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To cite this article: Santanu Das, Ashish Kumar & Tapas Mishra (24 Feb 2025): How do institutional investors dictate corporate cash holdings in a financially constrained environment?, The European Journal of Finance, DOI: [10.1080/1351847X.2025.2465454](https://doi.org/10.1080/1351847X.2025.2465454)

To link to this article: <https://doi.org/10.1080/1351847X.2025.2465454>



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Published online: 24 Feb 2025.



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How do institutional investors dictate corporate cash holdings in a financially constrained environment?

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ABSTRACT

Institutional investors use voting power to influence firms' financial decisions, such as their inclination toward large cash during heightened economic uncertainty and slack resource environment. This paper exploits agency theory and institutional channel in developing a theory-driven empirical apparatus to provide direct evidence that a country's political climate is instrumental in determining the extent financial constraints are an effective moderating tool for negotiating an optimal contract between the power of institutional investors and firms' cash holdings. In our empirical narrative, we assert the punctuating role of legal frameworks on institutional investors' actual influences on firms' financial decision-making. By using a sample of 30,000 firms from selected emerging and developed economies over a period of two decades, a suit of endogeneity-mitigated dynamic panel regressions helps elicit a strong negative relationship between institutional ownership and corporate cash holdings. Our results indicate that institutional investors motivate firms to downsize excess cash. Furthermore, we document that financially constrained firms tend to hold more cash in both emerging and developed countries whereas firms in common-law countries (both developed and emerging) prefer less cash as compared to firms in civil law countries.

ARTICLE HISTORY

Received 3 June 2024
Accepted 3 February 2025

KEYWORDS

Corporate cash holdings; institutional investor; financial constraints; common and civil law countries

1. Introduction

Institutional investors play a major role in firms' financial decisions, such as the amount of cash to hold during uncertain times. The predictive strategies of firms, both regarding their survival and long-term growth, are often at odds with the dominant short-term objectives of the profit-veering institutional investors.¹ An optimal 'contract' between the two parties is also governed by the institution's legal framework.² Eventually, the acceptable equilibrium outcome is a product of both parties' uncertainty-smoothing strategy that may ensure high returns for institutional investors as well as the persistence of growth gains for firms, *Ceteris Paribus*, the legal constraints are non-interfering. This paper builds on the above premises by exploiting agency theory and an institutional framework to argue that a country's political climate determines the extent financial constraints render moderating effects while negotiating an optimal contract between firms' propensity to cash holdings and the power of institutional investors. Endogeneity-mitigated empirical scrutiny for firms in both emerging and developed economies provides robust evidence that institutional investors influence firms to downsize cash holdings, but the results differ between common- and civil-law countries.

In his seminal paper, Jensen (1986) proposes that insiders of a firm depict an incentive to misappropriate resources of the firm including cash, for their personal benefit at the cost of shareholder's value creation. He argues that the major source of conflict between managers and shareholders is the excess cash holdings of the firm. On the one hand, managers have higher incentives to maintain a large cash balance as it helps them maintain enough liquidity to fund positive NPV projects that may arise in the future, and to avoid monitoring and

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scrutiny of the market. On the other hand, since the interest earned on cash is also taxed at the marginal tax rate of the firm, shareholders might induce the managers to reduce excess cash holdings to avoid paying taxes on interest. These contradicting intentions of the two important stakeholders lead to agency conflict. Prior studies indicate that agency conflict can be moderated or reduced to a large extent, if not entirely resolved, by efficient monitoring of various categories of shareholders in the firm (see Ameer 2010; Nikolov and Whited 2014; Dittmar and Mahrt-Smith, 2007). Institutional investors being one of the dominant shareholders in the firms present a unique opportunity to investigate their role in mitigating agency conflict arising out of the cash holdings of firms.

By virtue of their size and expertise, institutional investors exert greater influence on a firm's decision-making process as compared to smaller investors. Prior studies on the role and behavior of institutional investors put forward two opposing views – *monitoring* and *short-termism* (Callen and Fang 2013). The monitoring role of investors indicates a focus on long-term value creation for shareholders and they actively engage with the management of the firm to achieve this objective (Shleifer & Vishny 1986, 1997). They argue that institutional investors have an incentive to collect information and monitor management because they reap large benefits as compared to smaller investors. Further, they tend to monitor and discipline managers to ensure that the firm's investment strategy is consistent with the objective of maximizing long-term value, rather than meeting short-term earnings goals. Consistent with this monitoring view of institutional investors, empirical studies provide evidence of a variety of benefits from institutional ownership like CEO turnover (Helwege, Intintoli, and Zhang 2012), firm performance (Elyasiani and Jia 2008), corporate governance (Aggarwal et al. 2011), executive compensation (Janakiraman, Radhakrishnan, and Tsang 2010; Zheng 2010). The short-termism perspective argues that institutional investors are transient and are interested in a short-term performance of the firm and fail to act as a monitor (Bushee 1998; Cheng, Hong, and Scheinkman 2010; Yudan 2010; Manconi et al., 2012). In this paper, we investigate the monitoring role of the institutional investors with respect to corporate cash holdings and we attempt to enhance our understanding of the impact of country-level moderators on the relationship between institutional investors and cash holdings.

Recent studies have explored the impact of large investors on corporate cash holdings. For instance, Chen et al. (2018) find a positive relationship between state ownership and corporate cash holdings, suggesting that as state ownership increases, the value of cash holdings declines in countries with weak institutional frameworks. Investors tend to discount the value of cash in such settings due to the heightened risks associated with these firms, underscoring the importance of accounting for a country's institutional environment when analyzing agency conflicts. Similarly, Gupta and Bedi (2020) find a negative relationship between promoter ownership and cash holdings in Indian firms, arguing that larger and more diverse shareholders should play a central role in preventing excess cash accumulation in these companies.

