057\* | -0.0913\* | 0.3021\* | 0.1147\* | 0.1160\* | -0.0094\* | -0.0061\* | -0.0518\* | 0.0715\* | -0.1105\* |
| 1. *ceo\_horizon* | 0.1271\* | 0.1229\* | 0.2196\* | 0.1738\* | 0.1474\* | -0.1871\* | -0.0827\* | -0.0595\* | -0.0609\* | 0.0195\* | 0.0614\* | -0.0404\* | 0.0994\* |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variables | (14) | (15) | (16) | (17) | (18) | (19) |
| (15) *rd* | -0.0227\* | 1 |  |  |  |  |
| (16) *rating* | 0.0009\* | -0.1958\* | 1 |  |  |  |
| (17) *payer* | -0.0154\* | -0.2615\* | 0.1957\* | 1 |  |  |
| (18) *ceo\_share* | -0.0266\* | -0.0205\* | 0.0282\* | -0.0019\* | 1 |  |
| (19) *ceo\_comp* | 0.0125\* | -0.1291\* | 0.2051\* | 0.1696\* | -0.0362\* | 1 |
| (20) *ceo\_horizon* | 0.0073\* | 0.1157\* | -0.0938\* | -0.1802\* | -0.0972\* | -0.1352\* |

**Table 4**

**Relation between internal governance and cash holdings**

This table presents the regression results of the relation between internal governance (*int\_gov*, *ln\_horizon* and *ind\_horizon*) and cash holdings (*cash1* and *cash2*) (see Equation (1)). Robust standard errors (in brackets) are clustered at the firm level. The definitions of the variables used in this table are presented in Appendix. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Dependent variable:  *cash1* | | | Dependent variable:  *cash2* | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| *int\_gov* | 0.0086\*\* |  |  | 0.0063\*\* |  |  |
|  | (0.0035) |  |  | (0.0032) |  |  |
| *ln\_horizon* |  | 0.0243\*\*\* |  |  | 0.0184\*\*\* |  |
|  |  | (0.0067) |  |  | (0.006) |  |
| *ind\_horizon* |  |  | 0.0029\*\*\* |  |  | 0.0021\*\* |
|  |  |  | (0.0009) |  |  | (0.0009) |
| *fsize* | -0.0589\*\*\* | -0.0581\*\*\* | -0.0582\*\*\* | -0.0054 | -0.0048 | -0.0049 |
|  | (0.0098) | (0.0098) | (0.0098) | (0.01) | (0.0099) | (0.0099) |
| *lev* | -0.2209\*\*\* | -0.2211\*\*\* | -0.2222\*\*\* | -0.1936\*\*\* | -0.1937\*\*\* | -0.1946\*\*\* |
|  | (0.0345) | (0.0345) | (0.0345) | (0.043) | (0.0429) | (0.0429) |
| *roa* | -0.3997\*\*\* | -0.4008\*\*\* | -0.4002\*\*\* | -0.9066\*\*\* | -0.9074\*\*\* | -0.9069\*\*\* |
|  | (0.0664) | (0.0664) | (0.0664) | (.0824) | (0.0824) | (0.0824) |
| *nwc* | -0.7053\*\*\* | -0.7066\*\*\* | -0.7058\*\*\* | -0.4515\*\*\* | -0.4525\*\*\* | -0.4519\*\*\* |
|  | (0.065) | (0.065) | (0.065) | (0.0563) | (0.0562) | (0.0562) |
| *cap* | -1.0124\*\*\* | -1.0131\*\*\* | -1.0147\*\*\* | -0.5931\*\*\* | -0.5934\*\*\* | -0.5946\*\*\* |
|  | (0.0783) | (.0783) | (0.0783) | (0.0853) | (0.0853) | (0.0853) |
| *mb* | 0.0398\*\*\* | .0399\*\*\* | 0.0399\*\*\* | 0.029\*\*\* | 0.0291\*\*\* | 0.0291\*\*\* |
|  | (0.0048) | (.0048) | (0.0048) | (0.0044) | (0.0044) | (0.0044) |
| *cfo* | 0.1881\*\*\* | .1885\*\*\* | 0.188\*\*\* | -0.316\*\*\* | -0.3157\*\*\* | -0.3161\*\*\* |
|  | (0.0564) | (.0563) | (0.0563) | (0.0649) | (0.065) | (0.065) |
| *vol* | 0.4316\*\*\* | .4323\*\*\* | 0.4326\*\*\* | 0.3173\*\*\* | 0.3178\*\*\* | 0.3181\*\*\* |
|  | (0.1201) | (0.1201) | (0.12) | (0.1212) | (.1212) | (0.1212) |
| *acq* | -0.5567\*\*\* | -0.5581\*\*\* | -0.5581\*\*\* | -0.3712\*\*\* | -0.3723\*\*\* | -0.3723\*\*\* |
|  | (0.0333) | (0.0333) | (0.0333) | (0.0302) | (0.0303) | (0.0303) |
| *rd* | -0.7311\*\* | -0.7304\*\* | -0.7282\*\* | -1.7792\*\*\* | -1.7785\*\*\* | -1.777\*\*\* |
|  | (0.2854) | (0.2852) | (0.2853) | (0.2508) | (0.2507) | (0.2506) |
| *rating* | -0.0284\*\*\* | -0.0281\*\*\* | -0.0281\*\*\* | -0.0253\*\* | -0.025\*\* | -0.025\*\* |
|  | (0.0099) | (0.0099) | (0.0099) | (0.0104) | (0.0104) | (0.0104) |
| *payer* | 0.0158 | 0.0161 | 0.0161 | 0.0132 | 0.0134 | 0.0134 |
|  | (0.0108) | (0.0108) | (0.0108) | (0.0104) | (0.0104) | (0.0105) |
| *ceo\_share* | 0.0008 | 0.0006 | 0.0008 | 0.0012 | 0.001 | 0.0011 |
|  | (0.0028) | (0.0028) | (0.0028) | (0.0024) | (0.0024) | (0.0024) |
| *ceo\_comp* | 0.0011 | -0.0039 | -0.0039 | 0.0052 | 0.0015 | 0.0015 |
|  | (0.0066) | (0.006) | (0.0059) | (.0045) | (0.0041) | (0.0041) |
| *ceo\_horizon* | 0.001 | 0.001 | 0.001 | 0.0017\*\*\* | 0.0017\*\*\* | 0.0017\*\*\* |
|  | (0.0007) | (0.0007) | (0.0007) | (0.0007) | (0.0007) | (0.0007) |
| *constant* | 0.6851\*\*\* | 0.6527\*\*\* | 0.7135\*\*\* | -0.0391 | -0.0848\* | -0.038 |
|  | (0.1061) | (0.1038) | (0.1036) | (0.0437) | (0.0461) | (0.0435) |
| Year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,294 | 24,294 | 24,294 | 24,275 | 24,275 | 24,275 |
| Adjusted R2 | 0.1644 | 0.165 | 0.1649 | 0.1683 | 0.1687 | 0.1686 |

