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Corporate cash holdings: Causes and consequences

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ABSTRACT

The considerable growth in corporate cash holdings around the world has prompted scholarly interest. Consequently, there is now a large academic literature examining cash holdings and their impact on corporate outcomes and firm values. This article reviews and synthesizes the literature to offer insight into two primary motives to hold cash: precautionary and agency. We first present a stylized model that explores the trade-off in holding cash between these two motives and then examine empirical studies to determine how existing theories are supported by evidence using data from a variety of countries. In addition, we examine the effectiveness of a variety of corporate governance devices in curtailing cash holdings and also the extent to which these devices offer investors' confidence that cash will not be wasted. Finally, we discuss methodological and measurement issues associated with empirical cash holdings studies.

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1. Introduction

Companies worldwide have considerably increased their cash holdings over the past two decades. A recent report by Deloitte stated that "The top 1000 non-financial companies globally are holding $2.8 trillion in cash".[1] The sum of cash holdings by all US firms alone is estimated by Forbes to be $5 trillion.[2] From the 1990s to 2000s, the cash holdings of US firms more than doubled to about 13% of firms total assets, amounting to 10% of annual US GDP (Dittmar & Mahrt-Smith, 2007). In addition, Bates, Kahle, and Stulz (2009) report cash holdings increasing by 0.46% per annum over the 1980–2006 period. Large corporate cash holdings are not confined to the US. For example, Japanese firms hold $2.1 trillion in cash, which accounts for 44% of their GDP. Similar figures for Korean firms are $440 billion and 34%, respectively.[3] Continental European firms at the beginning of the 2000s held 15% of their total assets in cash (Ferreira & Vilela, 2004) while it is more than 20% for Chinese listed firms (Chen, Chen, Schipper, Xu, & Xue, 2012).

The numbers above indicate that cash holdings are important to firms and a growing literature has emerged to investigate its determinants and its consequences for firm behavior. Various aspects of firms' behavior relating to cash holdings have been explored, necessitating a synthesis of the literature in order to explain what is known, the issues that remain disputed, and to identify possible directions for future research. In this paper, we focus the review on two key theoretical perspectives on corporate cash holdings: (1) the precautionary motive and (2) the agency motive. The first addresses issues relating to liquidity and the retention of cash for investment purposes and how this is impacted by capital market imperfections. The second deals with the potential misuse of corporate cash by self-interested senior executives in pursuit of private gain, which is constrained by a system of good corporate governance.

We begin in Section 2 with a simple model that highlights the trade-off between risk management in a setting of capital market imperfections and the agency problem of cash holdings. The model provides a common framework through which a variety of issues explored in the paper can be understood. In Section 3 we focus on the level of cash holding and its changes in response to changes in financial constraints. In Section 4 we discuss cash-related agency problems and the effectiveness of internal and external governance in mitigating misuse of cash. In Section 5 we discuss implications of institutional factors with reference to cross-country studies and also draw attention to studies of two particular countries, China and India. Issues related to the measurement of cash holdings and methods employed are discussed in Section 6. Finally, in Section 7 we discuss possible paths for future research and conclude.

2. The model

Based on stylized facts, the simple model developed in this section serves to illustrate the basic trade-offs implicit in the cash holding literature. The main purpose of this section is to give underlying reasoning behind various hypotheses tested in the literature. The model will highlight the tension of a financially constrained firm's need to hold cash for precautionary motives versus managers' desire to hold and use this cash for self-interested reasons, illustrating the role of good corporate governance.

Let there be a financially constrained firm with a manager (who controls the firm's resources) and a group of dispersed shareholders. The model employs a two-date setting. At date 1 the firm has the opportunity of investing in a positive NPV project, which needs a variable scale of investment, I. The probability of the project opportunity arriving is β. Assuming the firm cannot fund the project by issuing financial claims to outside investors, β captures both the degree of financial constraints and the need to hedge it via cash. Hence, at date 0 the firm has to decide how much of its earnings (S) to retain in liquid assets to make investment I and how much to return to its investors. If the firm does not invest in the project, it returns the cash to shareholders. On the other hand, if the firm invests in the project, the manager is in charge and he can potentially divert an amount of cash (Δ) to other projects from which the manager obtains private benefit. This diversion destroys shareholder value directly because it reduces the probability of the project's success, $p(I-\Delta)$, which depends on the amount of cash diverted from the investment.

This section explores both the determinants of Δ and its consequent impact on investment and firm value. The firm's board of directors initiates investigation of the manager's decisions and actions with a probability q. Therefore, q captures "board activism". If the manager gets caught, depending on effectiveness of the board and the institutional environment, his punishment takes the following forms: either he is fired with a probability of τ and he retains only k fraction of Δ or, with complementary probability, the manager is retained in spite of being caught and punished with a small fine, F. Hence, τ captures the effectiveness of internal and external governance mechanisms in deterring an illicit diversion and q indicates how active and independent the board is for initiation of the enquiry of manager's malfeasance. The manager is not caught diverting cash with probability $1-q$. We also assume that there are two types of managers: honest and dishonest, so that catching an errant manager is non-trivial. The proportion of each type is exogenously determined. The probability the manager is honest and does not divert cash is α. We assume that the manager is paid (W) when the project is successful and he is not fired. With these ingredients, we can define the expected pay-off for the dishonest manager, who intends to divert Δ from the sum allotted to investment in the project, as:

$$(1-q)[p(I-\Delta)W+\Delta] + q[\tau k\Delta + (1-\tau)\{p(I-\Delta)(W-F)+\Delta\}] - c(\Delta) \quad (1)$$

Note that Eq. (1), reflecting the manager's decision to divert cash away from the project, is relevant when the manager has already invested the firm's surplus earmarked for the project. His trade-off from diversion of cash is as follows: it increases his personal benefit by the amount of diversion if not caught by the board. However, diverting funds reduces the project's probability of success and shrinks his expected payments from the firm and captured by the first term of (1). The second term of the equation shows his expected pay-off when he is caught and punished. If the board is strong, he is fired with a probability of τ and enjoys a fraction of k of Δ. The complementary probability where he is retained in the firm with a small fine, F, represents the case of a weakly governed firm. Finally, the last term represents the effort costs of stealing or diverting fund. Eq. (1) can be conveniently written as:

$$p(I-\Delta)[(1-\tau q)W-(1-\tau)F] + [1-\tau q(1-k)]\Delta - c(\Delta) \quad (1')$$

The dishonest manager chooses the optimal amount of cash diversion to balance his gains and costs at the margin. The first-order condition of his optimization problem is:

$$p'(I-\Delta)[(1-\tau q)W-(1-\tau)F] - c'(\Delta) = [1-\tau q(1-k)] \quad (2)$$

Eq. (2) describes the tension between the private benefits and costs of managerial diversion at the margin. If the manager diverts $1 of cash, it reduces the probability of the project's success by $p'(I-\Delta)$and shrinks his contractual pay-off (W) net of expected punishments either in the form of firing or fine, captured by the first term of Eq. (2). The second term is the marginal cost of stealing. The right hand side is the

[1] https://www.deloitte.com/assets/Dcom-UnitedKingdom/Local%20Assets/Documents/Market%20insights/uk-mi-cash-paradox-jan-14-v.pdf

[2] http://www.forbes.com/sites/louiswoodhill/2014/01/01/why-american-companies-are-holding-onto-5-trillion-in-cash/

[3] "A $2.5 Trillion problem" The Economist, September 27th, 2014.

increment in private benefit of a $1 net of punishment as proportion to the diverted amount.

The optimal amount of cash diversion will therefore depend on: (a) the amount of cash that the firm saves for investment I and (b) the probability of initiating investigation q, the share of the cash successfully diverted k, likelihood of being fired τ, and the amount of remuneration W that the CEO gets in event of success.

