1-1-2011

Essays on international corporate cash holdings

Yonghong Jia
Wayne State University,

ESSAYS ON INTERNATIONAL CORPORATE CASH HOLDINGS

by

YONGHONG JIA

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2011

MAJOR: BUSINESS ADMINISTRATION
(Finance)

_____

Advisor Date

_____

_____

_____

_____

ACKNOWLEDGEMENTS

Working on and writing this dissertation is a long, rewarding and fascinating process during which I have been fortunate enough to work with and learn from different people. Here I would like to express my deep appreciation for and acknowledge their support and encouragement.

I am especially indebted to my advisor, Mai Iskandar-Datta, who has been giving me countless support, guidance, and inspiration both inside and outside academic arena. Her outstanding scholarship, great dedication to the pedagogy, and more importantly deep devotion to the finance profession have shaped my thoughts and insights on the academic career. I would have not been able to accomplish this dissertation without her constantly stimulating my interests. She definitely deserves my sincere appreciation and respect even for the rest of my life.

I would also like to thank Dr. Sudip Datta, Dr. Mbodja Mougoué, and Dr. Kevin Cotter for kindly agreeing to take part of my dissertation committee. Their comments and suggestions are valuable to the completion of this dissertation.

I have received precious help from my fellow Ph.D. students, Xinghua Gao and Mark Gruskin and it is my pleasure to acknowledge both of them. I genuinely hope that we can keep our friendship in the future.

I am grateful to the School of Business Administration at Wayne State University for providing optimal working environment, good facilities, and the necessary administrative support. My special gratitude goes to Dr. Tim Butler who was attentive to our various needs when he served as the Ph.D. program director.

Last but not least, I owe greatly to my lovely daughter. Her understanding, unconditional love and sacrifice contribute to my accomplishment of this dissertation.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Introduction

Previous research establishes that the majority of all net financing are through the use of cash reserves. Furthermore, recent research finds that US firms doubled their cash balances in the past three decades (Bates et al. (2009)). As cash reserves account for an increasingly greater portion of corporate assets, academic research on corporate cash holdings has gained momentum in recent years. One line of the literature on cash holdings explores the various determinants of cash holdings while the second strand of the research focuses on the real implications of cash holdings. These studies have broadened and enhanced our understanding of the various facets of corporate cash policy. Nevertheless, much of the research focuses on the US firms and the evidence is mixed. It is fair to say that many questions remain unanswered in this area. For example, we lack conclusive evidence on the most fundamental question of whether investors should worry about large cash reserves. Furthermore, serving as a similarly important role as debts in corporate financing, corporate cash holdings have not actually received enough attention compared to capital structures. If we acknowledge that the choice of capital structures is still puzzling to us, we must admit that we have far more unknowns about corporate liquidity policy.

I started my research on corporate cash holdings by investigating whether the time trend on cash holdings observed in the US extends to other industrialized countries in the first chapter of this dissertation. Extending this study into international setting serves three purposes: one is to conduct an out-of-sample test of US findings, the second is to explore the ramifications of institutional structures for corporate liquidity policy and the last one is to test the agency motive of corporate cash holdings.

Focusing on the US, Australia, France, Germany, Japan, Canada and the UK, I find an almost systematic upward trend in cash holdings across seven industrialized countries over 1991-2008

with the exception of Japan which exhibit a substantial decline; however, the driving forces underlying the cash pattern are not uniform across countries. The agency motive plays a role in the rise in cash balances in Germany. My analysis highlights that the functioning of the financial system is crucial to corporate cash policy as Australia's cash pattern is driven by shallow private credit markets that curbed cash reserves during the earlier period of my study and the decelerating cash trend in Japan is ascribed to financial reforms that eliminated rent-extraction opportunities by banks.

The second chapter on cash holdings in this dissertation is concerned with the real implications of holding excess cash, that is the depletion of cash assets and resulting effect on firms' operating performance. Firms may hold cash out of economic reasons, such as transaction and precautionary consideration, or agency costs motive. Whether large cash holdings bode well for shareholders is an important empirical issue. However, the extant evidence is mixed in the US. Researchers attribute the mixed evidence to the strong investor protection in the US. In this chapter, I explore this issue in the multi-countries setting to take advantage of the large variation in legal environment across countries. My measure of the strength of legal environment is based on both *de jure* and *de facto* aspects of regulation. The de jure measure of investor protection is the anti-director rights (shareholder rights) index defined in LLSV (1998) and extended by Spamann (2009). The de facto investor protection is proxied by the rule of law and expropriation risk index drawn from LLSV (1998), which assesses the rule and order tradition of a country and governance stance towards business, respectively.

Using time-series financial data from 41 countries, I provide new evidence that firms under weaker legal structures or external corporate governance do not hold more cash as previously thought. Instead, my results reveal that the agency conflicts of corporate cash holdings primarily

manifest themselves through the use of cash. Simply put, firms invest more in the presence of excess cash and this effect is exacerbated in countries with weaker corporate governance. The inefficient use of excess cash hinders firms' performance, especially in countries where investors are not well protected. These findings are significant because they imply that the agency conflict of cash holdings primarily lies in the misallocation of capital, not in its accumulation.

Chapter 1: Why Do Firms Hold So Much Cash? The International Evidence

1.1. Introduction

Corporate cash holdings account for a significant part of corporate assets in US balance sheets and are indispensable for corporate operations. Large cash holdings held by corporations have recently received increasing attention from both the financial press and academia. As of September 2009, the cash to assets ratio of the largest 500 non-financial US corporations has risen to 9.8%.[1] For instance, Google Inc. is flush with a cache of $22 billion in liquid assets accounting for an astounding 58% of its assets while the information technology sector as a whole is reported to hold 27% of assets in cash reserves.[2] In their recent work, Bates, Kahle and Stulz (2009) find that US firms more than doubled their cash holdings in the past three decades with average cash reserves progressively growing from 10% of assets in 1980 to 23% in 2006. They attribute this astonishing rise in cash to enhanced precautionary demand for cash spurred by changing firm attributes and not due to agency conflicts. Their findings suggest that elevated US cash holdings do not translate into "excess" cash.