**Table 5**

**Endogeneity concern: accounting for omitted variables bias**

This table presents the regression results of the relation between internal governance and cash holdings (see Equation (1)) after including additional control variables that may affect cash holdings. Robust standard errors (in brackets) are clustered at the firm level. The definitions of the variables used in this table are presented in the Appendix. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% level, respectively.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Dependent variable:  *cash1* | | | Dependent variable:  *cash2* | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| *int\_gov* | 0.0115\*\* |  |  | 0.0111\*\*\* |  |  |
|  | (0.0045) |  |  | (0.0038) |  |  |
| *ln\_horizon* |  | 0.0225\*\*\* |  |  | 0.0218\*\*\* |  |
|  |  | (0.0077) |  |  | (0.0072) |  |
| *ind\_horizon* |  |  | 0.0027\*\* |  |  | 0.0026\*\* |
|  |  |  | (0.0011) |  |  | (0.001) |
| *ceo\_delta* | 0.0206\*\*\* | 0.02\*\*\* | 0.0204\*\*\* | 0.0269\*\*\* | 0.0262\*\*\* | 0.0266\*\*\* |
|  | (0.0055) | (0.0055) | (0.0055) | (0.0047) | (0.0047) | (0.0047) |
| *ceo\_vega* | -0.0007 | -0.0007 | -0.0008 | -0.0014 | -0.0014 | -0.0015 |
|  | (0.001) | (0.001) | (0.001) | (0.0012) | (0.0012) | (0.0012) |
| *sub\_delta* | 0.005 | 0.0058 | 0.0055 | 0.0097\*\* | 0.0105\*\* | 0.0102\*\* |
|  | (0.0046) | (0.0046) | (0.0046) | (0.0043) | (0.0043) | (0.0043) |
| *sub\_vega* | -0.0004 | -0.0003 | -0.0002 | -0.0025 | -0.0024 | -0.0023 |
|  | (0.0019) | (0.0019) | (0.0019) | (0.0017) | (0.0017) | (0.0017) |
| *ma* | 0.1442\*\*\* | 0.1444\*\*\* | 0.1444\*\*\* | 0.0046 | 0.0048 | 0.0048 |
|  | (0.0423) | (0.0422) | (0.0422) | (0.0393) | (0.0392) | (0.0392) |
| *re* | -0.0048 | -0.0052 | -0.0051 | 0.0714\*\*\* | 0.071\*\*\* | 0.0711\*\*\* |
|  | (0.0187) | (0.0187) | (0.0187) | (0.0178) | (0.0178) | (0.0178) |
| *ccc* | -0.4623\*\*\* | -0.4629\*\*\* | -0.4602\*\*\* | -0.3467\*\*\* | -0.3473\*\*\* | -0.3447\*\*\* |
|  | (0.1013) | (0.1013) | (0.1011) | (0.1105) | (0.1106) | (0.1103) |
| *constant* | 0.1336\*\*\* | 0.0782 | 0.1343\*\*\* | -0.1423\*\*\* | -0.1959\*\*\* | -0.1416\*\*\* |
|  | (.00457) | (0.0503) | (0.0454) | (0.0376) | (0.0419) | (0.0373) |
| Year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 16,589 | 16,589 | 16,589 | 16,589 | 16,589 | 16,589 |
| Adjusted R2 | 0.1728 | 0.1728 | 0.1728 | 0.1999 | 0.1999 | 0.1998 |