These comparative statics results provide the basis for hypothesis development tested in the literature linking cash holding for investment in project (I) agency costs, role of governance to the optimal amount of diversion and firm value. For example,

$$\frac{\partial \Delta}{\partial I} = \frac{p''(I-\Delta)[(1-\tau)W-(1-\tau)F]}{p''[(1-\tau)W-(1-\tau)F]+c''} > 0$$

implying the extra cash flow marked for investment leads to greater diversion of cash as expounded in Jensen (1986). In a similar way, it can be shown that better governance, in the form of (a) increased likelihood of board investigation (q), (b) magnitude of fine (F) and (c) likelihood of being fired τ, reduces the optimal diversion of cash by the manager. The implication of these results is that a firm's board takes into account the possibility of increased diversion from the cash reserved for the arrival of new investment opportunities as explained below.

Now let us suppose the firm currently has surplus cash S. The firm's expected value (V) is given by the amount of net cash holdings ($S - I$) *plus* the expected cash flow from investment that includes the probability of a project opportunity arriving (β) times cash flow to the shareholders from the project (Y) net of compensations and unchecked diversion of funds by the manager and the probability of non-arrival of the project opportunity times the return (r) on the idle cash. The firm's shareholders (the board of directors) decide to maximize the expected value by its choice of cash holding for the purpose of investment (I) while taking into account both the probability of the project's arrival and the potential cash diversion, which is related to the probability of the manager being dishonest, 1 - α.[4] That is, they choose an optimal I to maximize the following expression:

$$V = S-I+(1-\beta)I(1+r)+\beta[\{\alpha p(I)(Y-W)\}+(1-\alpha) \times\{(1-q)p(I-\Delta)(\Upsilon-W)\}+q\{p(I-\Delta)(\Upsilon-W+F)(1-\tau)] \quad (3)$$

Subject to Eq. (2), the first-order condition for the problem is:

$$\beta[\alpha p'(I)+(1-\alpha)p'(I-\Delta)\{(1-\tau q)(Y-W)+(1-\tau)F\}]\left[1-\frac{\partial \Delta}{\partial I}\right] = r\left[1-\beta\left(\frac{1}{r}+1\right)\right] \quad (4)$$

The left hand side of Eq. (4) is the firm's net incremental benefits of the cash holding in the event of arrival of the projects and the right hand side is the marginal costs of idle cash holding in case the project does not arrive. Note that the firm's board takes into account the benefit from net cash holding of diversion at the margin $(1-\frac{\partial \Delta}{\partial I})$ to arrive at the optimal value of cash holding.

We can combine (2) and (4) to get a number of testable hypotheses used in the literature. Any changes in external and internal governance mechanisms in our framework will have two effects: (a) a direct effect, which will change the value of the firm directly and (b) an indirect effect, which captures their impacts on firm value via changes in the optimal diversion of cash by the manager. For example, the following result illustrates the impact of "board activism" (measured by an increase in q), on the value of the firm:

$$\frac{dV}{dq} = p(I-\Delta)[(1-\tau)F-\tau(Y-W)]-p'(I-\Delta) \times[(1-\tau q)(Y-W)+(1-\tau)F]\frac{\partial \Delta}{\partial q} > 0$$

The term $[(1-\tau)F-\tau(Y-W)]$ is the *direct* incremental impact on firm value because greater board activism leads to greater detection of funds being diverted. The second term traces out the *indirect* impact of greater board activism on the optimal amount of cash diverted by the manager, $(\frac{\partial \Delta}{\partial q})$. This term captures the corporate governance effect that reduces cash diversion and improves firm value because less diversion increases the probability of the project's success and the amount available to shareholders. This leads to the hypothesis that cash is more valuable in a firm better governed by either improvement in board activism (increase in q) and/or effective punishment of a dishonest manager (an increased value of τ). A variant of this hypothesis has been explored empirically in the literature by Dittmar and Mahrt-Smith (2007); Pinkowitz, Stulz, and Williamson (2006) and described in detail later in Section 4.

Interestingly, the direct impact on firm value and the impact on cash diversion, Δ (which we call the corporate governance effect), work in the opposite direction for an increase in wage payment (W) to the manager, as shown by the equation below:

$$\frac{dV}{dW} = -p(I-\Delta)[(1-\tau q)]-p'(I-\Delta)[(1-\tau q)(Y-W)+(1-\tau)F]\frac{\partial \Delta}{\partial W}$$

The first term is negative as the increased compensations to manager directly increase costs to the shareholders. However, with the rise in wages, diversion becomes costly for the manager. First, it reduces the expected wage income as the probability of success decreases with more cash diversion. Second, the manager runs the risk of losing wage payment if he gets caught and loses his job. The result implies a non-monotonic relationship between firm value and the magnitude of manager compensation, which is vindicated by some of the empirical literature, see Section 4.1.1.

The impact of financial constraints together with the arrival of the project opportunity (an increased value of (β) is clear; *ceteris paribus*, it always increases the cash level retained for investment and firm value). The next section will capture various ways and means that firms use cash for this precautionary purpose and the section afterwards will discuss the literature on agency issues and governance aspects of cash holding.

3. Cash holdings as a response to external financial constraints

The starting point in our discussion is the *irrelevance* argument introduced by Keynes (1936), according to which, a firm's cash holdings are a sideshow to its investment and financing decisions if the firm has access to perfect capital markets. In that case, it can raise new capital on the spot at a fair price to finance its investment opportunities and should have little or no interest in accumulating cash, outside the need to meet its transaction needs. The precautionary motive for holding cash thus arises when firms have limited financing or hedging opportunities due to imperfect capital and insurance markets.

If the argument above is true, financing frictions and accumulation of cash should not only be positively related but also its variation across firms should be associated with differences in expected financing frictions. Thus, we analyze determinants of both levels and their variations of cash holdings in this section.

[4] The total cash holding, which is I, will thus affect the scale of investment as well. This is an important point because the diversion reduces the available cash for investment as well and becomes an opportunity cost. We do not elaborate on this because it will divert attention from the main issues of the survey paper.

3.1. Determinants of firms' demand for cash

In line with the view that financial constraints exert influence on the precautionary motive of cash holding, Opler, Pinkowitz, Stulz, and Williamson (1999) investigate the determinants of cash holdings of US publicly traded firms from 1971 to 1994 and find that firms have a target level of cash which is increasing with growth opportunities and riskiness of cash flows of their projects and decreasing with access to capital. Their evidence implies that firms hold cash when cash flow needed for investment is low and when outside capital is costly. Hence, it is consistent with the argument in Myers and Majluf (1984) that firms which suffer from larger information asymmetry problems are likely to secure 'financial slack' to avoid the need of raising external funds. This finding is also consistent with the predictions of the model presented by Kim, Mauer, and Sherman (1998) who show that a firm's optimal cash holding is determined by the trade-off between the low returns earned by holding a liquid asset and the benefit to fund future investment opportunities in the presence of costlier external finance.

In a similar vein, Bates et al. (2009) document a secular increase in the cash holdings of US firms and investigate the sources of this increase. In particular, they find that the average cash ratio had more than doubled from the early 1980s to the middle 2000s to become a quarter of firm's total assets. Further analysis reveals that this increase is associated with the more risky nature of cash flows, which is consistent with the findings in Opler et al. (1999) and also linked to compositional changes in firms' assets over time.[5] In particular, firms which keep more cash also hold fewer cash substitutes, i.e. inventories and receivables and are more R&D-intensive as opposed to being capital-intensive. Brown and Petersen (2011) show that the smaller and younger firms hold cash to smooth out volatilities in R&D expenditures over time.

Large cash holdings are not a phenomenon limited to firms located in the US. International studies also report that public firms around the world hold substantial cash on their balance sheets and present evidence consistent with the precautionary motive. For example, Ferreira and Vilela (2004) find that corporations in Continental Europe at the beginning of the 2000s held 15% of their total assets in cash and cash equivalents. Consistent with US studies (e.g. Bates et al., 2009; Opler et al., 1999), they find that cash holdings were positively associated with firms' investment opportunity set and cash flows and negatively with their access to bank financing. Similarly, Ozkan and Ozkan (2004) examine cash holdings of UK firms and find a positive relation with firms' growth opportunities and a negative relation with bank debt but also report significant effects arising from firms' ownership structure.[6]

The impact of institutional factors on the relationship between cash holdings and debt is also examined in the cross-country study of Pinkowitz and Williamson (2001). Using industrial firms from the US, Germany and Japan, they find that Japanese firms hold larger cash balances than their counterparts. They argue that the finding is driven by banks' monopoly power; firms hoarded cash in order to generate rents for banks and/or reduce their monitoring costs. More recently, Song and Lee (2012) identify long-term effects of a financial crisis on firms' demand for precautionary cash. In particular, after the 1997–1998 Asian financial crisis public firms in affected countries increased their cash holdings and dropped investment plans and these results persisted in the long-term despite economic recovery. Overall, international evidence suggests that large cash holdings are not a US phenomenon although the broad conclusion of this literature is that rising trends may differ across and within countries over time, depending on the patterns of institutional ownerships and systemic shocks such as financial crisis.