Another critical issue in cash management concerns determining the optimal level of cash holdings. Prior literature provides evidence that holding either excess or insufficient cash can erode shareholder value over time (Dittmar and Mahrt-Smith 2007; Harford, Mansi, and Maxwell 2008; Kalcheva and Lins 2007; Miller and Orr 1966; Opler et al. 1999). Excess cash is particularly problematic, as it becomes more susceptible to expropriation by managers or majority shareholders. Johnson et al. (2000) introduced the term 'tunneling' to describe the exploitation of minority shareholders by majority shareholders who divert assets, including cash, for personal gain. This issue is especially pronounced in countries with weaker shareholder protections, where greater access to cash by controlling shareholders correlates with reduced firm value (Kalcheva and Lins 2007). While the roles of retail investors in mitigating the agency problem are well-researched and documented (Aggarwal et al. 2011; Chen, Harford, and Li 2007; Ferreira, Massa, and Matos 2010), the role of institutional investors is still unexplored, especially in emerging countries which have a different institutional mechanism, political and business environment as compared to developed countries. Firth et al. (2016) provide evidence that institutional investors in China have substantially helped in improving efficiency, corporate governance, and, consequently, the firm value. Ameer (2007) and Bekaert and Harvey (2000) find that liquidity and cost of capital in emerging markets have substantially improved because of the advent of institutional investors in these countries. Ameer (2010) further argues that institutional investors are more methodical and better at evaluating managerial performance than ordinary investors. Given the growing importance

and relevance of institutional investors in improving firm efficiency, we examine their role in corporate cash holdings.

In addition, we investigate how financial constraints moderate the effect of institutional investors on cash holdings by firms. It is well documented that financial constraint faced by a firm significantly affects the corporate decision-making process. For instance, Faulkender and Wang (2006) provide evidence that the marginal value of cash declines for firms with high cash holdings and easy access to capital markets (financially unconstrained). Denis and Sibilkov (2010) find that the value of cash is higher for financially constrained firms than for financially unconstrained firms. Financially constrained firms have limited access to the capital market, which substantially restricts their ability to raise capital. Consequently, managers of these firms hold precautionary cash to deal with future exigencies. Opler et al. (1999) and Almeida, Campello, and Weisbach (2004) argue that shareholders of financially constrained firms tend to be less concerned about the managers holding more cash because these firms may invest in positive NPV projects without worrying about the availability of funds. Using a wide sample of firms from developed and emerging countries, we examine the relationship between institutional ownership and corporate cash holdings and how this relationship changes for financially constrained and unconstrained firms. Most emerging countries are also characterized by weak investor shareholder protection apart from less developed financial markets. This leads the firms in these countries to hold more cash because it is easier for entrenched managers to misappropriate cash for their own benefits (Dittmar, Mahrt-Smith, and Servaes 2003; Kalcheva and Lins 2007).

Our study contributes to the literature in the following ways. Firstly, we expand the extant scope of cash management policies of firms by including the moderating role of institutional investors. Studies so far have considered corporate governance, country-level institutional factors like shareholders' protection, and legal framework to explain the behavior of firms while holding cash. We exclusively study the role of institutional investors, who have become one of the most important watchdogs in improving the mechanism of how a firm operates. Secondly, we consider a wide sample from developed and emerging markets to study this phenomenon. These sets of countries vary widely in their corporate governance, protection framework of minority shareholders, and uncertainties in their political and economic environment. As highlighted by Chen et al. (2018), it is important that we consider a country's institutional environment while examining agency conflicts. This way, this paper enhances our understanding of the roles played by a country's environment in the corporate decision-making process.

Thirdly, we study the moderating effect of financial constraints on the relationship between institutional investors and corporate cash holdings. This is important as we get an insight into the firm's cash management behavior when it is financially constrained as well as unconstrained in the presence of institutional investors. Our results indicate that cash holdings and institutional ownership have a negative and significant relationship in both emerging and developed markets, indicating that institutional investors induce the firms to reduce the excess cash. We also find that financially constrained firms tend to hold more cash in both emerging and developed countries and firms in common-law countries (both developed and emerging) hold less cash as compared to firms in civil law countries.

The rest of the paper is organized as follows. In section 2, we develop our hypotheses by drawing on the extant body of literature on the subject. Section 3 is devoted to a discussion of data architecture and methodology. Section 4 provides a critical discussion of the empirical results. Finally, Section 5 concludes the paper.

2. Literature and hypotheses development

Excess cash balances held by firms can lead to agency problems, as they grant entrenched managers easy access to resources that may be used for personal gain rather than for maximizing shareholder value, thereby disadvantaging minority shareholders (Harford, Mansi, and Maxwell 2008; Kalcheva and Lins 2007; Nikolov and Whited 2014). The presence of institutional ownership can help mitigate these agency issues, as previous research highlights that corporate governance (Aggarwal et al. 2011; Dittmar and Mahrt-Smith 2007; Harford, Mansi, and Maxwell 2008) and state ownership (Chen et al. 2018) are effective in addressing such conflicts. Following the monitoring hypothesis, institutional investors are uniquely suited to manage and monitor firms effectively, thereby reducing agency problems arising from excess cash holdings (Huang and Zhu 2015; Stulz 2005). Their

resources, expertise, and significant stakes in firms enable them to exert influence on management, aligning managerial incentives with shareholder interests. However, this hypothesis presents two contrasting perspectives – value addition through efficient capital allocation in which institutional investors, particularly those with long-term horizons, can advocate for efficient capital allocation, pressuring managers to invest excess cash in profitable opportunities or return it to shareholders.

This proactive stance can maximize firm value, as documented by Ilyas, Mian, and Safdar (2021), who find that foreign institutional investors have a positive impact on the value of excess cash holdings in Pakistani firms, unlike domestic investors and on the other hand, Jensen (1986) posits that in the absence of suitable investment opportunities, managers may seek to retain excess cash, using it to strengthen their own positions rather than increasing shareholder wealth. This can lead to value-destroying activities, as managers may prioritize empire-building or unnecessary acquisitions over shareholder returns. The impact of institutional ownership on cash management may also vary by investor type. For example, foreign institutional investors might place stronger demands for value creation and transparency than domestic institutions due to stricter regulatory oversight and accountability to international stakeholders. This variation aligns with findings that foreign institutional investors play a more pronounced role in enhancing the value of excess cash (Ilyas, Mian, and Safdar 2021), suggesting that the effect of institutional monitoring depends on investor characteristics.

In summary, while institutional investors have the potential to mitigate agency problems associated with excess cash, their influence can be shaped by the availability of investment opportunities, the objectives of the firm's managers, and the specific nature of institutional ownership. This nuanced role underscores the importance of institutional composition and the need for a governance structure that incentivizes managers to prioritize shareholder value. Therefore, institutional investors play a significant role in reducing the cash flow problem, by forcing the managers to reduce the firm's excess cash. Dittmar and Mahrt-Smith (2007), Harford, Mansi, and Maxwell (2008) argue that when entrenched managers have excess cash at their disposal, they may invest it in value-destroying projects, thereby reducing the shareholder's value. Institutional investors may prevent these managers from investing money in value-destroying projects and may induce them to increase their cash holdings instead. These investors may induce firms to hold less cash or reduce excess cash balance by decreasing the cost of capital (Bekaert and Harvey 2000) and increasing the availability of finance to the firms (Stulz 1999).