The aim of this chapter is to investigate whether this large footprint of cash holdings observed in US corporate balance sheets is systemically shared by other industrialized countries. An intriguing, but unexplored question is whether the cash pattern observed in the US is an isolated or universal phenomenon. Simply put, is there a glut of cash holdings across the board globally? In essence, my study evaluates Bates et al.'s conclusions in a broader context, in an attempt to discover the extent to which their findings carry over to a broader sample of firms in other industrialized countries. If this phenomenon of pullulate cash reserves is ubiquitous, what

[1] Federal Reserve Bank data for 2009 indicates that corporate cash holdings are roughly 15% of US GDP.

[2] See The Wall Street Journal, November 2, 2009 (Companies Are Stockpiling Cash) and *The Economist*, July 7, 2006 (The Corporate Savings Glut).

prompted these changes? And are these levels of cash justifiable? If firms unjustifiably increase cash balances, the wealth loss to shareholders due to mismanagement of cash can be substantial when cash represents an increasingly higher portion of corporate assets. I extend the literature to the international setting by examining evidence on secular trends in corporate cash holdings for seven major industrialized countries (the United States, Canada, the United Kingdom, Germany, France, Japan and Australia) over the period 1991-2008. As such, this study is primarily exploratory in nature rendering this paper's approach akin in spirit to a number of studies that focus on cross-country comparisons for various corporate issues such as financing patterns (Rajan and Zingales, 1995; Booth, Aivazian, Demirguc-Kunt and Maksimovic, 2001) and dividend payout changes (Denis and Osobov, 2008), to name a few.

Even though my sample countries are homogeneous in economic development, they vary in institutional structures (such as shareholder rights, capital system orientation and the development of financial markets). The extent to which other industrialized countries do not exhibit similar cash pattern to US can speak to the relevance of institutional structures in equally developed countries. To the extent that sample countries experience similar time trends to the US, but with different underlying motivations, they enhance our understanding of the determinants of cash practices. Finally, if sample countries share similar secular trends and driving forces behind it, my results serve as an out-of-sample test of US findings.

In addition, the use of international data allows us to provide tests of the role of agency motives in corporate cash balances. Jensen's (1986) free cash flow argument posits that managerial opportunism can lead to stockpiling of cash at the expense of shareholders' welfare. Elevated cash levels facilitate managerial overinvestment inclinations and consumption of perquisites, in addition to insulating managers from external monitoring by capital markets. To

date, there is little, if any, evidence that corporate cash hoardings in the US are motivated by managerial opportunism.[3] Previous literature attributes this finding to the high quality of investor protection which forces entrenched managers in US firms to disgorge cash holdings. This begs the question of whether other countries with similarly strong shareholder rights as the US also show little evidence of agency conflicts in liquidity policy decisions. Prior research on international cash holdings (Dittmar, Mahrt-Smith, and Servaes, 2003; Pinkowitz, Stulz and Williamson, 2006; Kalcheva and Lins, 2007) addresses the question of whether countries with poor investor protections in aggregate suffer from agency problems in liquidity decisions. In contrast, I take on a different route by investigating whether the managerial agency motive is behind any secular trends in cash holdings in a specific country.

For a sample of 167,601 firm-year observations covering seven countries, my study contributes to the literature by documenting a long-term dramatic upward trend in corporate cash balances (ranging from 54% to 161%) in Canada, Australia, Germany, UK and US over a sample period spanning 18 years from 1991 to 2008. France posts the smallest increase (21%) in cash holdings while Japan experiences a pronounced decline of 21% in cash balances. The situation in Japan differs from other countries because its powerful banking sector extracted rents by forcing Japanese corporations to hold large cash balances during the 1980s. My results demonstrate that Japanese corporations' cash balances reached a more economically based level in the 2000s. The broader implication of the findings for Japan underscores the relevance of the functioning of the financial system to changes in corporate liquidity policy. Additional findings show that the suboptimal cash levels at Japanese firms induced by rent-extraction had a greater impact on low growth firms.

[3] See, for instance, Harford, Mansi and Maxwell, 2008; Mikkelson and Partch, 2003; and Bates et al., 2009.

My empirical analysis reveals that while sample countries share some common determinants of cash holdings, they also exhibit heterogeneity in the magnitude and relevance of certain determinants of corporate cash reserves identified for US firms. The findings accentuate the fact that the underlying forces found to influence firms' cash policy in the US are not spurious. Specifically, I find that market-to-book ratio, leverage, net working capital and capital expenditures have similar sway on cash balances across countries, supporting the view that cash holdings are built up by firms with growth opportunities and fewer substitutes for liquid asset.

I reason that if the institutional environment influence how firms set their cash policy, then the influence of the firm's dividend status on cash policy setting will vary based on the capital market orientation. My findings indicate that dividend paying firms which have greater access to external financing, and hence face little financial constraints, hold lower cash balances in Australia, Canada, UK and the US, but maintain higher reserves in the remaining three countries, suggesting that the well-documented effect of financial constraints on cash holdings in the US is only shared by other capital market-centered systems, but not in countries with bank-centered orientation where close ties with relationship banks reduce informational asymmetry between lender and borrower, causing financially constrained firms to hold less precautionary cash. Moreover, sample countries differ in their policies of how much cash to keep when it comes to cash flow risk and R&D innovations, with Japanese firms being the most conservative as they accumulate more cash in response to business risk and R&D innovation.