Similar trends of cash holdings have also been observed within privately held firms. A comparison of levels of cash held by US public and private firms by Gao, Harford, and Li (2013) shows that despite facing higher financial constraints, private firms hold about half as much cash as public firms and they attribute the difference to the relatively higher agency problems in the latter group of firms. Similar inferences on the importance of financial constraints in cash policies of private firms are presented by Bigelli and Sanchez-Vidal (2012) in Italy and in an international context by Hall, Mateus, and Mateus (2014).

Opler et al. (1999) assume that firms face a trade-off between the costs associated with foregone investment opportunities due to lack of capital market access and the costs associated with the liquidity premium of holding cash or cash equivalents. The assumption implies a target (or optimal) level of cash for each firm based on its operational, investment and financing needs. The concept of an optimal level of cash is problematic if it is assumed to be constant over time because optimal cash holdings might change depending on the external environment. For instance, optimal cash holdings will likely be different when there is a financial crisis compared to when there is no such event. Many empirical studies, cited in this section, however, assume optimal cash holdings are constant over time.

Duchin, Ozbas, and Sensoy (2010) is a notable exception, examining the transfer of cash holdings over different states of the world. They find that the excess cash holdings of US firms during the 2008 financial crisis are positively related to firms' capital investment. The seemingly excess cash held during the good state of the world was transferred to the bad state of the world, allowing firms to transfer financing capacity across those states. This is consistent with the precautionary motive. These findings are echoed in the survey evidence of Campello, Graham, and Harvey (2010), which reveals that during the crisis, financially constrained firms reduced their cash holdings considerably more than their less constrained counterparts.

To sum up, this sub-section presents overwhelming evidence that firms hold cash as a response to frictions in capital markets. In particular, we focused on the *level* of cash holding by financially constrained firms. The next section deals with how such firms' investment plans and cash holdings are sensitive to *changes* in measures of financial constraints as well as on the degree of development of financial markets.

3.2. Precautionary savings and financial constraints

It is well known from earlier research that financial constraints may significantly affect firms' cash flows and cash holdings, relevant to its investment decisions. The influential work of Fazzari, Hubbard, and Petersen (1988) suggests that under this scenario, investment should be positively related to firms' cash flow levels and hence positive *investment-cash flow sensitivity* is suggestive of financial constraints. However, a number of subsequent papers have questioned its interpretation, arguing among others that a high sensitivity may reflect instead significant growth opportunities (e.g. Kaplan & Zingales, 1997).

Based on this argument, Almeida, Campello, and Weisbach (2004) argue that managers in financially constrained firms should have at least a greater propensity to save cash out of their incremental cash flows to secure future financing compared to their counterparts in relatively unconstrained firms. Hence, they propose changes to cash savings, as opposed to physical investment, to gauge the cost of external finance. They estimate the *cash flow sensitivity of cash* across subsamples of US firms and find supporting evidence. In particular, they use differences in payout policies, size, bond and commercial paper ratings and an index derived from Kaplan and Zingales (1997) to partition their sample to seemingly 'unconstrained' and 'constrained' firms and find

[5] Foley, Hartzell, Titman, and Twite (2007) provide a different explanation for US firms' large cash holdings, attributing high levels to large amounts of cash held by their foreign subsidiaries due to tax costs of repatriating foreign income. Their tax-based argument is further developed by studies exploring the implications of foreign cash on domestic investment when repatriation costs are lowered (e.g. Faulkender & Petersen, 2012) and on foreign investment in the form of acquisitions (Hanlon, Lester, and Verdi (2015).

[6] Kling et al. (2014) extend the analysis of Ozkan and Ozkan (2004) on UK-listed firms to include potential alternatives to cash, including trade credit and short-term debt.

positive and significant values for their proposed sensitivity measure for the latter group of firms and insignificant for the former group of firms.

The framework proposed by Almeida et al. (2004) on saving propensities was employed by several theoretical and empirical studies to examine external finance constraints.[7] For example, Han and Qiu (2007) examine the impact of cash flow volatility on the link between cash holdings and financial constraints and find evidence that constrained firms increase their cash holdings in response to increases in cash flow volatility but unconstrained firms do not exhibit that sensitivity. From an international perspective, Khurana, Martin, and Pereira (2006) examine the influence of a country's financial development on firms' financial constraints and find that financial development increases firms' access to capital and lowers their demand for precautionary cash which is associated with a decline in their cash flow sensitivity of cash. Similar results are reported in Kusnadi and Wei (2011), however in their cross-country sample a country's legal system, rather than its financial development, has first-order effects on managers' decision to save cash. Denis and Sibilikov (2011) investigate why managers expecting financial constraints have a higher propensity to save cash and they document that cash is associated with higher investment spending in the presence of financial constraints. Hence, they provide support to the precautionary argument of Almeida et al. (2004) by showing that cash holdings matter more for financially constrained firms because they enable these firms to take advantage of investment opportunities which would be bypassed otherwise. More recently, Erel, Jang, and Weisbach (2015) investigate changes in financial constraints of target firms in European M&As and find evidence of relaxed constraints after acquisition takes place which is evidenced in firms' lower cash flow sensitivities of cash.

Almeida et al. (2004) also show that in the absence of financial constraints, there should be no systematic relationship between *changes* in firms' cash holdings and current cash flows. However, to the extent that sources of cash may differ across firms or over time, the cash flow sensitivity of cash may not capture well the impact of financial constraints on corporate outcomes. For example, recent evidence by McLean (2011) shows that US public firms increasingly get their cash from new equity issues rather than from operating cash flows. Specifically, between the 1970s and 2000s, cash saved from operating cash flows decreased by 6% per year and cash saved from new issuance activities increased by 7% per year on average, with the overall contribution of new issues to cash savings being relatively greater since the middle 1980s. Further analysis reveals that these trends are associated with increasing precautionary motives, most notably increases in R&D investment and cash flow volatility. From another perspective, Riddick and Whited (2009) develop a model on corporate savings in which the firm faces uncertainty in income and costly external finance. They test their theoretical predictions empirically and find that the sensitivity of saving to changes in cash flow is negative rather than positive as the work of Almeida et al. (2004) precludes, after adjusting for the measurement error in Tobin's *q*.

Implications of the above studies question the use of saving propensities as useful measures of firms' external financial constraints and highlight the importance of share issuance activities for cash saving purposes. In light of this argument, more work is needed to understand whether the increasing role of share issuances for cash savings is also present outside the US and how this might affect inferences on financial constraints. In addition, the firms also have access to alternatives to cash holding such as lines of credit or internal capital market which provides insurance or coinsurance and might serve as substitutes to cash holding. The following section investigates the link between these alternatives to cash in detail.

[7] For a related discussion on saving propensities as well as other issues on liquidity management, see Almeida, Campello, Cuhna, and Weisbach (2014). For an overview of cash management as a way to attain financial flexibility, see Denis (2011).

3.2.1. Cash and bank lines of credit as sources of liquidity

Theory suggests that outside cash holdings, bank lines of credit can also provide liquidity insurance to the firm consistent with a precautionary motive (e.g. Holmstrom & Tirole, 1998). Firms may establish committed lines of credit with outside lenders to hedge the risk of higher costs of financing in the spot market and thereby mitigate underinvestment problems. As a result, a credit line acts effectively as an 'option on liquidity' which can be exercised in case the spot market interest rate is higher than the pre-committed rate, at the cost of a bank fee. To what extent lines of credit belong to managers' portfolio of liquidity management tools and how they interact with other sources of liquidity, notably cash holdings, is a recent topic attracting interest.