In view of the above, we hypothesize the following:

H₁: Institutional investors' ownership significantly affects corporate cash holdings.

In the past decade or so, researchers have recognized that the business environment in which a firm operates may affect its decision-making process. In this context, studies have increasingly focused on emerging and developed economies owing to their different business environments. While emerging markets are characterized by poor corporate governance, less protection for minority shareholders, financial constraints faced by firms, and less developed financial markets, the developed markets have fewer issues with these problems (Bekaert and Lundblad, 2003). Against this backdrop, we argue that institutional investors may have different preferences for firms in emerging and developed economies. Aggarwal et al. (2005) find that foreign capital significantly contributes to economic growth in countries with developing financial systems, and that emerging markets display considerable variation in both country-level and firm-level policies that can impact foreign investment flows. They further argue that institutional investors are not primarily drawn to emerging markets for higher returns; rather, they exhibit specific preferences when selecting firms in these markets for investment.

LaPorta et al. (2002) argue that it is critical to recognize the differences in the ownership structures across countries because these differences have a bearing on the power and incentives of the controlling shareholders to expropriate minority shareholders. In a recent study, Lee and Wang (2021) find that financially constrained firms hold more cash with an increase in geopolitical risk. Lee and Park (2016) provide evidence that board governance mitigates agency concerns in cash holdings more significantly for financially less constrained firms. This, however, will depend on the business environment in which a firm operates. In the study of Japanese firms, Nguyen and Rahman (2020) find that higher institutional ownership and lower cross-shareholdings are associated with higher cash balances and managers spend the cash quickly. Since past studies have highlighted the distinctively different business environment (which includes economic policies, political environment, etc.) of emerging

markets than those of developed ones, we argue that institutional investors may induce the financially constrained firms in emerging markets to hold more cash to provide a cushion against increasing uncertainty in the existing business environment. On the other hand, institutional investors may force firms in developed markets to disgorge excess cash even if they are financially constrained. These firms can remove the constraints through effective corporate governance mechanisms that are relatively easier to implement in developed markets.

Accordingly, we hypothesize that:

H_{1a}: Institutional investors have positive (negative) relationship with cash holdings for financially constrained firms in emerging (developed) economies.

Substantial efforts have been made in the literature to understand the role of a country's environment on the decision-making process of firms located or operating in that country. With increased globalization and internationalization of firms, a country's environment plays a major role in a firm's financial performance and managerial decision-making process. For instance, Dittmar, Mahrt-Smith, and Servaes (2003) find that firms in countries with poor shareholder protection hold twice as much cash as compared to firms in countries with stronger shareholder protection. Some recent evidence suggests that corruption in a country significantly affects corporate cash holdings (Tran 2020). Firms in countries with high corruption hold more cash and have higher sensitivity to cash flows. We argue that institutional investors often have significant influence on a country's policy-making and therefore are likely to wield pressure on the local government to act on corruption and accordingly lead the firms to reduce cash holdings.

Furthermore, the legal system of a country also plays an important role in a firm's decision-making process. Common-law countries offer better legal protection to the shareholders as compared to civil law countries (LaPorta et al. 1987, 2002). Within the legal system, emerging countries are more prone and sensitive to the role of institutional investors on cash holding decisions of the firms. In a recent study Duan, Yang, and Zhang (2023) find that the improvement of the legal system moderates the impact of entrepreneur immigration on corporate cash holdings, deters their short-sighted tunneling, and motivates them to put more effort into long-term innovation. Das Gupta and Pathak (2021) find that firms operating in civil law systems hold significantly higher cash as compared to their peers from common-law systems. Managers consider improvements in judicial efficiency as increasing the probability of bankruptcy and loss of their jobs, responding to this fear by hoarding extra cash as a buffer against bankruptcy (Shah and Shah 2016). Emerging countries in civil law countries which are characterized by poor legal protection to shareholders are likely to hold more cash and are less likely to be moderated by the presence of institutional investors. On the contrary, the role of institutional investors in common or civil law developed countries may not be significant because these countries have well-developed financial markets, less corruption and a supportive business environment. Tran (2020) finds that corruption is positively associated with both cash holdings and the cash flow sensitivity of cash. In a recent study, Jayakody et al. (2023) find that firms located in states with higher corruption react to increases in local political uncertainty by increasing cash holdings more than those in less corrupt settings. Accordingly, we propose the following hypotheses:

H_{2a}: Institutional investors moderate the effect of corruption on cash holdings.

H_{2b}: Institutional investors have an asymmetric moderation effect of the legal system on cash holdings

3. Data and methodology

3.1. Sample characteristics

Our sample consists of an unbalanced panel of 18,738 firms from 26 emerging countries and 30,716 firms from 17 developed countries observed for 19 fiscal years from 2001 to 2019. We refer to the country classification by the WEO, International Monetary Fund for country classification and sample selection. Our selection of the sample is motivated by the extensive coverage of global perspective which allows us to compare financial behaviors and firm strategies. Further, these countries provide heterogeneity with respect to political stability, the level of corruption and the extent of financial constraints. All financial data are collected from the Bloomberg database. These firms belong to 7 industries following the Bloomberg Industry classification. Table 1 (Panels A and B) shows the details of the sample firms. Table 1, Panel A shows the number of firms from each sample

Table 1. Sample classification by country and sample classification by industries.

Emerging Economies		Developed Countries		
Country	Number of firms	Country	Number of firms	
(a)				
Argentina	64	Canada	3459	
Brazil	373	USA	13011	
Chile	128	Belgium	139	
Colombia	45	UK	2198	
Mexico	128	Denmark	213	
Peru	103	Finland	157	
Czech Republic	11	Japan	3695	
Egypt	179	New Zealand	124	
Greece	144	Israel	870	
Hungary	28	Italy	403	
Poland	626	Netherlands	142	
Qatar	26	Singapore	544	
Russia	744	Hong Kong	1972	
Saudi Arabia	136	Norway	327	
UAE	43	Portugal	42	
South Africa	289	Sweden	772	
Turkey	288	Switzerland	766	
China	3845	Total	30,716	
India	4050			
Indonesia	548			
Malaysia	800			
South Korea	2806			
Pakistan	387			
Philippines	171			
Taiwan	2170			
Thailand	595			
Total	18,738			
	Emerging Economies	% of total	Developed Economies	% of total
(b)				
Communication	672	3.6%	1499	4.9%
Consumer Discretionary	3837	20.5%	4171	13.6%
Consumer Staples	4107	22%	12577	41%
Health Care	1261	6.8%	2756	9%
Industrials	3449	18.4%	3055	10%
Materials	2868	15.2%	3550	11.6%
Technology	2550	13.6%	3108	10.1%
Total	18,738	100%	30,716	100%

country, while Panel B shows the distribution of firms across different industries as per the Bloomberg Industry Classification.