**Table 6**

**Endogeneity concern: two-stage least-squares estimation**

Panel A of this table presents the second-stage regression results of the relation between organisation capital and trade credit. We use CPI (*cpi*) at the executives’ birth year as an instrument for executives’ age. Panel B shows the second-stage regression results using the Lewbel (2012) approach that exploits the heterogeneity in the error term of the first stage regression to generate instruments from within the existing model. Robust standard errors (in brackets) are clustered at the firm level. The definitions of the variables used in this table are presented in the Appendix. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Dependent variable: *cash1* | | | Dependent variable: *cash2* | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| *Panel A: Instrumental variable estimation results* |  |  |  |  |  |  |
| *int\_gov* | 0.0146\*\*\* |  |  | 0.0118\*\* |  |  |
|  | (0.0052) |  |  | (0.0050) |  |  |
| *ln\_horizon* |  | 0.0300\*\*\* |  |  | 0.0243\*\* |  |
|  |  | (0.0108) |  |  | (0.0104) |  |
| *ind\_horizon* |  |  | 0.0036\*\*\* |  |  | 0.0029\*\* |
|  |  |  | (0.0013) |  |  | (0.0012) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm and year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,294 | 24,294 | 24,294 | 24,275 | 24,275 | 24,275 |
|  |  |  |  |  |  |  |
| Under-identification test: | |  |  |  |  |  |
| Kleibergen-Paap rk LM statistic | 690.833 | 720.573 | 703.726 | 690.254 | 720.402 | 703.441 |
| p-value | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
|  |  |  |  |  |  |  |
| Weak identification test: | |  |  |  |  |  |
| Kleibergen-Paap rk Wald F statistic | 1671.522 | 968.988 | 1343.275 | 1666.516 | 966.637 | 1340.034 |
| Stock and Yogo (2005) 10% maximal IV size (critical value) | 16.38 | | | | | |
|  |  | | |  | | |
| *Panel B: Lewbel approach* |  | | |  | | |
| *int\_gov* | 0.0554\*\* |  |  | 0.0386\* |  |  |
|  | (0.0267) |  |  | (0.0223) |  |  |
| *ln\_horizon* |  | 0.0552\* |  |  | 0.0349\* |  |
|  |  | (0.0290) |  |  | (0.0198) |  |
| *ind\_horizon* |  |  | 0.0076\* |  |  | 0.0046\* |
|  |  |  | (0.0043) |  |  | (0.0027) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm and year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,294 | 24,294 | 24,294 | 24,275 | 24,275 | 24,275 |
|  | |  |  |  |  |  |
| Under-identification test: | |  |  |  |  |  |
| Kleibergen-Paap rk LM statistic | 37.467 | 46.913 | 134.299 | 53.386 | 114.987 | 230.212 |
| p-value | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
|  |  |  |  |  |  |  |
| Weak identification test: | |  |  |  |  |  |
| Kleibergen-Paap rk Wald F statistic | 26.579 | 30.359 | 43.129 | 26.330 | 30.587 | 40.816 |
| Stock and Yogo (2005) 10% maximal IV size (critical value) | 19.93 | 22.30 | 33.84 | 22.30 | 26.87 | 43.27 |
|  |  |  |  |  |  |  |
| Over-identification test: |  |  |  |  |  |  |
| Hansen J statistic | 0.320 | 0.875 | 2.683 | 0.403 | 3.981 | 7.514 |
| p-value | 0.5717 | 0.6455 | 0.9127 | 0.8175 | 0.4085 | 0.7561 |

**Table 7**

**Alternative measures of internal governance and cash holdings**

This table presents the regression results of the relation between alternative measures of organisation capital and trade credit (see Equation (1)). Robust standard errors (in *italic*) are clustered at the firm level. The definitions of the variables used in this table are presented in the Appendix. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Dependent variable: *ln\_cash1* | | Dependent variable: *ln\_cash2* | | Dependent variable: *cash3* | |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| *diff\_horizon* | 0.008\*\*\* |  | 0.0105\*\*\* |  | 0.0065\*\*\* |  |
|  | (0.0027) |  | (0.0027) |  | (0.0024) |  |
| *diff\_ind\_horizon* |  | 0.0071\*\*\* |  | 0.0085\*\*\* |  | 0.0059\*\* |
|  |  | (0.0024) |  | (0.0024) |  | (0.0022) |
| *constant* | -0.6163\*\* | -0.5679\*\* | -2.7547\*\*\* | -2.7221\*\*\* | -0.7517\*\*\* | -0.7128\*\*\* |
|  | (0.2568) | (0.2551) | (0.1471) | (0.1467) | (.2217) | (.22) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry, year & industry × year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,294 | 24,294 | 24,294 | 24,294 | 24,294 | 24,294 |
| Adjusted R2 | 0.1744 | 0.1743 | 0.1503 | 0.1499 | 0.4554 | 0.4554 |