Starting with managers' own point of view on the subject, Lins, Servaes, and Tufano (2010) conduct a survey of finance managers in private and public firms around the world before the recent financial crisis and find that managers on average hold 9% of their assets in cash and 15% of their assets in the form of pre-committed lines of credit. Their evidence also reveals that pre-committed lines of credit rather than cash holdings are generally used by managers to finance future investment opportunities when they expect external financing needs to be high in contrast to the precautionary motive in the cash literature. From a different perspective, Yun (2009) reports that shareholders and managers may have different views on the optimal choice between the two liquidity instruments. In particular, shareholders in weakly governed firms may favor an increase in the share of loan commitments to overall liquidity to limit the discretionary power of managers through covenants and bank monitoring. From another perspective, Campello, Giambona, Graham, and Harvey (2011) examine the interaction between liquidity sources during the recent financial crisis, i.e. during a period when external financing was likely to be a binding constraint. Their evidence reveals that constrained firms drew more heavily on pre-committed lines of credit during the crisis compared to their unconstrained counterparts but the drawdown was negatively related to the amount of cash held. Therefore, previous findings from both a financing and agency perspective imply a negative relationship between the two liquidity instruments, consistent with substitution effects. However, they offer limited insight into why firms should establish a bank credit line in the first place and what determines this decision relative to that of holding cash.

A key insight of the above research is that cash provides unconditional liquidity at all times and states of the world while bank credit lines provide liquidity insurance provided that firms perform well to meet covenant restrictions and lenders are able to honor their commitment obligations. This creates a problem however because firms may not perform well at the same time that lenders may not be able to guarantee funding for them. Acharya, Almeida, and Campello (2013) examine both theoretically and empirically the link between banks' provision of liquidity insurance for firms and the latter's ex-ante choices between cash and lines of credit. The main idea proposed in the paper is that firms' exposure to aggregate shocks, their 'beta', is a significant determinant of their liquidity choices. Assuming a liquidity premium for holding cash, firms face a trade-off between the premium and aggregate risk, i.e. how correlated are its liquidity problems with those of other firms. The empirical evidence presented in Acharya et al. (2013) reveals that firms less likely to worry about aggregate liquidity shocks (low beta firms) can avoid the liquidity premium by securing bank credit lines while firms more likely to be hit by aggregate liquidity shocks (high beta firms) hold cash for liquidity insurance.

3.2.2. Cash holdings and internal capital markets

Firms need not rely on outside insurance instruments such as bank lines of credit and financial derivatives from external markets or FIs, but it may also count on internal funds to smooth investment opportunities and cash flow shortfalls. Multidivisional firms (i.e. conglomerates), business groups which also often owned by family firms fit well that description since they typically consist of a large number of

relatively diversified firms which could provide mutual insurance when needed. As a result, one would expect that firms affiliated with more complex organizations would exhibit a lower precautionary demand for cash.

Consistent with this view, Duchin (2010) examines the impact of corporate diversification on cash holdings of US multidivisional firms. They extend the framework proposed by Opler et al. (1999) to include uncertainty arising from volatility in investment opportunities across divisions and find evidence that the coinsurance benefit of internal capital markets reduces the need to hold precautionary cash. In a similar paper, Subramaniam, Tang, Yue, and Zhou (2011) attribute the lower cash holdings of diversified firms to the complementarity in growth opportunities across the different segments while Tong (2011) associates diversification with lower values of cash.

The evidence above is consistent with the argument that internal capital markets allocate funds to constrained corporate units, i.e. those with relatively higher investment opportunities but low cash flows which would find it difficult or prohibitively costly to get outside funding on their own (e.g. Matsusaka & Nanda, 2002; Stein, 1997). A further implication is that the benefit of having access to internal capital markets is higher when frictions in external markets become binding in situations like financial crisis (e.g. Rudolph & Schwetzler, 2013). However, this argument is weakened when internal funds are transferred instead to less efficient segments, due to agency and information asymmetry problems. This is consistent with evidence that inefficient allocation of internal funds relates to problems of overinvestment and rent-seeking activities (see for example Shin and Stulz, 1998; Scharfstein & Stein, 2000; Rajan, Servaes, & Zingales, 2000).

Thus, we summarize this section by arguing that frictions in financial markets and imperfect hedging instruments induce firms to hold excess levels of cash consistent with precautionary motives which in turn are affected by changes in cash flows, availability of alternative hedging instruments and risk sharing institutions such as business groups and family firms. An extended version of this argument shows that firms located in economies with low levels of financial development or hit by financial crises also tend to hold excessive cash. More recently, empirical studies show that cash holdings may be particularly important to firms relying on volatile sources of finance (e.g. R&D-intensive firms), consistent with precautionary motives.

3.3. The contribution of cash holdings to firm value across constrained and unconstrained firms

Unlike research studies above which focus on cross-sectional variations in *levels* and *changes* of firms' cash holdings, and the availability of alternative source of hedging instruments, a strand in the literature investigates the motives behind cash holding in a direct manner. This literature asserts that if financial constraint is the key determinant of cash holding, then cash should be more valuable for financially constrained firms than for unconstrained firms. Hence, extra cash reserves enable financially constrained firms to undertake value-increasing investment projects which would be bypassed otherwise, but also at the same time it could exacerbate the free cash flow problem (Jensen, 1986) within such firms, giving rise to differences in their relative values.

Consistent with this view, Faulkender and Wang (2006) investigate changes in firms' equity values that result from changes in their cash holdings and find that shareholders in the US place a higher value in the cash held by firms facing greater financing constraints. Their results imply that the marginal value of cash is significantly higher in financially constrained firms with low levels of cash since these firms are likely to face higher transaction costs when raising new capital in the outside markets. In contrast, the contribution of additional cash to firm value declines as cash holdings become larger due to tax and agency effects. Denis and Sibilikov (2011) also show that greater cash holdings are more valuable to constrained firms because they allow these firms to undertake more value-increasing projects and hence the market responds more favorably to investments undertaken by these firms. Luo (2011) finds that an extra dollar of cash spent in financially unconstrained firms leads to lower performance compared to financially constrained firms. Importantly, this finding is not significant in the sub-sample of firms with strong corporate governance. This is interpreted as strong corporate governance placing no additional constraint on self-interested managers' use of cash, implying that financial constraints substitute strong corporate governance.

Using a different methodology that examines variations in the level of firms' market-to-book ratios as opposed to equity returns, Pinkowitz et al. (2006) examine the relation between firm value and cash holdings in a cross-country analysis. They hypothesize that differences in institutional factors across countries may be associated with differences in financial constraints and agency problems across firms. In particular, a cash reserve may help as a buffer to protect the firm against adverse shocks but may also be siphoned out or invested in projects with private benefits, both of which may be more appealing to settings with poor economic development and weak investor protection. Their evidence provides support to the latter explanation, i.e. firms in low investor protection countries are associated with lower values of cash since part of this cash is likely used for the appropriation of private benefits by corporate insiders.

The findings above clearly illustrate the limitations that holding cash entails and its diminishing marginal contribution to firm value due to agency and free cash flow problems associated with the structure of modern corporations where the manager wields enormous power over the decision making process. The question then emerges as to what extent it can be mitigated by the corporate governance mechanisms in place and what is the empirical evidence? The rest of the paper addresses these important issues.

4. Cash holdings and corporate governance

It is well known that in publicly listed companies there is an agency conflict between managers and shareholders. Due to separation of ownership and control, the self-interested managers will seek to use corporate resources for their private benefit at the expense of shareholders' interests (Jensen & Meckling, 1976). Central to this issue is corporate cash holdings and the subsequent use of this cash. Shareholders' objectives are pursued when managers invest in profitable projects and distribute any excess cash to shareholders after all profitable investments have been made. Jensen (1986) highlights the difficulty of disbursement of this excess cash to shareholders because self-interested managers derive private benefit from investments in unprofitable projects. In such circumstances, the agency motive for holding cash predicts that managers will hold excess cash which will destroy shareholder value.