3.2. Variables

We collect all financial variables from the Bloomberg database. The variables and their definitions are provided in Appendix I. We measure financial constraint through *SA_Index* (Hadlock and Pierce 2010) and convert it into a dummy variable (1 if the *SA_Index* is more than the median value and zero otherwise). Following Opler et al. (1999) and Bates, Kahle, and Stulz (2009), we include the firm characteristics that may affect the firm's cash holdings as control variables – cash flow from operations, plant, property, and equipment (PPE), sales growth, research, and development (R&D), return on assets (ROA) and leverage. We extract the scores of corruption in each country in our sample from the Worldwide Governance Indicators database of the World Bank. Finally, we manually collect the data on the legal systems of a country from *worldpopulationreview.com*. The website shows the common-law countries, and we consider the remaining countries in our sample as having civil law.

According to the description on the website we segregate the common and civil law countries as belonging to emerging or developed economies. Then we code the country as having common law as 1, else 0.

3.3. Estimation strategy

Following previous studies, we adopt the dynamic model of cash holdings in which it is assumed that the adjustment of cash to the target is costly and takes place with a lag (Ozkan and Ozkan 2004; Riddick and Whited 2009). This is done by regressing the cash holdings on its past values. We adopt the GMM estimation method to deal with endogeneity issues that may exist between cash holdings and institutional ownership. Our choice of GMM over OLS is motivated by the following factors – (i) key variables like institutional ownership, financial constraints, and cash holdings are likely to be endogenously related. For instance, institutional investors might target firms with certain cash policies, or firms with specific levels of cash holdings might be seen as less financially constrained, attracting more institutional investment. This feedback loop creates reverse causality, making OLS estimates biased and inconsistent, (ii) there may be unobserved factors (e.g. managerial quality, firm-specific governance practices) that influence both cash holdings and institutional ownership or corruption levels. GMM allows for the inclusion of instruments that help control for these unobserved factors, reducing the omitted variable bias that would otherwise affect OLS estimates, (iii) OLS assumes homoskedastic errors, but the real-world data on firm characteristics, particularly in emerging markets, often exhibit heteroskedasticity. GMM is robust to heteroskedasticity, making it more appropriate when the variance of errors is likely to vary across firms or over time, (iv) With interactions between institutional ownership, financial constraints, and corruption, the risk of multicollinearity increases. GMM mitigates this risk by using instruments to isolate the independent variation in each variable, allowing for a more reliable interpretation of the coefficients and (v) In both emerging and developed markets, accurate estimation is crucial for understanding the economic significance of institutional ownership and cash policies. GMM provides a rigorous framework that enhances the robustness of the findings, making it more suitable for policy-relevant insights than simple OLS, which could lead to misleading inferences in the presence of endogeneity.

Accordingly, we use the model as shown below:

$$Cash_{it} = \alpha_i + \alpha_t + \beta_1 Cash_{it-1} + \beta_2 inst_own_{it} + \beta_n controls + \varepsilon_{it}, \quad (1)$$

where α_i = firm-specific fixed effects, α_t = time-invariant factors, $inst_own_{it}$ = institutional ownership as a percentage of the market value of equity, and $Cash_{it}$ represent contemporaneous cash holdings. The vector of controls includes working capital, dividends, sales growth, plant, property and equipment, R&D, and leverage. Equation 1 is first-differenced with time-invariant unobserved heterogeneity is removed from estimation. Then we estimate the first-differenced equation as follows:

$$\Delta Cash_{it} = \beta_1 \Delta Cash_{it-1} + \beta_2 \Delta inst_own_{it} + \beta_n \Delta controls + \Delta \varepsilon_{it}. \quad (2)$$

However, due to this differencing, the endogeneity problem arises between the cash holdings and the idiosyncratic error because $\Delta Cash_{it-1}$ and $\Delta \varepsilon_{it}$ is correlated by design which results in endogeneity biases. Nickell (1981) notes that the usual fixed effects estimators (such as the first-difference estimator) are inconsistent for estimating a dynamic panel data model with a lagged dependent variable as a regressor. Because of the peculiar lag structure of the model, the error term is correlated with the lagged dependent variable and creates the problem of endogeneity. To overcome this problem, Anderson and Hsiao (1981) propose the instrument variable (IV) method, which uses the deeper lags ($\Delta y_{i,t-2}$, $\Delta y_{i,t-3}$,...) as instruments for the first lag of the differenced dependent variable ($\Delta y_{i,t-1}$). Arellano and Bond (1991) suggest a GMM-based approach (known as difference-GMM) for estimating the dynamic panel regressions, which uses the deeper lags of level observations ($(y_{i,t-2}, y_{i,t-3}, \dots)$) as instruments for $\Delta y_{i,t-1}$ orthogonality conditions.

These approaches, though consistent, fail to incorporate all potential orthogonality conditions into account. Blundell and Bond (1998) propose the System-GMM to deal with this problem. In addition to Arellano and Bond type orthogonality conditions ($E[y_{i,t-\tau} \Delta u_{i,t}] = 0$, for $t \geq 3$ and $\tau \geq 2$), it uses additional orthogonality conditions – $E[\Delta y_{i,t-\tau}, (\alpha_i + u_{i,t})] = 0$, for $t \geq 3$ and $\tau \geq 2$. Therefore, System GMM uses deeper lags of level

observations and the first lag of differenced dependent variable as instrumental variables. Therefore, the estimation requires using the generalized method of moments (GMM), as suggested by Arellano and Bond 1991. Chowdhury and Russell (2018) argue that in the presence of structural breaks, the estimates of the dynamic models may be biased. The models by Arellano and Bond (1991) and Blundell and Bond (1998) are designed to improve the efficiency of the estimation. As our paper is centered on long-term patterns in the relationship between cash holdings and institutional shareholdings, we assume that structural breaks, if any, do not fundamentally alter the relationships being studied over the entire period.³

As argued in past studies, institutional investors may have preferences for firms holding high cash; the contemporaneous endogeneity may still be an issue (Brown, Chen, and Shekhar 2012; Loncan 2020). Therefore, in addition to considering the lagged values of cash holdings, we also include the lagged values of institutional ownership in the GMM estimation. Accordingly, both the lagged values are taken as instrument variables. Further, a firm's decision on cash holding can be affected by other firms, as a result, cross-sectional correlation arises, which if ignored can bias the GMM estimation. Therefore, we report the Heteroscedastic Corrected Standard errors in our models to address the issue. However, we acknowledge that future work could explore dynamic panel models incorporating common factors like a combination of Common Correlated Effects (CCE) and GMM methods. Finally, we use the Sargan's test for instrument validity and the Arellano-Bond test for second-order serial correlation.