**Table 8**

**Alternative explanations**

This table presents the regression results of the relation between internal governance and cash holdings (see Equation (1)) after including additional control variables to rule out possible alternative explanations. Panels A, B and C control for pay gap between CEO and subordinate executives, executives’ confidence and corporate governance, respectively. Robust standard errors (in brackets) are clustered at the firm level. The definitions of the variables used in this table are presented in the Appendix. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% level, respectively.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Dependent variable:  *cash1* | | | Dependent variable:  *cash2* | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| *Panel A: pay gap* |  |  |  |  |  |  |
| *int\_gov* | 0.0114\*\*\* |  |  | 0.0092\*\* |  |  |
|  | (0.0036) |  |  | (0.0036) |  |  |
| *ln\_horizon* |  | 0.024\*\*\* |  |  | 0.0179\*\*\* |  |
|  |  | (0.0068) |  |  | (0.0061) |  |
| *ind\_horizon* |  |  | 0.0028\*\*\* |  |  | 0.0021\*\* |
|  |  |  | (0.0009) |  |  | (0.0009) |
| *pay gap* | 0.0089\*\* | 0.0088\*\* | 0.009\*\* | 0.0108\*\*\* | 0.0108\*\*\* | 0.0109\*\*\* |
|  | (0.0036) | (0.0036) | (0.0036) | (0.0029) | (0.0029) | (0.0029) |
| *constant* | 0.6852\*\*\* | 0.6615\*\*\* | 0.7193\*\*\* | -0.083\*\* | -0.1264\*\*\* | -0.0832\*\* |
|  | (0.0877) | (0.0866) | (0.0878) | (0.0346) | (0.0378) | (0.0349) |
| Year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 22,682 | 22,682 | 22,682 | 22,665 | 22,665 | 22,665 |
| Adjusted R2 | 0.1655 | 0.1657 | 0.1656 | 0.1666 | 0.1666 | 0.1666 |
|  |  |  |  |  |  |  |
| *Panel B: confidence* |  |  |  |  |  |  |
| *int\_gov* | 0.0118\*\*\* |  |  | 0.009\*\* |  |  |
|  | (0.0041) |  |  | (0.0037) |  |  |
| *ln\_horizon* |  | 0.0259\*\*\* |  |  | 0.0192\*\*\* |  |
|  |  | (0.0074) |  |  | (0.0069) |  |
| *ind\_horizon* |  |  | 0.0031\*\*\* |  |  | 0.0023\*\* |
|  |  |  | (0.0011) |  |  | (0.001) |
| *ceo\_confidence* | 0.0079 | 0.0077 | 0.0076 | 0.0258 | 0.0257 | 0.0256 |
|  | (0.024) | (0.024) | (0.024) | (0.0221) | (0.022) | (0.022) |
| *sub\_confidence* | 0.0685\*\*\* | 0.0687\*\*\* | 0.0688\*\*\* | 0.1078\*\*\* | 0.1079\*\*\* | 0.108\*\*\* |
|  | (0.0266) | (0.0265) | (0.0265) | (0.0263) | (0.0263) | (0.0263) |
| *constant* | 0.6164\*\*\* | 0.5882\*\*\* | 0.6518\*\*\* | -0.1294\* | -0.1774\*\* | -0.128\* |
|  | (0.1315) | (0.1301) | (0.1288) | (0.0681) | (0.0715) | (0.0682) |
| Year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 19,084 | 19,084 | 19,084 | 19,065 | 19,065 | 19,065 |
| Adjusted R2 | 0.1687 | 0.169 | 0.1689 | 0.1931 | 0.1932 | 0.1932 |
|  |  |  |  |  |  |  |
| *Panel C: corporate governance* | |  |  |  |  |  |
| *int\_gov* | 0.0211\*\* |  |  | 0.0186\*\*\* |  |  |
|  | (0.0096) |  |  | (0.0068) |  |  |
| *ln\_horizon* |  | 0.0278\* |  |  | 0.0269\*\* |  |
|  |  | (0.0147) |  |  | (0.0113) |  |
| *ind\_horizon* |  |  | 0.0013 |  |  | 0.0023\* |
|  |  |  | (0.0027) |  |  | (0.0013) |
| *number\_director* | -0.0146 | -0.0142 | -0.0137 | -0.0174\*\* | -0.0171\*\* | -0.0146\*\*\* |
|  | (0.0114) | (0.0114) | (0.0113) | (0.0079) | (0.0079) | (0.0054) |
| *number\_ind\_director* | 0.0055 | 0.0057 | 0.005 | 0.017\*\* | 0.0172\*\* | 0.0158\*\*\* |
|  | (0.0114) | (0.0114) | (0.0114) | (0.0084) | (0.0085) | (0.0051) |
| *gindex* | 0.0015 | 0.0015 | 0.0005 | -0.0027 | -0.0026 | -0.0063 |
|  | (0.0093) | (0.0093) | (0.0093) | (0.0073) | (0.0073) | (0.0119) |
| *io* | 0.286\* | 0.2901\* | 0.2896\* | 0.107 | 0.1109 | 0.1275\*\* |
|  | (0.1593) | (0.1601) | (0.1604) | (0.1225) | (0.1228) | (0.0645) |
| *number\_analyst* | -0.0031 | -0.0006 | -0.0006 | 0.0372 | 0.0395 | 0.0227 |
|  | (0.0431) | (0.0435) | (0.0438) | (0.0331) | (0.0333) | (0.0185) |
| *constant* | 0.2102 | 0.1387 | 0.2115 | -0.0307 | -0.1002 | -0.0556 |
|  | (0.2383) | (0.2451) | (0.2406) | (0.1709) | (0.17) | (0.0566) |
| Year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,238 | 1,238 | 1,238 | 1,238 | 1,238 | 1,238 |
| Adjusted R2 | 0.2001 | 0.1983 | 0.1968 | 0.2268 | 0.2246 | 0.2409 |