The purpose of this section is twofold. First, it explores the agency costs of retaining cash within the firm rather than distributing it to shareholders. Second, it explores the conditions under which corporate governance mitigates the agency costs of retaining cash.

4.1. Corporate governance and the value of cash holdings

Results based on a large-scale sample study are mixed. Opler et al. (1999) and Bates et al. (2009) find no evidence of a decrease in the value of cash holdings on their samples of US firms. On the other hand, Gao et al. (2013) in a comparative study with private firms as well as Dittmar, Mahrt-Smith, and Servaes (2003) and Ferreira and Vilela (2004) in an international context present evidence that large cash holdings are associated with more severe agency problems.

By using a sample of 1952 US industrial firms over the period 1990–2003, Dittmar and Mahrt-Smith (2007) estimate the importance of good corporate governance on cash holdings. They examine two aspects of corporate governance on the value of cash holdings: managerial entrenchment from the use of antitakeover provisions and monitoring

from institutional block holders. Both aspects of corporate governance indicate that cash holdings are valued higher in firms with stronger corporate governance. Using stock returns to value cash holdings, Dittmar and Mahrt-Smith (2007) report that the average value of a dollar of cash is about $1.09. When antitakeover provisions are used to determine the quality of corporate governance, a dollar of cash for poorly governed firms can fall as low as $0.42, while for well-governed firms a dollar of cash is valued at up to $1.62. When institutional block holder monitoring is used to determine the quality of corporate governance, a dollar value of cash in poorly governed firms is as low as $0.88 while for well-governed firms it is worth $1.27. Further analysis reveals that the quality of corporate governance does not influence the decision to *accumulate* cash; rather, it influences the decision to *spend* excess cash. This flexibility in the usage of cash only has value to shareholders under the condition of strong corporate governance which ensures that cash holdings will be used in circumstances that enhance shareholder value rather than in the pursuit of managerial objectives.

4.1.1. Managerial stock ownership

If large cash holdings are a consequence of an agency problem between senior executives and shareholders, any mechanism that reduces the agency problem would in turn reduce the amount of corporate cash holdings. Equity is included as a component of senior executives' compensation in an attempt to align their interests with those of outside equity owners. It implies that senior executives will bear a cost in holding sub-optimally large amounts of cash. Nikolov and Whited (2014) find that low managerial ownership is a key driver of increased cash holdings. However, Liu and Mauer (2011) find that CEO compensation providing risk-taking incentives is associated with higher levels of cash holding but this cash has lower value to shareholders. They suggest that bondholders might be requiring higher cash reserves because they anticipate CEOs taking greater risks with corporate resources.

Ozkan and Ozkan (2004) find that the relationship between management equity ownership and cash holding is non-monotonic. They find that cash holdings fall as managerial equity ownership increases to 24%; cash holdings then increase as managerial equity holdings increase to 64%, falling again when managerial equity ownership is above 64%. Part of this relationship could be explained by CEO entrenchment. Elyasiani and Zhang (2015) find that entrenched CEOs prefer liquid assets because it reduces firms' risks, which in turn provides managers with job security, but it also provides the resources to pursue objectives that deliver private benefit. It might be that very high levels of management ownership are associated with lower cash holdings because managers bear a greater share of the cost for each unit of cash that is misused.

4.1.2. Board of directors

The Board of Directors has a fiduciary duty to act on shareholders' behalf and so it has a key role in monitoring senior executives to protect shareholders' interests. A board tends to be more effective in ensuring stronger corporate governance if it has a higher proportion of independent directors. Therefore, if a high level of cash holdings is an agency problem we expect a more effective board to mitigate this problem. In addition, an effective board restricts a self-interested manager's ability to extract private benefit when the cash is spent. In which case, firms with a high level of cash and an effective board will not suffer detrimental performance because managers are unable to pursue self-interested uses of the cash. There is no indication that board structure impacts on cash holdings (Harford, Mansi, & Maxwell, 2008, Ozkan & Ozkan, 2004) and the operating performance of firms with high cash holdings (Mikkelson & Partch, 2003). This indicates that high cash holdings may not be related to board structure per se but it certainly impacts the prudent uses of such cash.

4.1.3. Debt

Debt (or leverage) has the potential to discipline managers' discretionary behavior, therefore reducing the agency costs of cash holdings. Jensen (1986) argues that the fixed interest obligation of debt bonds managers to pay out cash to creditors rather than hoard it or enjoy private benefit from spending it on unprofitable investments. Thus, higher leverage reduces the amount of cash under managers' control and therefore reduces the agency costs associated with firm expenditures that yield managers private benefit. The reduction of discretionary expenditures is expected to increase the value of the firm and benefit shareholders. Higher leverage, however, increases financial risk because it increases the likelihood of default and bankruptcy costs. Faulkender and Wang (2006) find evidence that increases in cash levels and leverage decrease the marginal value of cash. An extra dollar of cash in an all equity-financed firm is worth $0.143 more than an extra dollar of cash in a firm with a 10% leverage ratio.

4.1.4. Antitakeover provisions

Takeovers are a feature of the market for corporate control that acts as a governance device in two ways. First, the threat of takeover attenuates self-interested managers' propensity to indulge in non-value-maximizing behavior. Second, the takeover itself removes underperforming senior managers from their posts. In this sense takeovers are a form of natural selection ensuring that the best performing managers control corporate resources. Antitakeover provisions weaken the takeover as a governance device, allowing managers to become entrenched. Such entrenchment would allow self-serving managers to increase corporate cash holdings for their private benefit.

Bates et al. (2009) and Brisker, Colak, and Peterson (2013) examine the impact of managerial entrenchment on corporate cash holdings. They use the Gompers, Ishii, and Metrick (2003) index (GIM index) as a measure of managerial entrenchment. The GIM index is a cumulative index of 24 antitakeover provisions obtained from the Investor Responsibility Research Center (IRRC). Firms with a high value of the GIM index are considered to have more entrenched management. Bates et al. (2009) find no statistical relationship between the GIM index and corporate cash holdings and conclude that agency costs have no impact on corporate cash holdings. Brisker et al. (2013) also make use of the GIM index focusing their attention on changes in cash holdings after indexing in the S&P500. They find that mean industry-adjusted cash holdings decline by nearly 32% from the year before the listing to the year after the listing and associate this with increased use of antitakeover provisions, measured by the GIM index. They argue that this deterioration in corporate governance increases managerial entrenchment leading to a reduction in cash holdings.

From another perspective, Masulis, Wang, and Xie (2009) examine the value of cash holdings in firms with dual-class shares. This ownership structure exacerbates the potential to entrench managers since they typically hold disproportionately more voting shares which insulates them from hostile takeovers. Using a sample of 2440 US firms with a dual-class share structure over the 1995–2003 period, Masulis et al. (2009) find that when managers' voting rights increase relative to their cash flow rights, the value of cash holdings declines. This is because the antitakeover provision of dual-class shares makes it more likely that managers can extract private benefit from the cash holdings without fear of being disciplined by takeover.

4.2. Corporate governance and the propensity of managers to spend excess cash

In the presence of weak corporate governance self-interested managers are able to use excess cash to pursue their own private benefits. It is not theoretically clear, however, from an agency perspective whether self-interested managers will spend excess cash or retain it within the firm (Harford et al., 2008). This is because managers can obtain private benefit from spending the excess cash but they also derive private

benefit from the flexibility that excess cash holdings offer. Mergers and Acquisitions (M&A) provide some evidence of the use of accumulated cash of the acquirers. In this section we explore the assorted means by which managers expend excess cash holdings in the pursuit of private benefit in context of M&A to examine their impact on firm value.

Harford (1999) finds that cash-rich firms are more likely to attempt corporate acquisitions. In addition, when they successfully complete an acquisition it destroys shareholder value. Indeed, cash-rich bidders destroy seven cents in shareholder value for every excess dollar of cash reserves held. These findings are consistent with the theoretical predictions of agency theory. In contrast, Pinkowitz, Sturgess, and Williamson (2013) find that cash-rich firms are 23% less likely to make cash bids than stock bids. In addition, cash-rich firms use a lower proportion of cash in their bids. There is no clear explanation as to why the managers of cash-rich firms prefer to use stock when making acquisitions. Therefore, this is an issue that requires further theoretical and empirical investigation.