Firm attributes change markedly over the sample period for all seven countries. Examination of the evolution of firm characteristics reveals that the increase in cash holdings in all countries is accompanied by pronounced leverage declines (26%) indicative that firms in sample countries do not simply finance the increase in liquid assets with additional debt; rather, they have

deployed some of liquid assets to reduce leverage. I also observe a decline in net leverage (debt minus cash) that is more than twice the rate of decline in leverage, which suggests that firms favor holding on to some of their accumulated cash balances rather than eliminate completely their outstanding debt. In addition, all countries exhibit a decline in net working capital over time driven by more efficient inventory management. The steady increase in market-to-book ratio and substantial spike in cash flow volatility over the sample period for most countries is accompanied by a decline in firm size and corroborates the recent literature on increases in idiosyncratic risk across countries**.** During the last two decades a shift has occurred in corporate investments away from expenditures on capital stock and working capital and into R&D investments that appears to have necessitated reduced leverage and accumulations of cash. In a nutshell, my findings reveal a pronounced convergent evolution of firm attributes in these industrialized countries.

Further, I find that sample countries exhibit some commonality in the impact of changing firm attributes on the changes in cash reserves where the most important four factors affecting all sample countries are: changes in net working capital, changes in R&D expenses, changes in growth options and changes in industry cash flow volatility. These common factors point to the fact that firms that engage in building up their liquid assets are riskier firms with more information asymmetry.

Using different strategies to investigate whether the evolutionary changes in firm attributes provokes the shift in cash holdings, I document compelling evidence that the secular cash pattern is explainable by the time-varying firm attributes for only some countries—revealing that US, Canadian and French firms exhibit a *declining*—not increasing—time trend in cash reserves after accounting for changing firm attributes. This implies that the documented build up in cash holdings does not necessarily constitute excess cash in these countries. Japanese firms, induced

by financial reforms, exhibit even deeper cuts in their cash balances after controlling for changing firm characteristics. However, for Australia and Germany, even though the time-varying characteristics explain part of the upward trend in liquid assets, there is some evidence that other unobserved factors play a role in the upsurge in cash reserves.

To understand the rationale behind the cash pattern in Germany and Australia, I scrutinize whether the agency motive is a trigger behind the secular trend. First, I examine the association between growth opportunities and excess cash over time. I reason that excess cash in firms with superior investment prospects are more likely to be put to good uses than in firms with poor opportunities. Thus, if managerial opportunism drives cash policy—firms accumulate cash instead of paying it out to shareholders—it is more likely to be agency driven when it occurs in firms with inferior investment opportunities. Out of the seven sample countries, only German firms with poor growth opportunities hold positive excess cash over time, suggesting an agency motive in the secular cash pattern.

In a second test, I examine whether an additional dollar of cash in firms that increase their cash reserves contributes less to a change in firm value compared to firms that experience declines in cash balances on the grounds that cash reserves beyond justifiable levels facilitate extraction of private benefits. The evidence confirms the agency motive behind the accumulation of cash in Germany. I do not find similar evidence in other countries.

For Australia, I conduct a battery of tests on whether external financing costs, macro-economic changes or other factors which are not characterized in the current prevailing model of the determinants of cash holdings are capable of explaining the increase in cash holdings. My results show that developments in capital markets add explanatory power to the changes in cash balances, particularly the expansion of credit markets. The evidence suggests that the upward

cash pattern in Australia is driven by shallow private credit markets during the earlier period of my study which rendered corporate cash holdings inadequate early on. These findings establish that the functioning and development of the financial system are central to our understanding of corporate cash policy. In sum, although the phenomenon of upward cash trend documented for the US is shared by Australia and Germany, the causes that provoked the higher demand are not uniform across countries. Further, the causes behind the cash patterns in Australia and Japan highlight the importance of the functioning of financial markets to corporate cash practices.

Cross-country studies using international data to conduct time-series analysis can be subject to sample coverage bias. To explore this issue, I conduct a series of robustness checks and find that sample coverage bias in Worldscope does not influence the secular cash trend in my sample countries. In addition, I show that firms entering the sample in later years constitute a major driving force of the upward cash trend, especially in France and UK. The new entrant effect is consistent with the previous findings on cash holdings in the US (Bates et al., 2009) and dividend policy (Denis and Osobov, 2008).[4]

This chapter is structured as follows. First, I discuss theoretical predictions and empirical evidence in the literature in section 1.2. The sample construction and data description are detailed in section 1.3. The empirical results on the secular cash trends are provided in section 1.4. I describe the results from my analysis of the economic determinants of corporate cash holdings in section 1.5. I devote section 1.6 to the analysis of whether changing firm attributes explain the secular change in cash ratio and the determinants of this secular trend of cash

[4] I recognize that different accounting practices can present difficulty in interpretation of the results which is an inherent limitation in cross-country studies; for example, the valuation of assets in Germany may differ substantially from other countries because German accounting places greater emphasis on "conservatism."

reserves. In section 1.7, I explore the relevance of the agency motive and institutional structures behind unexplained changes in cash policies. Section 1.8 concludes this chapter.

1.2. Literature background and theoretical predictions

1.2.1. Literature background

The financial economics literature offers a number of rationales for holding liquid assets, the earliest of which is the need to conserve on the cost of converting nonfinancial assets into cash, commonly referred to as the transaction cost motive. According to this rationale, firms that are more likely to incur higher transaction costs are expected to maintain higher cash balances. Cash and marketable securities also are employed for precautionary reasons to meet the needs of the firm when it faces unanticipated contingencies. However, accumulating high levels of cash reserves can exact a price, the most notable of which is the low rate of return on cash relative to investments in real assets. The conventional trade-off view holds that the firm will optimize cash holdings by balancing the marginal costs of investing in low return liquid assets against the marginal costs of being short of funds.