4. Results

In the previous section, we presented descriptive statistics of our main variables (Panel A: Emerging countries and Panel B: Developed countries) in Table 2. It was noted that the cash holdings of firms in emerging countries are greater than their counterparts in developed countries, which is expected. Moreover, the emerging countries in our sample have low scores on control of corruption, indicating a high level of corruption in these countries. The median score of emerging countries (-0.365) is significantly lower than those of developed countries (1.747). The lowest score (indicating high corruption) in our sample is Russia with an average value of -0.969 and Denmark has the average highest score (indicating least corrupt) of 2.327 . We now present our main empirical results, beginning with the relationship between institutional ownership and cash holdings.

4.1. Institutional ownership and cash holdings

We now investigate our main results in examining the impact of institutional ownership on cash holdings. We use a dynamic panel model following Ozkan and Ozkan (2004), and the model parameters are estimated using the generalized method of moments (GMM). The model is justified because early research suggests that since cash adjustment to the target is costly, it may take time for the firms to adjust them with a lag (Nikolov and Whited 2014). Further, institutional investors may prefer to invest in firms with high cash holdings resulting in an endogenous relationship. Under this situation, the GMM model is appropriate. We use first-differenced lagged values of cash and institutional ownership and the control variables as instruments in the model.

Our results indicate that cash holdings and institutional ownership have a negative and significant relationship in both emerging and developed markets, indicating that institutional investors may induce the firms to reduce cash holdings (Table 3). Models 1 and 3 only consider the institutional investment, and Models 2 and 4 also include all control variables. The relationship does not change. The parameters of the control variables largely agree with previous studies (Opler, 1999; Kalcheva and Lins 2007; Bates, Kahle, and Stulz 2009). The Sargan over identification test and the Arellano-Bond second-order serial correlation tests also suggest the appropriateness of our models.

4.2. Effect of financial constraint and institutional ownership on cash holdings

We study here the moderating effect of financial constraints on cash holdings for a given level of institutional ownership. It can be argued that institutional ownership may help financially constrained firms to access funds in case of need through increased discipline and improved governance. We use the *SA Index* suggested by Hadlock

Table 2. Descriptive statistics.

	Mean	Median	Standard deviation	Minimum	Maximum	Obs.
<i>Panel A: Emerging economies</i>						
Cash	0.168	0.113	0.009	0.341	0.105	150,372
NWC	0.115	0.134	-1.005	0.723	0.195	150,372
PPE	0.322	0.267	0.006	0.879	0.252	150,372
R&D	0.011	0.000	0.000	0.50	0.05	150,372
<i>SA_Index</i>	-4.86	-4.47	-8.43	-1.9	1.76	150,372
<i>3_yr_sales_gr</i>	0.063	0.024	-0.129	0.381	0.128	150,372
Leverage	0.202	0.161	0.000	0.562	0.171	150,372
Corruption	-0.150	-0.365	0.1401	-1.203	1.628	150,372
<i>Ins_Own</i>	0.125	0.132	0.145	0.015	0.268	150,372
<i>Panel B: Developed countries</i>						
Cash	0.133	0.085	0.137	0.004	0.51	220,963
NWC	0.091	0.068	0.142	-0.159	0.396	220,963
PPE	0.328	0.272	0.257	0.006	0.890	220,963
R&D	0.004	0.000	0.012	0.000	0.048	220,963
<i>3_Yr_Sales_gr</i>	0.064	0.025	0.125	-0.120	0.376	220,963
Leverage	0.186	0.158	0.165	0.000	0.563	220,963
Corruption	1.632	1.747	0.127	0.282	2.327	220,963
<i>Ins_Own</i>	0.175	0.132	0.097	0.065	0.293	220,963

Note: *Cash* is defined as cash and cash equivalents, *NWC* is net working capital and defined as account receivables, inventories less accounts payables, *PPE* is plant, property and equipment, *R&D* is R&D expenses, *3_Ys_Sales_gr* is the average growth rate of sales of past consecutive three years, *Leverage* is interest bearing long-term and short-term debt, *Corruption* is Control of corruption index ranges from -2.5 (Most corrupt) to +2.5 (least corrupt) and *Ins_Own* is the institutional investments (in USD million) divided by last year's market value of equity. All variables except corruption and *ins_own* are divided by net total assets (total assets less cash and cash equivalents)

Table 3. Effect of institutional ownership on the firm's cash holdings.

Variables	$Cash_{it} = \alpha_i + \alpha_t + \alpha_c + \beta_1 Cash_{it-1} + \beta_2 inst_own_{it} + \beta_n controls + \varepsilon_{it}$			
	Emerging Economies		Developed Countries	
	(1)	(2)	(3)	(4)
<i>Cash</i> _{it-1}	0.235*** (0.0151)	0.178*** (0.0212)	0.158*** (0.0241)	0.136*** (0.0281)
<i>inst_own</i> _{it}	-0.104*** (0.0015)	-0.125*** (0.0021)	-0.095*** (0.0018)	-0.087*** (0.0054)
NWC		-0.025*** (0.000)		-0.018*** (0.000)
3_year growth		0.004*** (0.001)		0.001*** (0.000)
R&D		0.0029*** (0.000)		0.0156*** (0.000)
Leverage		0.195*** (0.052)		0.149*** (0.002)
PPE		-0.172*** (0.001)		-0.229*** (0.001)
Div_dum		0.0025*** (0.000)		0.016*** (0.000)
Sargan's test (<i>p</i> -value)	0.115	0.121	0.142	0.138
AR(2) test	0.485	0.415	0.587	0.562
Obs.	165,635	165,635	183,516	183,516

Note: The figures in parentheses are the HAC standard errors. *Cash* is defined as cash and cash equivalents, *NWC* is net working capital and defined as account receivables, inventories less accounts payables, *PPE* is plant, property and equipment, *R&D* is R&D expenses, *3_Ys_Sales_gr* is the average growth rate of sales of past consecutive three years, *Leverage* is interest bearing long-term and short-term debt, *Div_dum* is a dummy variable and is equal to 1 if the firm paid dividend in the last fiscal year and 0 otherwise. All variables except *div_dum* are divided by net total assets (total assets less cash and cash equivalents). *Ins_Own* is the institutional investments (in USD million) divided by last year market value of equity.