Opler et al. (1999) also find that increases in cash holdings are associated with increases in acquisitions and payouts to shareholders. While this acquisition activity is consistent with the agency motive, the payout of excess cash is not. In a survey of finance managers, Brav, Graham, Campbell, and Michaely (2005) present evidence that managers often impose discipline upon themselves by disgorging cash via dividend payouts or repurchases of shares. These findings provide interesting insights on the managerial decisions of returning cash to shareholders on their own. However, it might simply be that managers are pragmatic in paying out enough cash to satisfy shareholders to prevent closer scrutiny of their acquisitions.

The holding of cash also gives firms a competitive edge in their pursuit to either outperform their rivals in securing larger market shares (Bolton and Scharfstein, 1990), undertaking new investment opportunities (Haushalter, Klasa, and Maxwell, 2007), or winning technological races (Qiu and Wan, 2015). In all such cases, holding more cash relative to rivals gives a firm strategic advantage, which can boost its market value.

Finally, Masulis and Reza (2015) examine the use of corporate cash for philanthropic purpose and find such donations are often spent on charities affiliated to independent directors. This evidence suggests at least indirect attempts by these CEOs to undermine the independence of the board of directors. The reduction in firm value associated with charity giving suggests that shareholders regard it as a misuse of corporate resources. Several studies have also focused on various other means that CEOs and block holders often resort to form outside connections to further their own personal and private interests. One such important area relevant to our study is the economic behaviors of founders of powerful family firms who tend to use their connections to expropriate minority shareholders by diverting cash and tunnel them to projects that augment their private benefits. We survey such phenomenon below in the next section.

4.3. Family ownership and political connections

The founders or owners of family firms often have large and persistent shareholding positions which enable them to monitor and exert effective governance on firms' management. Burkart, Panuzi, and Shleifer (2003) formalize this argument in a model in which family control substitutes weak formal institutions to resolve the classic owner–manager agency problem. Also, their long-term commitment to the firm lessens agency conflicts with debt holders which induce the firm to undertake safer projects resulting to a lower cost of debt financing (Anderson, Duru & Reeb, 2012 Anderson, Mansi & Reeb, 2003) and both factors tend to reduce the precautionary demand for cash.

However, family ownership may give rise to another type of agency problem which originates from the separation of ownership and control rights (e.g. through pyramids, dual-class shares and cross-shareholdings) and it creates conflicts of interest between family founders and minority shareholders. See Almeida and Wolfenzon (2006). The empirical evidence shows that family owners of such firms may divert cash to serve their own liquidity needs or projects of private interest (e.g. Bertrand, Mehta & Mullainathan, 2002; Lins, Volpin & Wagner, 2013).

Many of such powerful families often form close ties with the Government to pursue rent-seeking activities especially in weaker legal regimes (e.g. Faccio, 2006, Khanna & Yafeh, 2007, Morck & Yeung, 2004) and family insiders can expropriate other stakeholders without fearing regulatory punishment (Liu, Luo, & Tian, 2015). The overall evidence of cash holding pattern of politically connected firms is also mixed and it varies across countries. For example, Liu et al. (2015) show that cash holding tends to be greater for such firms in China and the evidence shows that such cash is used for tunneling towards private benefits of the controlling shareholders. The excess cash is neither paid to shareholders nor invested in profitable projects. On the other hand, Boubaker, Derouiche, and Hassen (2015) find that the French family firms tend to hold lesser amount of excess cash to address the minority shareholders' concern for appropriation and tunneling. Megginson, Ullah, and Wei (2014), show that partially privatized Chinese firms tend to hold more excess cash compared to the non-privatized firm. All such studies however show that marginal value of cash declines in firms with either concentrated family or state ownerships. For French family firms, the value of excess cash declines by 76% compared to the non-family firms and for the Chinese firms the marginal value of cash is 0.36 (RMB) higher for the privatized firm. Since most studies in the literature are in the context of Chinese state enterprise, we discuss this topic further in Section 5.2 below. Finally, we also note that political uncertainty itself gives rise to holding of precautionary demand of cash and cutting back of investment projects (Julio & Yook, 2012), implying politics matters for cash anyway.

5. Cash holdings in international firms outside the US

5.1. Cross-country analysis

Much of the empirical literature on cash holdings is set in the US context. There is, however, a growing literature examining corporate cash holdings in different institutional contexts. Such studies are very important to furthering our understanding of the role of the legal system and capital market conditions on corporate cash holdings. This section briefly outlines why firms operating in a weak legal system and in an under-developed capital market are more likely to hold cash.

A well-functioning legal system creates an environment for effective corporate governance because it protects the minority shareholders' rights and also prevents self-interested managers from expropriating shareholders' wealth (La Porta, Lopez-De-Silanes, Shleifer, & Vishny, 2000, Shleifer & Vishny, 1997). Hence, weaker legal regimes with poorer shareholder protection contribute to underdevelopment of financial markets due to lack of participation of broad classes of investors and also allow self-interested managers to accumulate cash in pursuit of their private benefits. Also contributing to weak corporate governance in developing and transition economies is the lack of effective managerial and takeover markets to discipline managers (Sun & Tong, 2003).

Several empirical studies thus seek to examine the roles of legal protection and capital market development across a variety of countries. Such studies are able to isolate agency cost and precautionary motives for corporate cash holdings. Consistent with the agency cost motive for holding cash, firms operating in countries with weak legal protection for shareholders hold more cash than firms in countries with strong investor protection (Dittmar et al., 2003; Ferreira & Vilela, 2004) and will hold more cash in response to an increase in cash flow (Kusnadi & Wei, 2011). However, if weak legal protection allows corrupt politicians to extract cash from firms, they tend to hold less cash and more physical assets, which make it harder for politicians to extract rents (Caprio, Faccio, & McConnell, 2013). Political corruption therefore encourages

firms to hold sub-optimally low levels of cash while weak corporate governance in the form of weak legal protection allows self-interested managers to accumulate corporate cash holdings.

Evidence on the impact of capital market development on cash holdings is mixed. Dittmar et al. (2003) find that firms hold more cash when capital market development is weak while Ferreira and Vilela (2004) find that capital market development has a negative effect on cash holdings. The different findings for capital market development could be attributed to the different samples employed; Dittmar et al. (2003) use a sample of 45 countries with a wide range of capital market development while Ferreira and Vilela (2004) use a sample of 11 EMU countries, all of which are regarded as having well developed capital markets, though to varying degrees.

Hall et al. (2014) examine the cash holdings of firms operating in 20 Central and Eastern European countries that are at varying stages of economic transition where soft budget constraints tend to exacerbate incentive problems of self-interested managers. Firms operating in a more market-oriented environment are found to hold more cash due to the threat of bankruptcy arising from better creditor protection. A problem of this study, however, is that it was not able to decompose the effects of investor legal protection and capital market development.

The evidence overwhelmingly supports the accumulation of cash holdings as an agency cost in countries with poorer investor protection. Pinkowitz et al. (2006) find that cash contributes more to firm value in countries with stronger investor protection (weak political corruption). A one dollar increase in cash is associated with an increase in firm value of $0.33 in countries with weak investor protection while it increases firm value by $0.91 in countries with strong investor protection. In a similar study Kalcheva and Lins (2007) examine the impact of entrenched managers on the value of cash holdings. In countries with weak investor protection the value of a dollar increase in cash holdings is $0.76 and this deteriorates further to $0.39 when managers are the largest blockholders. If, however, entrenched managers pay a dividend, this raises the value to outside shareholders of incremental increases in cash holdings. It is only when there is strong legal protection for shareholders that corporate governance has no impact on the value of cash holdings. Fresard and Salva (2010) adopt a slightly different approach by examining the impact of cross-listing on US exchanges on the value of cash of non-US firms. The legal protection for investors in the US provides a stronger system of corporate governance in the US than in firms' domestic countries. This is reflected in one dollar of cash holdings being valued at $1.61 for cross-listed firms compared $0.58 for non-US firms that are not cross-listed.