More recent research advances more nuanced reasons to hold cash by positing that being short on cash can be costly if it forces the firm to forego valuable investment opportunities due to costly external financing. Under this argument, firms with greater information asymmetry, higher agency costs of debt, and more difficult access to external funds are more likely to seek investment flexibility by building cash reserves, thus escaping the underinvestment problem. Baskin (1987) puts forward the notion that cash holdings allow the firm to swiftly deploy funds for strategic purposes to pre-empt the competition while John (1993) argues that firms subject to higher financial distress costs will hold larger cash balances to reduce the likelihood of financial trouble.

A number of researchers show that firms amass cash reserves to safeguard against future liquidity shocks—in other words, cash serves as liquidity insurance in imperfect capital markets. For example, both Kim et al. (1998) and Opler et al. (1999) document that cash holdings are positively related to the costs of external financing and cash flow volatility. Lins et al. (2010) provide survey evidence that firms around the world use cash reserves as a hedge against future cash flow volatility. Further, Acharya et al. (2007) and Almeida et al. (2004) point out that only financially constrained firms exhibit inclinations to invest cash out of cash flow to hedge against changes in the expected value of future cash flow.

Large cash holdings can exact a price in the form of the managerial discretion problem. As the most liquid asset, cash can be easily converted into private benefits. Accordingly, entrenched managers may stockpile cash to facilitate their overinvestment inclinations and consumption of perquisites, as well as to avoid external monitoring from capital markets. Because cash is at the most risk to be misused or consumed, liquid assets provide a unique opportunity to investigate agency conflicts between managers and shareholders. However, the empirical evidence, thus far, on the agency motive of cash holdings is mixed. While Dittmar et al.'s (2003) study shows that firms in countries with poor shareholder rights hold more cash, Opler et al. (1999), Harford et al. (2008), and Bates et al. (2009) do not find evidence that the agency motive drives corporate cash policy in the US. These latter studies attribute their results to strong external investor protection in the US that forces self-interested management to disgorge free cash flows. In addition to country level shareholder rights, the banking system also plays a role in corporate liquidity policy. On the one hand, the close ties with the relationship bank reduce informational asymmetry, which permits firms to hold less cash for precautionary purposes; yet the rent-extraction by banks may force firms to amass higher levels of cash reserves.

1.2.2. Theoretical predictions

Guided by the literature discussed above, several firm-specific characteristics are identified as relevant in determining firms' cash policies. Among these are future investment opportunities, information asymmetry, firm size, cash flows, volatility of cash flows, substitutes for cash, and the ability to access the external markets which are employed in my model explaining cash holdings.

Firms with higher growth options have informational disadvantages which make external financing costly. In addition, financial distress costs are high for firms with higher growth options given that growth opportunities are intangible in nature and their value falls sharply in financial distress. Thus, corporate liquid assets can be viewed as an insurance policy that reduces the likelihood of financial distress and the odds of foregoing good investments when external financing is expensive.

Schroth and Szalay (2009) argue that firms racing to innovate may hold cash not only to invest in a timely manner but also to do it faster than their competitors. For firms who want to be in the technological lead, their innovation success is dependent on cash holdings. Given that firms with high R&D outlays tend to be more opaque, R&D expenses also serve as a proxy for information asymmetry as well as for costs of financial distress. These arguments suggest a positive link between R&D intensity and cash balances.

Firms facing liquidity constraints can raise cash balances by selling nonfinancial assets or reducing dividends. Working capital serves as a good substitute for holding a high level of cash because of ease of conversion into cash. Therefore, firms holding more working capital will hold lower cash balances. Besides serving as substitutes for cash holdings, dividends are proxy for financial soundness. Almeida et al. (2004) consider non-dividend payers as financially

constrained. Moreover, dividend payers have a track record in capital markets and enjoy lower external financing costs. This argument suggests that dividend payment status should have a negative effect on corporate liquid assets. However, close ties with relationship banks can reduce the informational asymmetry faced by financially constrained firms and thus render non-dividend payers less motivated to hold precautionary cash. Therefore, I posit that the capital market orientation might alter the relevance of dividends to cash policy.

Industry cash flow volatility is associated with higher frequency of cash flow shortfalls, which can adversely affect the firm's future investments. To avoid passing up valuable investment opportunities, firms in industries with more volatile cash flows are expected to hold more cash. In other words, the association between industry cash flow risk and cash holdings should be positive.

It is often argued that small firms have greater information asymmetry, greater sensitivity to economic shocks, and higher costs of financial distress than large firms**.** Furthermore, larger firms have better access to capital markets while at the same time enjoy economies of scale for cash management. Accordingly, small firms are expected to hold higher levels of cash balances than large firms.

The pecking-order model of financing choice suggests that there is no optimal cash holding in corporations and firms' cash balances are the mechanical outcome of investment and financing decisions (Myers and Majluf, 1984). Hence, firms with large cash flows are expected to maintain higher cash balances—a prediction of a positive sign on firm cash flows. However, Kim et al. (1998) maintain that the higher the cash flow, the greater the ability of the firm to generate cash and less likely to be subject to financial constraints. Hence, they postulate a lower

precautionary demand for cash for such firms. Therefore, the link between cash flow and corporate cash holdings is ambiguous.

Borrowing capability of the firm also serves as a substitute for cash holdings. Acharya et al. (2007) argue that firms can increase future funding capacity by either issuing additional debt to boost its cash balances or paying down outstanding debts to preserve its borrowing capacity. Accordingly, cash holdings may be positively linked to leverage. However, more highly levered firms may face higher costs of external financing due to asset substitution and the underinvestment problem. In addition, Baskin (1987) argues that the cost of investing in liquid assets increases with debt financing. These arguments suggest a negative relation between leverage and cash holdings. Overall, the association between leverage and cash holdings is an empirical issue.