**Table 9**

**The role of long-term investment growth**

This table presents the results of a regression with an interactive term between internal governance and long-term investment growth (*growth\_ppe* and *growth\_cap*). The main variables of interest are the interaction terms between organisation capital and the proxy for long-term investment growth. Panel A (Panel B) shows the estimated results from the proxy of *growth\_ppe* (*growth\_cap*). Robust standard errors (in brackets) are clustered at the firm level. The definitions of the variables used in this table are presented in the Appendix. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Dependent variable: *cash1* | | | Dependent variable: *cash2* | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| *Panel A: growth\_ppe* | | |  |  |  |  |
| *int\_gov × growth\_ppe* | -0.02\*\*\* |  |  | -0.0123\*\* |  |  |
|  | (0.0054) |  |  | (0.0049) |  |  |
| *ln\_horizon × growth\_ppe* |  | -0.0307\*\*\* |  |  | -0.0226\*\*\* |  |
|  |  | (0.0087) |  |  | (0.0087) |  |
| *ind\_horizon × growth\_ppe* |  |  | -0.0033\*\*\* |  |  | -0.002\* |
|  |  |  | (0.0012) |  |  | (0.0011) |
| *growth\_ppe* | -0.0468\*\*\* | 0.0275 | -0.0472\*\*\* | -0.0295\*\*\* | 0.0201 | -0.0349\*\*\* |
|  | (0.006) | (0.0211) | (0.0046) | (0.0066) | (0.021) | (0.0049) |
| *int\_gov* | 0.0155\*\*\* |  |  | 0.0124\*\*\* |  |  |
|  | (0.0047) |  |  | (.0042) |  |  |
| *ln\_horizon* |  | 0.0294\*\*\* |  |  | 0.0221\*\*\* |  |
|  |  | (0.0067) |  |  | (0.0062) |  |
| *ind\_horizon* |  |  | 0.0034\*\*\* |  |  | 0.0024\*\*\* |
|  |  |  | (0.001) |  |  | (0.0009) |
| *constant* | 0.7265\*\*\* | 0.6239\*\*\* | 0.6984\*\*\* | 0.4334\*\*\* | 0.3996\*\*\* | 0.4558\*\*\* |
|  | (0.1168) | (0.1036) | (0.1031) | (0.1165) | (0.0879) | (0.0875) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm & year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,294 | 24,294 | 24,294 | 24,275 | 24,275 | 24,275 |
| Adjusted R2 | 0.1704 | 0.1697 | 0.1696 | 0.1971 | 0.1718 | 0.1716 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| *Panel B: growth\_cap* |  |  |  |  |  |  |
| *int\_gov × growth\_ cap* | -0.0092\* |  |  | -0.0104\*\*\* |  |  |
|  | (0.0048) |  |  | (0.0035) |  |  |
| *ln\_horizon × growth\_ cap* |  | -0.0161\*\* |  |  | -0.0207\*\* |  |
|  |  | (0.0076) |  |  | (0.0063) |  |
| *ind\_horizon × growth\_ cap* |  |  | -0.0021\*\* |  |  | -0.0024\*\* |
|  |  |  | (0.0012) |  |  | (0.001) |
| *growth\_ cap* | -0.0328\*\*\* | 0.0074 | -0.0313\*\*\* | -0.0203\*\*\* | 0.0199 | -0.0154\*\*\* |
|  | (0.0043) | (0.0177) | (0.0048) | (0.0036) | (0.0163) | (0.0043) |
| *int\_gov* | 0.0099\*\*\* |  |  | 0.0078\*\* |  |  |
|  | (0.0035) |  |  | (0.0033) |  |  |
| *ln\_horizon* |  | 0.0267\*\*\* |  |  | 0.0207\*\*\* |  |
|  |  | (0.0069) |  |  | (0.0063) |  |
| *ind\_horizon* |  |  | 0.0036\*\*\* |  |  | 0.0026\*\* |
|  |  |  | (0.0012) |  |  | (0.0011) |
| *constant* | 0.6233\*\*\* | 0.5844\*\*\* | 0.707\*\*\* | 0.4097\*\*\* | 0.3779\*\*\* | 0.4353\*\*\* |
|  | (0.1076) | (0.1055) | (0.1149) | (0.088) | (0.088) | (0.116) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm & year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,294 | 24,294 | 24,294 | 24,275 | 24,275 | 24,275 |
| Adjusted R2 | 0.1553 | 0.1557 | 0.1578 | 0.1648 | 0.168 | 0.1784 |