5.2. China

China represents an interesting context for examining corporate cash holdings because government agencies retain a controlling or significant ownership stake in Chinese PLCs. There are two competing arguments concerning the impact of government ownership on cash holdings. First, government shareholdings provide a financial incentive to monitor and discipline management behavior, which substitutes for weak legal investor protection and weak corporate governance. In this case, firms will maintain cash holdings to ensure liquidity and the strategic flexibility to make necessary investments. Second, firms with high government ownership are subject to a 'soft budget' constraint, suffer the burden of pursuing social objectives and enjoy easier access to credit from state-owned banks (Cull & Xu, 2000; Lin & Tan, 1999). They therefore hold lower levels of cash.

Megginson et al. (2014) find that the level of cash holdings increases with the decline in state ownership. Firms are less likely to hold cash to maintain liquidity if they are subject to soft budget constraints. Thus, the increase in corporate cash holdings reported by Megginson et al. (2014) is due to the soft budget constraint having less of an impact on firms' behavior. They also report that the decline in state ownership is associated with an increase in the marginal value of cash, which suggests shareholders are more likely to value cash that is less likely to be appropriated for use by the state.

In contrast to SOEs, privately owned firms find it more difficult to get financial support from banks. Although the largest Chinese banks were permitted to lend to private firms in 1998, Allen, Qian, and Qian (2005) suggest that private firms still have more difficulty in gaining access to external finance compared to SOEs. In order to overcome such financial constraints private firms' investment activity relies more heavily on cash compared to SOEs (Ding, Guariglia & Knight, 2013). Therefore, in order to exploit future investment opportunities, PLCs controlled by private owners will have a higher optimal level of cash holding compared to a state controlled PLC. Indeed, the opportunity cost of not holding cash for privately controlled PLCs is higher given the investment opportunities available in China's rapidly growing economy. In the case of family owned Chinese firms, however, high levels of cash are used for tunneling at the expense of minority shareholders (Liu et al., 2015).

The form of partial state ownership of companies in China can be viewed as a substitute for weak corporate governance. The state can use its control rights to mitigate the shareholder–manager agency problem and protect shareholders from wealth expropriation by managers (Lin, Cai, & Li, 1998). The state has an incentive to implement this only if it can establish credibility in the privatization process (Perotti, 1995). In contrast to firms controlled by a private owner, however, listed firms whose ultimate owner is a branch of government might have to pursue social and political objectives as part of a government agency's objective.

Chen et al. (2012) examine the impact of corporate governance on 1293 Chinese-listed non-financial firms observed over the 2000–2008 period. More specifically, they examine how ease of converting non-tradable shares into tradable shares improves corporate governance. By allowing blockholders to realize financial gains from improvements in firm performance, financial incentives are created to actively monitor senior management. This corporate governance reform resulted in the ratio of cash to non-cash assets falling from 23.5% to 20.8%. This is consistent with the shareholding reform improving corporate governance, which in turn reduces self-interested managers' ability to save corporate cash for their private benefit. This reduction is larger in privately controlled firms than state controlled firms. Chen et al. (2012) argue that this finding is consistent with privately controlled and government controlled enterprises pursuing different objectives i.e. privately controlled firms are more likely to pursue value-maximization while state controlled firms are more likely to pursue social and political objectives.

Evidence concerning the quality of political governance and development of a more market-oriented economic environment show mixed results. Using World Bank data on the local government quality of 120 Chinese cities, Chen, Li, Xiao, and Zou (2014) find that when local government is of high quality, firms hold less cash for precautionary reasons. They argue that this is due to local government attenuating financial constraints by facilitating access to bank finance and trade credit. In addition, they find no evidence to support the argument that the government appropriates cash; rather, good government creates a legal environment that better protects investors' interests from entrenched managers. Kusnadi, Yang, and Zhou (2015) use indices constructed by the National Economic Research Institute to proxy institutional development (i.e. the development of a more market-oriented economy). They find a positive relationship between institutional development and cash holdings and it is more pronounced for non-state-controlled firms. These findings are consistent with stronger institutional development mitigating the threat of political intervention to extract cash. The findings of Chen et al. (2014) and Kusnadi et al. (2015) are inconsistent with each other. This could be due to the different measures used to proxy the economic and political environment in which firms operate. Nevertheless, more research is required on this issue for a clearer picture to emerge.

5.3. India

While much academic interest has been devoted to the cash holding policies of Chinese firms and the role of the state, less research has focused on family-controlled firms which constitute the dominant organizational form in other Asian emerging economies such as India and in most parts of Continental Europe (e.g. La Porta, Lopez-De-Silanes, & Shleifer, 1999).

Similar to their Chinese counterparts, Indian firms are subject to market imperfections, which increase informational asymmetries and make it costly to raise external funds (e.g. Khanna & Palepu, 2000). In response, firms may be organized in business groups, i.e. collections of firms under family ownership, to mitigate external market failures. In this context, group affiliation may substitute for precautionary demand for cash since groups can operate internal capital markets, for example in the form of intra-group loans and cross-guarantees, to alleviate group firms' financial constraints (e.g. Gopalan, Nanda, & Seru, 2007). However, business groups may also engage in tunneling activities in which cash holdings of one firm could be expropriated to other affiliates at the expense of outside shareholders (e.g. Bertrand et al., 2002).

Drawing on the evidence concerning US conglomerates, one would expect that business group firms would similarly hold less cash than individual firms since group membership may implicitly or explicitly mitigate financial constraints. However, legal and institutional imperfections in these markets combined with the need to provide financial assistance to other group affiliates, may induce these firms to accumulate cash holdings considerably larger than the amount determined by firm-specific financial characteristics (e.g. the spirit of Opler et al., 1999). Given the prevalence of business groups around the world, we consider determinants and consequences of cash holdings in family business groups as an underexplored but interesting area for future research. In the following section, we discuss this as well as other paths for future research and conclude.

6. Methodological and measurement issues

This section discusses two key issues in relation to empirical studies of cash holdings. The first concerns the measurement of cash holdings. In particular, we highlight a fundamental inconsistency between how some studies measure cash holdings and the precautionary motive for holding cash. The second concerns 'sources' of the endogeneity problem and methods employed to address the problem.

6.1. The composition of corporate cash holdings

The measure of cash holdings used in most studies is the sum of cash and cash equivalents and short-term investments in marketable securities[8] (e.g. Bates et al., 2009; Opler et al., 1999). These short-term investments typically include financial assets with maturity of up to 90 days and assets that the firm intends to liquidate within the year (e.g. overnight repos, commercial paper). The identifying assumption is that corporate cash holdings comprise of cash and non-cash financial assets which are highly liquid, risk-free securities that can be readily converted to cash at low or no cost, as required by the precautionary motive.[9]

There is concern, however, that the reporting of firms' short-term investments may take place outside the readily available measure of cash reported in firms' accounts, which means some studies are inaccurately measuring cash. The problem is illustrated by Duchin, Gilbert, Harford, and Hrdlicka (2015), who hand-collect individual asset holdings (short-term investment) data from the footnotes of the annual reports of S&P 500 firms and find large discrepancies with the standard measure of cash holdings. They observe that the average firm's total reserves are 17% larger than the figure reported as 'cash' in the balance sheet, which suggests that the stockpiling of cash reported in some studies (e.g. Bates et al., 2009) might be even more pronounced. Importantly, this questions the use of readily available account variables to accurately measure a firm's total cash holdings.

Notwithstanding measurement issues, including non-cash financial assets in firms' cash holdings is conceptually problematic in relation to the precautionary motive. Firms are increasingly including more risky and illiquid securities among their reserves, which may not provide adequate liquidity in times of need. Duchin et al. (2015) report that a large fraction of firms' reserves get invested in relatively risky and illiquid non-cash assets such as corporate debt, equity and mortgage-backed securities. Holding such assets is clearly inconsistent with cash being held for precautionary motives.