*Significant at the 10% level.

**Significant at the 5% level.

***Significant at the 1% level.

Table 4. Effect of financial constraints and institutional ownership on cash holdings.
$$Cash_{it} = \alpha_i + \alpha_t + \beta_1 Cash_{it-1} + \beta_2 SA_index_{it} + \beta_3 inst_own_{it} + \beta_4 inst_own_{it} * SA_index_{it} + \varepsilon_{it}$$

Variables	Emerging economies		Developed countries	
	(1)	(2)	(3)	(4)
$Cash_{it-1}$	0.235*** (0.0151)	0.178*** (0.0212)	0.158*** (0.0241)	0.136*** (0.0281)
$inst_own_{it}$	-0.104*** (0.0015)	-0.125*** (0.0021)	-0.095*** (0.0018)	-0.087*** (0.0054)
SA_index_{it}	0.102*** (0.000)	0.087*** (0.002)	0.048*** (0.001)	0.041*** (0.001)
$inst_own_{it} * SA_index_{it}$	0.121*** (0.000)	0.115*** (0.003)	-0.015*** (0.002)	-0.028*** (0.001)
NWC		-0.031*** (0.000)		-0.015*** (0.000)
$3_year\ growth$		0.037*** (0.001)		0.001*** (0.000)
R&D		0.001*** (0.000)		0.0171*** (0.000)
Leverage		0.158*** (0.052)		0.129*** (0.002)
PPE		-0.184*** (0.001)		-0.191*** (0.001)
Div_dum		0.005*** (0.000)		0.024*** (0.000)
Obs.	165,635	165,635	183,516	183,516
Adj R^2	0.451	0.517	0.528	0.531

Note: The figures in parentheses are the HAC standard errors. *Cash* is defined as cash and cash equivalents, *NWC* is net working capital and defined as account receivables, inventories less accounts payables, *PPE* is plant, property and equipment, *R&D* is R&D expenses, *3_Ys_Sales_gr* is the average growth rate of sales of past consecutive three years, *Leverage* is interest bearing long-term and short-term debt, *Div_dum* is a dummy variable and is equal to 1 if the firm paid dividend the last fiscal year and 0 otherwise. All variables except *div_dum* are divided by net total assets (total assets less cash and cash equivalents). *Ins_Own* is the institutional investments (in USD million) divided by last year market value of equity. *SA_index* is the measure of financial constraint following Hadlock and Pierce (2010).

*Significant at the 10% level.

**Significant at the 5% level.

***Significant at the 1% level.

and Pierce (2010) to measure the financial constraints faced by a firm. This is a composite index estimated using the size and age of the firm. The lower value of the index indicates that the firm is less constrained, and higher values indicate firms are financially constrained. In other words, the financial constraints decrease with the SA Index. We then convert the index into a dummy variable with code 1 for firms with an index value less than the median (i.e. financially constrained firms) and 0 otherwise.

The results are reported in Table 4. We find that financially constrained firms tend to hold more cash in both emerging and developed countries, which is consistent with previous literature (Almeida, Campello, and Weisbach 2004; Riddick and Whited, 2009). However, the interaction terms are contrastingly different in emerging and developed markets. The results indicate that institutional ownership tends to induce firms to reduce cash holdings even if they are financially constrained. We may argue that in developed markets where raising capital is easier, the presence of institutional investors reduces the need for the firms to hold more cash even if the firm is financially constrained. The presence of institutional investors improves the governance of the firm, and the market perceives this as a positive indicator, thereby easing the frictions faced by the financially constrained firms to raise capital and consequently reducing the need to hold more cash.

The interaction term is positive and statistically significant (Models 1 and 2). This indicates that although institutional ownership helps the firms to reduce cash, financial constraints faced by the firms in emerging economies force them to hold more cash. This may happen because the financial markets in emerging markets are less developed and mature compared to developed ones; the frictions faced by financially constrained firms in emerging countries in raising capital do not immediately reduce with an increase in institutional ownership. It may take a considerable time for the institutional investors to effect improvement of governance and

financial parameters in the firms in these markets, and as a result, there may not be an immediate decrease in cash holdings in financially constrained firms.

4.3. Effect of corruption on cash holdings

There has been an increasing debate on the impact of country-level factors on corporate cash holdings. Among those, the level of corruption in a country is found to have a significant impact on corporate financial decisions. For instance, Xu and Li (2018) find that firms located in more corrupt regions of China hold less cash to shield them from illegal extraction by corrupt officials. In another study in the context of emerging economies, Thakur and Kannadhasan (2019) report opposite findings. They find that firms hold more cash with increased corruption in a country because they can benefit from the corrupt environment by trading cash. Similarly, Rocca et al. (2017) find evidence that the value of firms decreases for those firms holding higher cash in a corrupt environment.

To further investigate the effect of the level of corruption for financially constrained and unconstrained firms, we run a regression. The results are reported in Table 5. We find that corruption and cash are positively correlated in both emerging and developed markets, which supports the findings of Thakur and Kannadhasan (2019). When we examine the effect of institutional ownership, our findings suggest that firms that are financially constrained tend to hold more cash even if the institutional ownership increases. The results are similar in both emerging and developed countries, but the extent of cash holdings in developed countries is less than in emerging markets.

4.4. Cash holdings in common law and civil law countries

In their paper, La Porta et al. (1987) study the legal determinants of external finance. They study the extent of development in countries having common-law and civil law systems.

Table 5. Effect of corruption on cash holdings.