**Table 10**

**The role of dividend**

This table presents the regression results with an interactive term between internal governance and dividend (*div* and *div\_dummy*). The main variables of interest are the interaction terms between organisation capital and the proxy for dividend. Panel A (Panel B) shows the estimated results from the proxy of *div* (*payer*). Robust standard errors (in brackets) are clustered at the firm level. The definitions of the variables used in this table are presented in the Appendix. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Dependent variable: *cash1* | | | Dependent variable: *cash2* | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| *Panel A: div* | | |  |  |  |  |
| *int\_gov × div* | -0.0162 |  |  | -0.0141\*\*\* |  |  |
|  | (0.0049) |  |  | (0.0049) |  |  |
| *ln\_horizon × div* |  | -0.0422\*\*\* |  |  | -0.0266\*\* |  |
|  |  | (0.0121) |  |  | (0.0111) |  |
| *ind\_horizon × div* |  |  | -0.0048\*\*\* |  |  | -0.0039\*\* |
|  |  |  | (0.0016) |  |  | (0.0015) |
| *div* | -0.0061 | 0.1004\*\*\* | -0.0082 | 0.0612\*\*\* | 0.0736\*\* | 0.005 |
|  | (0.0127) | (0.0319) | (0.0128) | (0.02) | (0.0317) | (0.0139) |
| *int\_gov* | 0.0162\*\*\* |  |  | 0.0107\*\* |  |  |
|  | (0.005) |  |  | (0.0054) |  |  |
| *ln\_horizon* |  | 0.0488\*\*\* |  |  | 0.0339\*\*\* |  |
|  |  | (0.0118) |  |  | (0.0107) |  |
| *ind\_horizon* |  |  | 0.0053\*\*\* |  |  | 0.004\*\*\* |
|  |  |  | (0.0015) |  |  | (0.0014) |
| *constant* | 0.6736\*\*\* | 0.5868\*\*\* | 0.7097\*\*\* | 0.6858\*\*\* | 0.379\*\*\* | 0.4636\*\*\* |
|  | (0.1047) | (0.1058) | (0.103) | (0.1161) | (0.0897) | (0.0871) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm & year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,263 | 24,263 | 24,263 | 24,275 | 24,275 | 24,275 |
| Adjusted R2 | 0.1653 | 0.166 | 0.1658 | 0.2014 | 0.1692 | 0.1693 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| *Panel B: payer* |  |  |  |  |  |  |
| *int\_gov × payer* | -0.0163\*\*\* |  |  | -0.0141\*\* |  |  |
|  | (0.0049) |  |  | (0.0049) |  |  |
| *ln\_horizon × payer* |  | -0.0424\*\*\* |  |  | -0.0268\*\* |  |
|  |  | (0.0121) |  |  | (0.0111) |  |
| *ind\_horizon × payer* |  |  | -0.0048\*\*\* |  |  | -0.0039\*\* |
|  |  |  | (0.0016) |  |  | (0.0015) |
| *div\_dummy* | 0.0152 | 0.12\*\*\* | 0.0164 | 0.0169 | 0.0791\*\*\* | 0.0135 |
|  | (0.0108) | 0(.0312) | (0.0108) | (0.0111) | (0.0289) | (0.0105) |
| *int\_gov* | .0162\*\*\* |  |  | 0.0107\* |  |  |
|  | (0.005) |  |  | (0.0054) |  |  |
| *ln\_horizon* |  | 0.0489\*\*\* |  |  | 0.0339\*\*\* |  |
|  |  | (0.0118) |  |  | (.00107) |  |
| *ind\_horizon* |  |  | 0.0053\*\*\* |  |  | 0.004\*\*\* |
|  |  |  | (0.0015) |  |  | (0.0014) |
| *constant* | 0.6731\*\*\* | 0.5862\*\*\* | 0.7092\*\*\* | 0.6857\*\*\* | 0.3787\*\*\* | 0.4635\*\*\* |
|  | (0.1046) | (0.1057) | (0.1029) | (0.116) | (0.0897) | (0.0871) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm & year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,294 | 24,294 | 24,294 | 24,275 | 24,275 | 24,275 |
| Adjusted R2 | 0.1653 | 0.1659 | 0.1657 | 0.2014 | 0.1691 | 0.1693 |