There is cross-firm variation in the composition of cash holdings with respect to assets held in cash and assets held in short-term investments. Evidence that firms make a choice concerning this composition suggests that firms do not treat cash and short-term investments as perfect substitutes and do not treat short-term investments as cash (Brown, 2014; Cardella, Fairhurst, & Klasa, 2015; Duchin et al., 2015). Firms with more difficulties predicting their short-term liquidity needs and those with weaker governance hold a lower fraction of their cash reserves in short-term investments because as managers value liquidity in these firms higher (Cardella et al., 2015). Therefore, short-term investments are not simply a store of excess cash, but an investment decision (Brown, 2014). It suggests that assets that are included as cash by many studies are not necessarily perceived as cash by managers.

The additional concern in measuring reserves of non-US firms is that they may include marketable securities issued by related companies (e.g. subsidiaries or affiliates), due to the prevalence of complex organizational structures in emerging and developing countries (e.g. business groups). As liquidity problems may be correlated, the firm is exposed to a large covariance risk which makes holdings of these securities inconsistent with precautionary motives. Due to this, Pinkowitz and Williamson (2001) measure cash holdings of public firms in Japan by deducting cross-holdings from firms' marketable securities.

Overall, this section summarizes recent developments in the literature which reveals problems of measuring firms' cash holdings and challenges the traditional explanation of underlying precautionary motives, at least for the fraction of reserves invested in less liquid and safer financial assets. In future research, more care should be exercised in the measurement issues of cash which should clearly differentiate between cash and so-called cash equivalents which may not be perfect substitutes.

6.2. Endogeneity

An important issue in modern empirical analysis is the problem of endogeneity because it can lead to biased coefficient estimates. Not all studies recognize that the empirical strategy adopted will result in endogeneity bias. Clearly, the results of such studies should be treated with caution. There are a variety of potential sources for the endogeneity problem, but the common factor involves the cash holdings decision being jointly determined with other corporate policies. First, empirical models include variables reflecting the capital structure decision, such as leverage. The cash holding decision is a feature of the capital structure decision and so they are jointly determined. Second, empirical models often include a dividend payout variable because it will directly impact on cash holdings, but the cash holding decision will impact on the dividend payout. Finally, empirical models often include an investment variable because investment can draw down cash

[8] For example, US studies typically report as *cash* the sum of cash and cash equivalents (Compustat variable 'CH') and short-term investments (Compustat variable 'IVST'), deflated by assets or sales.

[9] A strand in the literature studying firms' liquidity choices defines total liquid assets as the sum of cash holdings and bank credit lines (e.g. Elyasiani & Zhang, 2015; Yun, 2009).

holdings. Whether firms make investments depends on whether firms have access to the necessary financial resources, including cash.

Scholars that recognize their empirical models might suffer from endogeneity problems have adopted four broad strategies to address the problem. First, a small number of studies have dropped endogenous variables (e.g. Opler et al., 1999). This procedure is unsatisfactory because dropping significant variables introduces omitted variable bias. A second strategy involves using a predetermined independent variable i.e. a lagged regressor. This requires sound theoretical justification for the direction of causality, thus motivating the use of a lagged regressor. For instance, Harford et al. (2008) argue that prior theory suggests that corporate governance is more likely to influence cash holdings than vice versa.

A third strategy used in the literature is to use an instrumental variable (IV) estimator. A standard IV estimator of reduced form models is two-stage least squares, but generalized method of moment estimators has also been used. The usual problem in implementing these models is finding an appropriate instrument i.e. a variable that is correlated with the endogenous variable but is uncorrelated with the error term. Typically, lagged values of the endogenous variable are used. Care needs to be taken with this approach because of the potential for the lagged value to be correlated with a serially correlated error term. This is why tests for serial correlation and Hansen/Sargan tests are employed to identify a valid instrument set.

IV estimators using lagged variables as instruments are a pragmatic way of addressing endogeneity in reduced form models and often reflect the difficulties in obtaining instruments (exogenous variables). When it is possible to obtain instruments a fourth strategy employed in the literature is the estimation of a structural model i.e. a system of simultaneous equations. Estimating a system of equations is preferable to the estimation of a reduced form model because of the difficulties in interpreting coefficient estimates as the underlying parameters of the structural model cannot be identified. A variety of techniques have been employed to estimate structural models e.g. three-stage least squares (e.g. Acharya, Almeida, & Campello, 2007; Liu et al., 2015), full information maximum likelihood (D'Mello, Krishnaswami, & Larkin, 2008), panel vector autoregression (Kling, Paul, & Gonis, 2014), and simulated method of moments (Nikolov & Whited, 2014).

This section has outlined potential sources of endogeneity in empirical models of cash holdings. We briefly explain the standard IV approach to addressing the problem and have also outlined recent developments in the econometric techniques used to estimate structural models that better identify the underlying parameters of structural relationships between variables.

7. Conclusions and future research

Overall, the literature on cash holdings suggests two primary motives which induce firms to hold cash, namely a precautionary motive that relates to future financial constraints and an agency motive that relates to imperfections in the dispersed form of ownership of the public firm. However, much of the literature has treated these motives in separation, thereby failing to detect possible interactions between firms' demand for insurance and implications arising from governance failures. This paper draws attention to this gap by presenting a stylized model that highlights the trade-off in firm's demand for cash and summarizes the arguments in the cash literature around these two motives.

While studies examine the determinants of firm-level variation in cash holding, we still require an adequate explanation for the rapid increase in aggregate corporate cash holding over the past 30 years. Given worldwide advancements in technology and reforms in capital markets (permitting improved inventory management, improved access to finance and advanced hedging instruments), it is still not clear why firms around the world keep so much cash on their balance sheets. Much of the focus in the literature has been on exploring precautionary and agency motives for corporate cash holding; while they explain variation between firms, they do not provide an adequate explanation for the aggregate increase in corporate cash holdings outlined in the first paragraph of this paper. Thus, further research is required and we propose a number of areas.

First, scant attention has been given to cultural factors. A notable exception is Chen, Dou, Rhee, Truong, and Veeraraghavan (2015); using national cultural characteristics, they report that cash holdings have a negative association with individualism and a positive association with uncertainty avoidance. Further research could analyze other individual characteristics. Does managers' risk preferences and risk perception impact on the precautionary motive for holding cash? Does religion and gender play a role in managers' preferences to hold cash?

Second, larger precautionary cash holdings might be required in some industries because the cost of investments in such industries has increased dramatically. For instance, successfully competing in the pharmaceutical sector requires an ability to fund large-scale R&D projects. Also, if firms in high-technology industries find it difficult to obtain external funding for investment, they will rely more on cash holdings to fund their investment (Himmelberg & Petersen, 1994). In an economy where the average value of a project increases or an economy that is shifting towards high-technology industries, we might expect to observe the precautionary levels of cash holdings to be higher. What role does project scale and the riskiness of new technology play in corporate cash holding?

Third, Harford et al. (2008) argue that agency theory is not clear on whether self-interested managers will spend or hoard cash in excess of that required to fund all profitable projects. This might explain why theoretical and empirical studies do not explore the hoard–spend choice that confronts self-interested managers. Harford et al. (2008) point out that the choice managers make might be a function of the likelihood of being disciplined. Determining and quantifying the relationship between the hoard–spend choice and the likelihood of managers being disciplined is an empirical issue that can be explored in future research. Another aspect of corporate governance impacting on the hoard–spend decision could be executive remuneration. What is the link between components of CEO pay and firms' cash holdings?

Fourth, private equity represents a development in the capital market with the potential to alleviate financial constraints (Amess, Stiebale, & Wright, 2015). In which case, we would expect a reduction in observed precautionary cash holdings. In addition, improved corporate governance reduces the agency motive for holding cash (Jensen, 1986). Private equity backed leveraged buyouts have come under criticism, however, for creating financial inflexibility (Rappaport, 1990). Therefore, there is an issue as to whether LBOs reduce managers' precautionary motive for holding cash, which could damage firms' ability to make strategic investments, or LBOs simply curtail excessive cash holdings.

Finally, political uncertainty during election years is associated with lower firm-level investment (Julio & Yook, 2012). Political parties often have different policies regarding the regulatory environment, the establishment or abolition of regulatory institutions, how and by how much firms are taxed, and regarding policies to stimulate economic growth. Does political uncertainty impact on corporate cash holdings? How do different economic policies impact on corporate cash holdings?

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