$\begin{aligned} \text{Cash}_{it} = & \alpha_0 + \alpha_i + \alpha_t + \beta_1 \text{Cash}_{it-1} + \beta_2 \text{inst_own}_{it} + \beta_3 \text{SA_index}_{it} + \beta_4 \text{Corruption}_{it} \\ & + \beta_5 \text{Corruption} * \text{inst_own}_{it} + \beta_6 \text{inst_own}_{it} * \text{SA_index}_{it} \\ & + \beta_7 \text{Corruption} * \text{inst_own}_{it} * \text{SA_index}_{it} + \varepsilon_{it} \end{aligned}$		
Variables	Emerging economies	Developed countries
constant	0.115*** (0.042)	0.095*** (0.000)
Cash_{it-1}	0.172*** (0.001)	0.098*** (0.001)
inst_own_{it}	-0.151*** (0.001)	-0.083*** (0.001)
SA_index_{it}	0.085*** (0.000)	0.066*** (0.001)
Corruption	0.112*** (0.005)	0.086*** (0.001)
Corruption* inst_own_{it}	-0.0015*** (0.017)	-0.0003*** (0.000)
inst_own_{it} * SA_index_{it}	0.011** (0.002)	-0.017*** (0.001)
Corruption* inst_own_{it} * SA_index_{it}	0.041*** (0.000)	0.008** (0.000)
Controls	Yes	Yes
Country FE	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Obs.	165,635	183,516
Adj R^2	0.455	0.378

Note: The figures in parentheses are the HAC standard errors. *Cash* is defined as cash and cash equivalents divided by net total assets (total assets less cash and cash equivalents). Controls include *NWC*, *PPE*, *R&D* is R&D and *Leverage*. *Ins_Own* is the institutional investments (in USD million) divided by last year market value of equity. *SA_index* is the measure of financial constraint following Hadlock and Pierce (2010). *Corruption* is Control of corruption index ranges from -2.5 (Most corrupt) to +2.5 (least corrupt).

*Significant at the 10% level.

**Significant at the 5% level.

***Significant at the 1% level.

Table 6. Cash holdings in Common vs. Civil law countries.
$$Cash_{it} = \alpha_i + \alpha_t + \alpha_c + \beta_1 inst_own_{it} + \beta_2 Common_{it} + \beta_3 Common * inst_own_{it} + \varepsilon_{it}$$

Variables	Emerging economies	Developed countries
Intercept	0.068*** (0.001)	0.025*** (0.000)
<i>inst_own_{it}</i>	-0.087*** (0.001)	-0.048*** (0.001)
Common	-0.018*** (0.001)	-0.0037** (0.000)
Common* <i>inst_own_{it}</i>	-0.014*** (0.000)	-0.001 (0.026)
Controls	Yes	Yes
Country FE	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Obs.	171,554	216,317
Adj <i>R</i> ²	0.18	0.13

Note: The figures in parentheses are the HAC standard errors. *Cash* is defined as cash and cash equivalents divided by net total assets (total assets less cash and cash equivalents). Controls include *NWC*, *PPE*, *R&D* is R&D and *Leverage*. *Ins_Own* is the institutional investments (in USD million) divided by last year market value of equity. *Common* is a binary variable and is coded as 1 if the country belongs to the common-law regime and 0 if it belongs to the civil law regime.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Common law is the body of law that is derived from judicial decisions of courts rather than statutes. Common law influences decision-making in cases where the outcome cannot be determined based on written laws or statutes. A common law court looks to past precedential decisions to apply the principles of those cases to the current case. In contrast to common law is civil law, which is a codified set of legal statutes and laws created by legislatures. In civil law, judicial authorities use the civil code to evaluate cases and reach decisions.⁴

La Porta et al. (1998) find that countries with civil law systems, on average, have the weakest investor protection compared to those in common-law countries, and firms in civil law countries find it difficult to access capital for raising capital. In the context of the emerging market, Buchanan and English II (2007) find that firms in civil law countries earn higher stock returns than firms in common-law countries.

We attribute these findings to the risk premium that firms must generate to attract investors. Consequently, we examine cash holdings for firms across common and civil law countries. For this analysis, we divide our sample within both emerging and developed markets, categorizing each country as either a common or civil law jurisdiction, with common-law countries coded as one and civil law countries as zero. The results are presented in Table 6. Our findings show that firms in common-law countries (both developed and emerging) hold less cash compared to those in civil law countries. Specifically, firms in developed common-law countries hold significantly less cash ($0.025 - 0.0037 = 0.0213$) than those in emerging common-law countries ($0.068 - 0.015 = 0.053$). Even when institutional ownership is included as an interaction term, firms in common-law countries continue to hold lower cash reserves. This supports LaPorta's et al. (1987) argument that common-law countries offer stronger investor protection and governance structures, reducing the need for firms in these countries to maintain high cash holdings compared to their counterparts in civil law countries.

4.5. Robustness: impact heterogeneity

So far, we have produced mean-based estimates from dynamic panel regressions under various conditions. The estimates could be interpreted as the mean. In other words, the estimate represents 'average effects' of the explanatory variables on the outcome variable.

In Table 2 (emerging and developed economics in Panel A and Panel B) presents large differences between the minimum and the maximum. In case of emerging economies, for instance, for the variable *Cash*, the minimum is 0.105, whereas the maximum is 0.341. Likewise, for developed countries, the minimum is 0.004 and the maximum is 0.51 with a median value for *Cash* is 0.085. The latter is significantly different from the mean value of 0.133. This difference between the mean and the median as well as between the minimum and maximum (not only for *Cash*, but also for other variables) motivates us to ask if the effects of cash in the previous period and the institutional ownership exert uniform (average effects) on the current value of cash holding or the impact

Table 7. Uncovering impact heterogeneity.

Variable	Quantile: 0.25	Quantile: 0.50	Quantile: 0.75
<i>Panel A: Developed market</i>			
$Cash_{it-1}$	0.007*** (0.001)	0.105*** (0.002)	0.173*** (0.000)
$inst_own_{it}$	-0.012*** (0.000)	-0.078*** (0.001)	-0.125*** (0.002)
Controls	YES	YES	YES
Intercept	0.063*** (0.000)	0.186*** (0.001)	0.359*** (0.002)
Pseudo R^2	0.033	0.098	0.234
Obs.	183,516	183,516	183,516
Note: *, **, and ***, denote significance at 10%, 5%, and 1% levels, respectively. The results pertain to panel unconditional quantile regression. Quantile regression component: Huber Sandwich Standard Errors and Covariance; Bandwidth Method: Hall-Sheather (bw = 0.013 for tau = 0.25; bw = 0.019 for tau = 0.50 and bw = 0.013 for tau = 0.75); Sparsity Method: Kernel (Epanechnikov) using residuals. <i>Cash</i> is defined as cash and cash equivalents divided by net total assets (total assets less cash and cash equivalents). Controls include <i>NWC</i> , <i>PPE</i> , <i>R&D</i> is R&D and <i>Leverage</i> . <i>Ins_Own</i> is the institutional investments (in USD million) divided by last year market value of equity.			
<i>Panel B: Emerging market</i>			
$Cash_{it-1}$	0.015*** (0.001)	0.143*** (0.003)	0.186*** (0.005)
$inst_own_{it}$	-0.001*** (0.000)	-0.093*** (0.001)	-0.161*** (0.002)
Controls	YES	YES	YES
Intercept	0.053*** (0.000)	0.133*** (0.001)	0.273*** (0.005)
Pseudo R^2	0.031	0.067	0.137
Obs.	165,635	165,635	165,635

The results pertain to panel unconditional quantile regression. Quantile regression component: Huber Sandwich Standard Errors and Covariance; Bandwidth Method: Hall-Sheather (bw = 0.013 for tau = 0.25; bw = 0.018 for tau = 0.50 and bw = 0.013 for tau = 0.75); Sparsity Method: Kernel (Epanechnikov) using residuals. *Cash* is defined as cash and cash equivalents divided by net total assets (total assets less cash and cash equivalents). Controls include *NWC*, *PPE*, *R&D* is R&D and *Leverage*. *Ins_Own* is the institutional investments (in USD million) divided by last year market value of equity.

magnitudes are heterogeneous at various points of the distribution of cash holding. Evidence of heterogeneous impacts would indeed be more policy-relevant, as we map out how a change in institutional ownership, for instance, triggers variable responses to cash holding at the low, median, and upper quantile of the distribution.