**Table 11**

**Additional analysis: internal governance, cash holdings and firm-specific knowledge**

This table presents the regression results with an interactive term between internal governance and firm-specific knowledge (*knowledge*). The main variables of interest are the interaction terms between internal governance and the proxy for firm-specific knowledge. Robust standard errors (in brackets) are clustered at the firm level. The definitions of the variables used in this table are presented in the Appendix. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Dependent variable: *cash1* | | | Dependent variable: *cash2* | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
| *int\_gov × knowledge* | 0.0228\*\*\* |  |  | 0.0208\*\*\* |  |  |
|  | (0.0062) |  |  | (0.0054) |  |  |
| *ln\_horizon × knowledge* |  | 0.0545\*\*\* |  |  | 0.0349\*\*\* |  |
|  |  | (0.0125) |  |  | (0.0111) |  |
| *ind\_horizon × knowledge* |  |  | 0.0047\*\*\* |  |  | 0.0039\*\* |
|  |  |  | (0.0018) |  |  | (0.0016) |
| *int\_gov* | -0.0033 |  |  | -0.0045 |  |  |
|  | (0.0035) |  |  | (0.0028) |  |  |
| *ln\_horizon* |  | -0.0021 |  |  | 0.0015 |  |
|  |  | (0.0062) |  |  | (0.0053) |  |
| *ind\_horizon* |  |  | 0.0003 |  |  | 0.0000 |
|  |  |  | (0.0008) |  |  | (0.0007) |
| *constant* | 0.6758\*\*\* | 0.645\*\*\* | 0.711\*\*\* | -0.0367 | -.00876\* | -0.0362 |
|  | (0.1038) | (0.1034) | (0.103) | (0.0434) | (0.046) | (0.043) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm & year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,294 | 24,294 | 24,294 | 24,275 | 24,275 | 24,275 |
| Adjusted R2 | 0.1659 | 0.1665 | 0.1656 | 0.1698 | 0.1694 | 0.1692 |

**Table 12**

**Additional analysis: sources of cash saving**

This table reports path analysis of the effects of internal governance on corporate cash holding propensity (*Δcash*), which can be decomposed into five components: investment (*invest*), cash dividends (*div*), internal cash flows (*cashflow*), debt issuance (*Δdebt*), and equity issuance (*Δequity*) according to Chang *et al.* (2014). These five components combined will yield change in cash. We regress the five components on internal governance to determine the mechanism through which internal governance influences change in cash. Panel A report the results. Robust standard errors (in brackets) are clustered at the firm level. The definitions of the variables used in this table are presented in the Appendix. \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Panel A: estimated results* | | | | | | | | | |
|  | Dependent variable: *Δcash* | | | Dependent variable: *invest* | | | Dependent variable: *div* | | |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| *int\_gov* | 0.0021\*\* |  |  | 0.0012 |  |  | -0.0009\*\*\* |  |  |
|  | (0.0009) |  |  | (0.0011) |  |  | (0.0002) |  |  |
| *ln\_horizon* |  | 0.0049\*\*\* |  |  | 0.0053\*\*\* |  |  | -0.0015\*\*\* |  |
|  |  | (0.0017) |  |  | (0.0019) |  |  | (0.0004) |  |
| *ind\_horizon* |  |  | 0.0005\*\* |  |  | 0.0005\* |  |  | -0.0002\*\*\* |
|  |  |  | (0.0002) |  |  | (0.0003) |  |  | (0.0001) |
| *constant* | -0.0556\*\* | -0.0605\*\* | -0.049\*\* | -0.0477 | -0.0577 | -0.0441 | 0.0133\*\*\* | 0.014\*\*\* | 0.0102\*\* |
|  | (0.025) | (0.0247) | (0.0244) | (0.0378) | (0.038) | (0.0371) | (0.0046) | (0.0047) | (0.0046) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm & year effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 22,099 | 22,099 | 22,099 | 24,284 | 24,284 | 24,284 | 24,150 | 24,150 | 24,150 |
| Adjusted R2 | 0.1732 | 0.1732 | 0.1732 | 0.4617 | 0.4619 | 0.4618 | 0.0696 | 0.0689 | 0.0685 |
|  |  |  |  |  |  |  |  |  |  |
|  | Dependent variable: *cashflow* | | | Dependent variable: *Δdebt* | | | Dependent variable: *Δequity* | | |
|  | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
| *int\_gov* | 0.0035\*\*\* |  |  | 0.0000 |  |  | 0.002\*\* |  |  |
|  | (0.0008) |  |  | (0.0008) |  |  | (0.0009) |  |  |
| *ln\_horizon* |  | 0.006\*\*\* |  |  | 0.0016 |  |  | 0.005\*\*\* |  |
|  |  | (0.0015) |  |  | (0.0016) |  |  | (0.0015) |  |
| *ind\_horizon* |  |  | 0.0007\*\*\* |  |  | 0.0001 |  |  | 0.0005\*\* |
|  |  |  | (0.0002) |  |  | (0.0002) |  |  | (0.0002) |
| *constant* | -0.0305\* | -0.033\* | -0.0179 | -0.1744\*\*\* | -0.1788\*\*\* | -0.1748\*\*\* | 0.0362\* | 0.0306 | 0.0434\*\* |
|  | (0.0182) | (0.0183) | (0.0178) | (0.0248) | (0.025) | (0.0245) | (0.0196) | (0.0193) | (0.019) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm & year effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 24,284 | 24,284 | 24,284 | 24,284 | 24,284 | 24,284 | 24,284 | 24,284 | 24,284 |
| Adjusted R2 | 0.4997 | 0.4995 | 0.4995 | 0.3775 | 0.3776 | 0.3775 | 0.1006 | 0.1007 | 0.1005 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Panel B: mediating effects on the change of cash* | | | | | | | | | | | |
|  | Dependent variables: | | | | | | | | | | |
| Variables: | *cash1* | *invest* | *cash1* | *div* | *cash1* | *cashflow* | *cash1* | | *Δdebt* | *cash1* | *Δequity* |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | | (8) | (9) | (10) |
| *int\_gov* | 0.0032\*\*\* | -0.0001 | 0.0028\*\*\* | -0.0011\*\*\* | 0.0028\*\*\* | -0.0020\*\* | 0.0036\*\*\* | | -0.0008 | 0.0024\*\*\* | 0.0032\*\*\* |
|  | (0.0008) | (0.0010) | (0.0008) | (0.0001) | (0.0008) | (0.0008 | (0.0007) | | (0.0008) | (0.0007) | (0.0006) |
| *invest* | 0.2538\*\*\* |  |  |  |  |  |  | |  |  |  |
|  | (0.0063) |  |  |  |  |  |  | |  |  |  |
| *div* |  |  | -0.5832\*\*\* |  |  |  |  | |  |  |  |
|  |  |  | (0.0442) |  |  |  |  | |  |  |  |
| *cashflow* |  |  |  |  | 0.2141\*\*\* |  |  | |  |  |  |
|  |  |  |  |  | (0.0080 |  |  | |  |  |  |
| *Δdebt* |  |  |  |  |  |  | 0.4086\*\*\* | |  |  |  |
|  |  |  |  |  |  |  | (0.0064) | |  |  |  |
| *Δequity* |  |  |  |  |  |  |  | |  | 0.5362\*\*\* |  |
|  |  |  |  |  |  |  |  | |  | (0.0075) |  |
| *constant* | 0.0548\*\*\* | 0.1302\*\*\* | 0.0162 | 0.0203\*\*\* | 0.0491\*\* | 0.1581\*\*\* | 0.0853\*\*\* | | 0.0231 | -0.0070 | 0.0117 |
|  | (0.0191) | (0.0227) | (0.0197) | (0.0024) | (0.0195) | (0.0176) | (0.0182) | | (0.0189) | (0.0179) | (0.0131) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | | Yes | Yes | Yes |
| Year effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | | Yes | Yes | Yes |
| Observations | 24,284 | 24,284 | 24,150 | 24,150 | 24,284 | 24,284 | 24,284 | | 24,284 | 24,284 | 24,284 |
|  |  |  |  |  |  |  |  | |  |  |  |
|  | Bootstrap method (with Bootstrap standard error and Bootstrap-based 95% confidence interval) | | | | | | | | | | |
|  | Investment effect | | Dividend effect | | Internal cash flow effect | | Debt issuance effect | | | Equity issuance effect | |
|  | -0.00002 | | 0.00062\*\*\* | | -0.00043\*\*\* | | -0.00033 | | | 0.00173\*\*\* | |
| Bootstrap S.E. | 0.00020 | | 0.0001 | | 0.00020 | | 0.00033 | | | 0.00038 | |
| 95% confidence interval | -0.00041 | 0.00039 | 0.00044 | 0.00084 | -0.00083 | -0.00005 | -0.00097 | 0.00032 | | 0.00099 | 0.00245 |