It has been argued that capital expenditures, by creating assets that can be employed as collateral, can potentially increase a firm's borrowing capacity, which would reduce the firm's needs for cash reserves. Further, as demonstrated by Riddick and Whited (2009), productivity shocks that lead to jumps in investments can lead to lower cash balances. Thus the predicted link for capital expenditure is negative.

1.3. Sample and data

1.3.1. Sample construction

I begin by gathering financial data from Worldcope database for all firms between 1981 and 2008. I exclude firms that have missing information on the method of reporting long-term investments in which they have interest in excess of 50% and firms that do not consolidate their major subsidiaries. I also require observations to have non-missing and non-negative values on total assets, sales, book value of equity, and cash and marketable securities. I also exclude

financial services and utilities firms, whose cash policies are influenced by statutory capital requirements and other government regulations.

After imposing data availability requirements, only several countries have enough observations that enable us to conduct time-series analyses of corporate cash holdings. I focus my analysis on seven industrialized countries—the US, Canada, UK, Germany, France, Japan, and Australia—over 1991-2008 period. I include the US in my analysis for comparative purposes. I choose 1991 as the start year because firm coverage in Worldscope is sparse before 1985. Further, Denis and Osobov (2008) find that virtually all firms covered by Worldscope in the 1981–1985 period are larger and more mature firms and that over time smaller firms were added to Worldscope database. By starting my sample period in 1991, I try to avoid this bias. The final sample consists of 167,601 observations for 20,688 firms from the seven sample countries. The subsequent various analyses may have different observations due to missing values of certain variables.

1.3.2. General data description

Table 1.1 displays descriptive statistics for key firm characteristics for time-series cross-sectional data from 1991-2008 for my sample countries. I calculate corporate cash holdings as the ratio of cash and marketable securities to total assets.[5] Some previous research employs cash and marketable securities to net assets, where net assets are total assets less cash and marketable securities. I find extreme outliers in my data when I use a cash ratio scaled by net assets. To alleviate the effect of outliers, I winsorize all financial data at the 1% in both tails of each variable. The statistics are measured as the average of annual median values. Market-to-book

[5] This measure may not fully capture a firm's liquidity position. In their survey of CFOs of public and private firms around the world, Lins, et al. (2010) report that corporate cash balances represent a part of total corporate liquidity while lines of credit constitute optional liquidity that can meet their future external financing needs. Since data for lines of credit for our sample countries is unavailable, our analysis is based on cash holdings.

Table 1.1 Firm Characteristics for Seven Countries

This table provides summary statistics for a sample of seven industrialized countries over the period 1991 to 2008. Sample includes all firm-year observations in Worldscope database (excluding financials and utilities) with non-missing and non-negative values on total assets, sales, cash and marketable securities, and book value of equity. All numbers are averages of annual median values. Size is the book value of assets in 2008 US dollars (millions). Percent of firms with R&D (dividend payers) is the mean value of the annual proportion of firms with positive R&D expense ratio (dividends).

Country	# of Obs.	Cash Ratio	Size	Market-to-Book	Leverage	Cash Flow	CAPEX	CFVOL	NWC	% Firms w/R&D	% Div Payers
Australia	8,281	0.072	140	1.382	0.167	0.049	0.046	0.078	0.007	0.210	0.496
Canada	9,057	0.045	160	1.314	0.205	0.060	0.058	0.056	0.021	0.246	0.344
France	9,370	0.096	169	1.224	0.211	0.071	0.041	0.032	0.045	0.199	0.635
Germany	8,663	0.074	219	1.247	0.184	0.069	0.053	0.042	0.106	0.314	0.526
Japan	34,950	0.139	436	1.113	0.256	0.035	0.034	0.016	-0.013	0.522	0.854
UK	19,994	0.086	111	1.467	0.157	0.057	0.042	0.049	0.001	0.329	0.667
US	77,286	0.101	162	1.530	0.162	0.064	0.041	0.061	0.070	0.468	0.251

is estimated as (total assets - book value of equity + market value of equity) scaled by total assets. Book leverage is measured as long term debt plus short term debt, net leverage is long term and short term debt minus cash and marketable securities, cash flow is earnings after interest, taxes and common dividends but before depreciation, and net working capital is current assets less current liabilities less cash and marketable securities. All above variables are scaled by total assets.

Table 1.1 shows that although cash holdings vary widely from a 13.9% high for Japan to a 4.5% low for Canada, the remaining countries' cash balances lie within a tight range—from 7.2% to 10.1% of assets. Column 4 of the table reveals that firm size is fairly homogeneous across countries from mean size of $111 million in UK to $169 million in France with the exception of Japan and Germany where the average firm size is $436 million and $219 million, respectively. Consistent with previous studies, my data indicates that the US and UK have the

highest market-to-book ratios, while Japan has the lowest growth options over my sample period. Leverage, net leverage, cash flow, and capital expenditures do not exhibit substantial variability across countries in my sample. However, firms hold substantially different levels of net working capital across countries. For instance, firms in Germany hold the highest level of net working capital—12.1% of their total assets—while Japanese firms on the other side of the spectrum hold -1.5% of their total assets in net working capital.

Interestingly, Australia ranks highest in cash flow volatility, CFVOL, while Japan has the lowest variability. To ameliorate the impact of outliers, I measure CFVOL as the median standard deviation of industry cash flows over the previous eight years (minimum of 3 years needed) using the procedure employed by prior research.[6] The high average cash flow volatility in Australia is attributable to the remarkably sharp increase in cash flow risk from 3.9% in 1997-2002 period to 15.9% in 2003-2008 period, a period marked by high commodity price volatility. The last two columns in the table indicate that firms in sample countries exhibit varied characteristics in terms of R&D expenses and dividend policy. A greater proportion of Japanese and US firms invest in R&D than in other countries. Further, Japanese firms are more likely to pay dividends while the US has the smallest fraction of dividend payers.