In Table 6, we present unconditional quantile regression estimates of the baseline regression. It is apparent that the median estimates for the lagged effects of cash and institutional ownership variables are substantially different from the mean-based estimates in Table 3. It is interesting to note that the estimates we obtain at the higher quantile (75th quantile) are closer to the mean-based estimates from dynamic panel regression, which means that these estimates are biased upwards and do not fully capture the effects at the lower quantile of the distribution of the dependent variable, Cash. Indeed, both the lower and median quantile estimates are far smaller than the obtained mean-based regression estimates. However, the generality of the implications of our regression remains robust (that financially constrained firms tend to hold more cash). The impact magnitudes differ across the distribution though.

5. Concluding remarks and managerial implications

5.1. Conclusions

In this paper, we study the role of institutional ownership on corporate cash holdings. Using a wide sample from both emerging and developed markets, we find that institutional investors help to reduce the cash holdings in both emerging and developed countries. We provide new evidence that the cash holdings pattern changes when we consider financial constraints, corruption at the country level, and legal regimes. The level of corruption significantly affects cash-holding decisions by firms. Institutional ownership plays a marginal role in reducing cash for financially constrained firms. Further, if a firm operates in a corrupt environment, it tends to hold more cash, and this is common across firms in both emerging and developed countries. We also provide new findings

that the legal system of a country affects cash holdings decision and firms in common-law countries, which are characterized by better investor protection, hold less cash.

5.2. Managerial implications

The findings of this paper can be used by managers of a firm to re-look at the way to manage cash holdings. Due to increased internationalization and globalization of businesses, it is important that managers recognize the roles played by the country-level variables that can affect their decision-making. In a globalized business landscape, it is crucial for managers to recognize the impact of country-specific variables on financial decisions. We highlight two key but underexplored country-level factors – the level of corruption and the legal framework within a country. Our study reveals that institutional investors have a limited impact on cash management in developed common-law countries, even if corruption levels are high, which contrasts with their role in emerging common-law economies. This has several important implications for managers – (i) before expanding into new countries, managers can use these findings to assess the local institutional environment, especially corruption levels and legal protections. This evaluation can help them decide on appropriate levels of cash reserves to mitigate potential risks. (ii) The study underscores the importance of institutional investors, especially in emerging markets, in moderating financial resource management. Managers in such regions may benefit from actively engaging with institutional investors to align cash management practices with broader financial stability goals and finally (iii) by understanding how corruption and legal frameworks affect cash holdings, managers can implement targeted risk mitigation strategies. For instance, in high-corruption countries, maintaining higher liquidity may provide a buffer against potential instability.

Notes

1. Lee and Kim (2024) construct a two-period optimal liquidation problem to study the optimal intertemporal liquidation strategies to meet the cash requirements of large institutional investors. Atallah, Le, and Wood (2022) demonstrate that institutional heterogeneity can improve firms' long-term growth and the institutions that focus on regular income seem to resist cuts in the event of exogenous shocks, such as the COVID-19.
2. Klettner (2021) analyses, for instance, national stewardship codes to understand cross-country variations in investor stewardship policy. The author notes that stewardship codes influence the shareholder–manager relationship and can encourage integration of wider economic and societal concerns into corporate finance.
3. Thanks to an anonymous referee for offering insights to this note.
4. <https://worldpopulationreview.com/country-rankings/common-law-countries>, accessed June 11, 2022.

Acknowledgements

We thank two anonymous referees, an associate editor, and Professor Chris Adcock, the Editor-in-Chief for many helpful comments. We are solely responsible for any remaining errors in the paper.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix 1. Variable definition.

Variable	Measure	Source
Cash	$\frac{(\text{Cash} + \text{cash equivalents})}{(\text{Total Assets} - \text{cash} - \text{cash equivalents})}$	Bloomberg
Age	Age from the date of listing in the stock exchange	Bloomberg
Cash from Operations (CFO)	$\frac{(\text{Cash from operations})}{(\text{Total Assets} - \text{cash} - \text{cash equivalents})}$	Bloomberg
Net working capital (NWC)	$\frac{(\text{Inventories} + \text{Account Receivables} - \text{Account payables})}{(\text{Total Assets} - \text{cash} - \text{cash equivalents})}$	Bloomberg
Plant, Property and Equipment (PPE)	$\frac{(\text{Plant, Property and Equipment})}{(\text{Total Assets} - \text{cash} - \text{cash equivalents})}$	Bloomberg
Research and Development (R&D)	$\frac{(\text{R\&D Expenses})}{(\text{Total Assets} - \text{cash} - \text{cash equivalents})}$	Bloomberg
Return on Assets (ROA)	$\frac{(\text{Earnings before interest and taxes})}{(\text{Total Assets} - \text{cash} - \text{cash equivalents})}$	Bloomberg
SA_Index	$(-0.737 \times \text{Size}) + (0.043 \times \text{Size}^2) - (0.04 \times \text{Age})$	Hadlock and Pierce 2010
Size	Natural log of $(\text{Total Assets} - \text{cash} - \text{cash equivalents})$	Authors own
Sales_growth	3-years moving average of sales growth	Bloomberg
Leverage	$\frac{(\text{Interest bearing long} - \text{term and short} - \text{term debt})}{(\text{Total Assets} - \text{cash} - \text{cash equivalents})}$	Bloomberg
Institutional investors	$\frac{\text{Institutional investment (US \$ million)}}{\text{Market value of equity (US \$ million)}}$	Authors' calculation
Corruption	Control of corruption index ranges from –2.5 (Most corrupt) to +2.5 (least corrupt)	World Governance Indicators, IMF Database