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1. 12.72% is calculated by firm-year observations in the business services (3,639) divided by sample firm-year observations for analysis (28,600). Same formula is used for 7.77% (retail) and 6.91% (electronic equipment). [↑](#footnote-ref-1)
2. *diff\_ind\_horizon* is calculated by (*average age of subordinate executivesind,t - average age of subordinate executivesi,t*) *–* (*average age of CEOsind,t - age of CEOi,t*). [↑](#footnote-ref-2)
3. We find the estimated coefficients on internal governance measures remain positive and statistically significant when internal governance proxies are measured at *t-1.* [↑](#footnote-ref-3)
4. The standard deviation of *int\_gov*, *ln\_horizon* and *ind\_horizon* are 1.3547, 0.5173 and 4.2274, and the average of *cash1* is 0.2751. An increase in one standard deviation in *int\_gov* increase cash holding by 4.23% [(0.0086 × 1.3547) / 0.2751]. [↑](#footnote-ref-4)
5. The average of *cash2* is 0.2456. An increase in one standard deviation in *int\_gov* increase cash holding by 3.48% [(0.0063 × 1.3547) / 0.2456]. [↑](#footnote-ref-5)
6. Identification can be achieved by having regressors that are uncorrelated with the product of heteroskedastic errors. [↑](#footnote-ref-6)
7. Several studies adopt the model of McLean (2011), which decomposes cash inflows into four components: internal cash flows, asset sales, equity issuance and debt issuance. In our analysis, we prefer the model of Chang *et al.* (2014) as it explains the negative changes in cash. [↑](#footnote-ref-7)
8. Note that some control variables are omitted to avoid multilinearity. For example, when dependent variable is *invest*, the control variable of *cap* is excluded in the regression. [↑](#footnote-ref-8)