1.3.3. Description of evolution in firm attributes

The general summary of the data in Table 1.1 may mask time-series properties of firm attributes across countries. Since the main objective of my paper is to examine the dynamics of corporate cash holdings, I am interested in the time-series evolution of the determinants of liquid assets. Consequently, I split the sample period into three subperiods—1991-1996, 1997-

[6] I rely on Industry Classification Benchmark (ICB) for industry classification which is offered by Dow Jones Indexes and FTSE and adopted by stock exchanges representing over 65% of the world's market capitalization. ICB has a four-tiered structure: 10 industries, 19 supersectors, 41 sectors and 114 subsectors.

Table 1.2 Evolution of Firm Characteristics

This table provides the evolution of firm characteristics in seven industrialized countries over 1991-2008 period. Sample includes all firm-year observations in Worldscope database (excluding financials and utilities) with non-missing and non-negative values on total assets, sales, cash and marketable securities, and book value of equity. The sample period is divided into three subperiods: 1991-1996, 1997-2002 and 2003-2008. All numbers are averages of annual median values for each subperiod. Percent of firms with R&D (dividend payers) for each subperiod is the mean value of the annual proportion of firms with positive R&D expense ratio (dividends).

Country	Period	Firm Size ($Mil)	Market-to-Book	Leverage	Net Leverag	Cash Flow	CAPEX	CFVOL	NWC	%Firms w/R&D	%Div. Payers
Australia	1991-1996	279	1.310	0.190	0.129	0.065	0.056	0.035	0.025	0.278	0.774
	1997-2002	110	1.313	0.186	0.121	0.044	0.045	0.039	0.004	0.200	0.517
	2003-2008	32	1.523	0.124	0.016	0.038	0.035	0.159	-0.007	0.202	0.426
Canada	1991-1996	270	1.242	0.242	0.203	0.068	0.061	0.038	0.037	0.206	0.512
	1997-2002	112	1.288	0.212	0.145	0.062	0.062	0.049	0.024	0.265	0.290
	2003-2008	98	1.413	0.160	0.087	0.048	0.052	0.081	0.001	0.246	0.323
France	1991-1996	274	1.099	0.232	0.137	0.070	0.045	0.024	0.061	0.148	0.753
	1997-2002	87	1.292	0.207	0.111	0.078	0.045	0.032	0.050	0.150	0.601
	2003-2008	145	1.282	0.193	0.086	0.065	0.032	0.040	0.024	0.295	0.579
Germany	1991-1996	399	1.244	0.200	0.134	0.072	0.071	0.025	0.166	0.205	0.721
	1997-2002	126	1.245	0.184	0.099	0.068	0.054	0.038	0.097	0.267	0.518
	2003-2008	132	1.253	0.169	0.060	0.067	0.034	0.062	0.054	0.419	0.431
Japan	1991-1996	653	1.308	0.305	0.136	0.023	0.045	0.010	-0.033	0.419	0.892
	1997-2002	360	0.997	0.266	0.127	0.035	0.032	0.016	-0.022	0.416	0.837
	2003-2008	297	1.034	0.198	0.070	0.047	0.025	0.022	0.017	0.656	0.851
UK	1991-1996	128	1.439	0.175	0.093	0.064	0.051	0.030	0.033	0.320	0.845
	1997-2002	101	1.496	0.156	0.074	0.055	0.046	0.046	-0.017	0.320	0.665
	2003-2008	105	1.467	0.141	0.051	0.053	0.029	0.071	-0.013	0.345	0.530
US	1991-1996	195	1.524	0.186	0.100	0.081	0.051	0.033	0.124	0.453	0.367
	1997-2002	119	1.427	0.162	0.055	0.055	0.041	0.056	0.054	0.464	0.191
	2003-2008	174	1.640	0.139	0.003	0.057	0.030	0.093	0.033	0.484	0.244

2002, and 2003-2008—and calculate the average of annual median values for firm attributes for each subperiod and present the results in Table 1.2.

Market-to-book ratio increases steadily over time in Australia, Canada, France and the US, declines in Japan, and remains almost unchanged in Germany and UK. Column 5 and Fig. 1.1

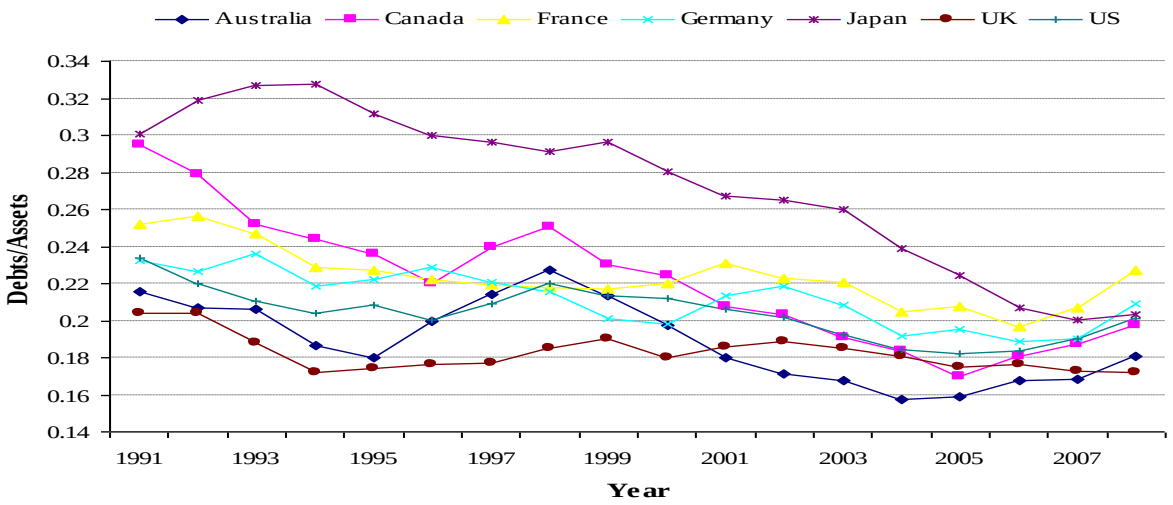

Fig. 1.1. Evolution of leverage for seven industrialized countries from 1991 to 2008

depicting the average leverage over time indicate that although leverage levels are somewhat similar across these countries, corroborating Rajan and Zingales' (1995) findings, the median country's leverage exhibits large declines across all countries with 26.4% drop from earlier period (1991-1996) to latest period (2003-2008). Japan and Australia experience the biggest declines of roughly 35% and 34%, respectively. In addition, leverage measured after cash and marketable securities, net leverage, paints a more dramatic picture. Column 6 and Fig. 1.2 both highlight the fact that net leverage ratio has decreased by impressively large amounts across all seven countries with the median country reducing net leverage over 60%. Australia had a precipitous decline in net leverage of over 87% from the earliest to the latest subperiod. Further, Fig. 1.2 shows that the US and Australia have zero or negative net leverage in more recent years, reflecting that nonfinanical firms in these two countries were net *lenders*, not borrowers. The downward patterns in leverage and net leverage imply a significant deleveraging trend as corporations in all these industrialized countries have cut back on their reliance on debt as a source of financing over the last two decades.

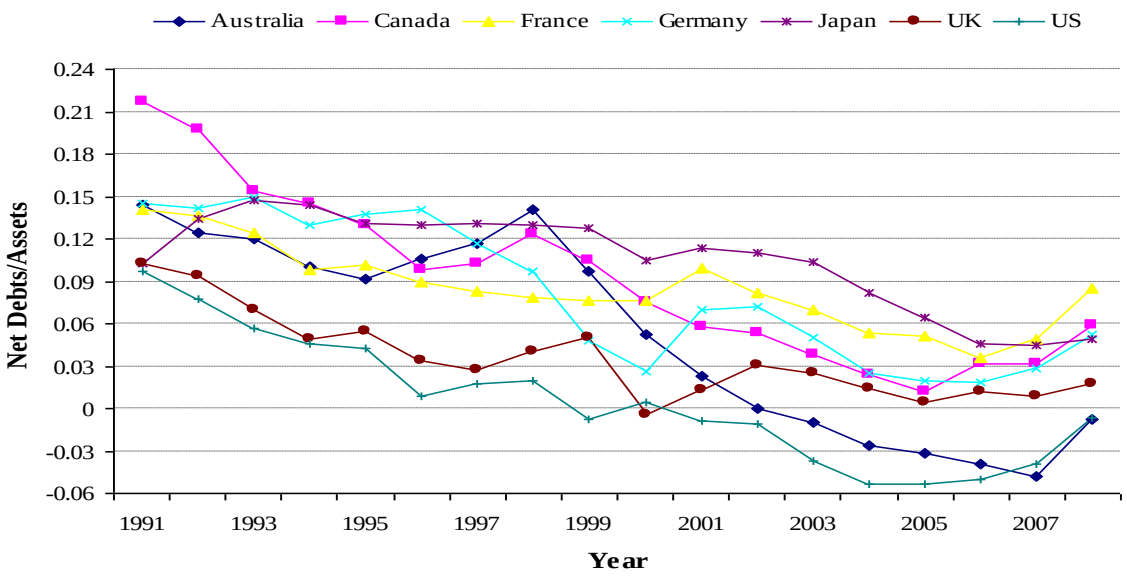

Fig. 1.2. Evolution of net leverage for seven industrialized countries from 1991 to 2008

Furthermore, net working capital declines dramatically in countries other than Japan with the decline ranging from 135% in Australia to 61% in France. A closer inspection of the data reveals that this decline is driven largely by diminishing investments in inventories and to some degree in accounts receivables. Cash flow to assets exhibits a downward trend in all countries except in Japan. I also find that all sample countries experience a substantial decrease in their capital spending over the sample period, indicative of weakening corporate investments and a general decline in capital intensity in developed countries. Canada experiences the smallest decline of roughly 15% and Germany the largest with a staggering 52% drop. In contrast, cash flow volatility figures depict remarkably massive increases over the three subperiods across all countries with the smallest increase being 67% in France, suggesting increasingly uncertain environments. A closer look at the year-by-year numbers reveals that cash flow volatility peaks around 2004 and 2005 in most countries and declines afterwards, consistent with the findings in a growing body of research on idiosyncratic risk (Campbell, et al., 2001; Brandt et al. 2008).

The second to last column reveals large increases over the three periods in the proportion of

firms with R&D expenditures in almost all sample countries with the exception of Australia which displays a decline in the fraction of firms with R&D outlays. Consistent with Fama and French (2001) and Denis and Osobov (2008), I observe a steady decline in the proportion of firms with dividend payouts. Both of these trends, concurrent with other changes in firm characteristics—steady increases in riskiness of cash flows and market-to-book ratio, a greater proportion of smaller firms—point to a striking convergence in evolution in key attributes of sample firms that fuels firms' need for more cash for precautionary motives.

1.4. International evidence on secular changes in cash holdings

In this section, I shed light on the secular changes in cash holdings for the seven sample countries over time. Fig. 1.3 depicts the dynamics of cash holdings using the mean annual cash ratios for each country. All countries exhibit a substantial secular increase in cash balances with two exceptions. France posts a more modest increase, 21.3%, in cash holdings and Japan experiences a decline of 20.5% in cash balances. The decline in Japanese firms' cash reserves to 15.8% in 2008 brings it more in line with other countries in my sample. Australia's average cash ratio more than doubles during sample period while the growth in cash balances in Canada, US, UK and Germany cluster in a narrow range from 54.1% to 88.2%.

A closer examination reveals that firms in all sample countries except for Japan experience a substantial decline of cash holdings in 2008 ranging from 3.7% in Germany to 12.3% in Canada, consistent with the survey evidence by Campello, Graham and Harvey (2010) that firms around the world drew down their cash reserves to finance investments and operations during the recent financial crisis when capital markets seized up and external financing was prohibitively costly. In addition, I find that corporate cash holdings peak around 2004-2005, and then fall slightly in recent years in all sample countries except Australia. Bates et al. (2009) who document similar

evidence for US firms point that the slight decline in cash ratios coincides with the recent reverse in increases in idiosyncratic risk.

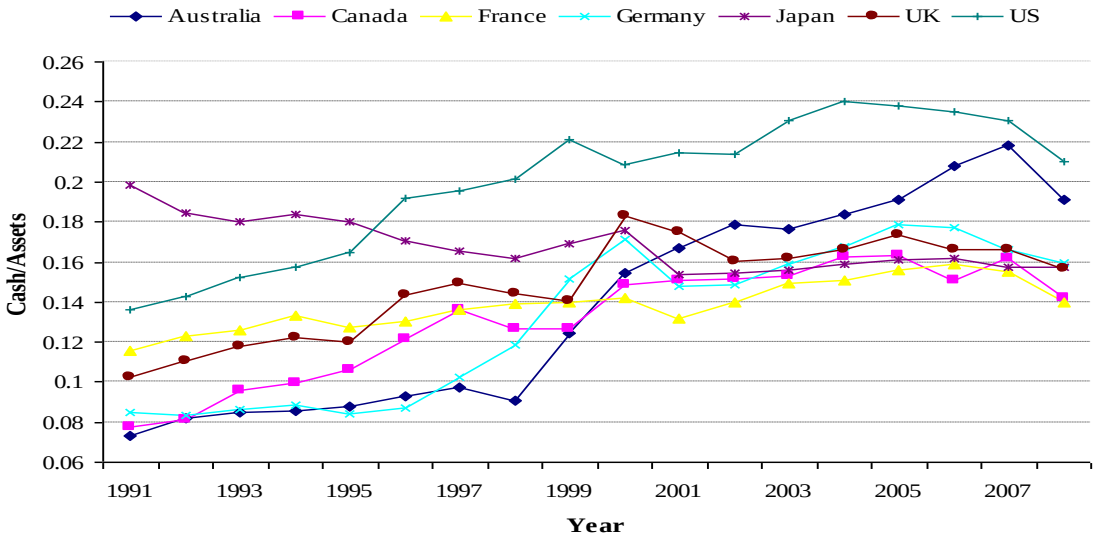

Fig. 1.3. Evolution of average cash ratio for seven industrialized countries from 1991 to 2008

To quantify and test the significance of the secular change in cash holdings, I estimate regressions of the mean cash ratio each year on a time-trend variable, YEAR. The untabulated empirical results show that all the coefficients for the time-trend variable (except for Japan) are positive and highly statistically significant at 1% level, suggesting a robust upward trend in corporate cash reserves in all sample countries except in Japan. The estimates reveal that the average cash holdings in the US have increased by 0.58% annually over the 18-year period, which is similar to the corresponding figure documented by Bates et al. (2009) for US firms during 1980-2006 period. Australia has the highest increase in cash holdings among sample countries, with coefficient on YEAR of 0.92%. Canada, Germany and UK have a similar secular trend in corporate cash balances, with increases in cash holdings of 0.48%, 0.65% and 0.38%, respectively. France posts a small but significant 0.19% increase, while Japan is unique among these sample countries, posting a substantial decrease in cash ratio at 0.21% annually.

The increase in cash holdings, in combination with the results in the preceding section, points to a number of revealing conclusions. First, the accumulation of cash is not an outgrowth of increases in cash flows since the latter declines on aggregate. More likely, the observed surge in cash reserves is a reflection of reductions in spending on capital stock. Second, the concurrent significant secular increases in cash holdings and downward trend in leverage lead us to conclude that firms in my sample countries do not simply finance their liquid assets with additional debt; rather, they have employed some of those built up liquid assets to reduce leverage. Third, given that shrinkage in net leverage is more than twice the rate of decline in leverage, it appears that firms favor holding on to some of their accumulated cash balances rather than eliminate completely their outstanding debt. Furthermore, the evidence in Japan suggests that the substantial decrease in cash holdings was achieved by paying down debt, consistent with the argument that Japanese banks wielding significant influence expropriated wealth from industrial firms by forcing them to borrow more, thus inflating corporate cash holdings. As new regulation governing issues of debt and equity removed the hold of banks on Japanese corporations, firms began to pay down their debt, thereby decreasing their cash holdings. In a nutshell, during the last two decades a shift has occurred in corporate investments away from expenditures on capital stock and into R&D investments, which appears to have necessitated reduced leverage and accumulations of cash.

For robustness, I also use the median cash ratios to estimate the secular trends. My results are invariant to the use of the median for all sample countries. I also measure cash relative to investments, defined as the sum of capital and R&D expenditures. In unreported findings, I find this cash holdings measure still displays a large and positive trend for all countries, except France and Japan.

1.5. International evidence on the determinants of corporate cash holdings

1.5.1. Multivariate baseline analysis

In this section, I conduct multivariate analysis to examine whether the sample countries share the same determinants of corporate cash holdings. Among these are future investment opportunities, information asymmetry, firm size, cash flow, volatility of cash flows, substitutes for cash, and ability to access the external markets. Guided by the previous literature, I choose my model specification for firm i at time t as follows:

$$\text{Cash ratio}_{it} = \beta_0 + \beta_1 \text{CFVOL}_{it} + \beta_2 \text{LSIZE}_{it} + \beta_3 \text{MTB}_{it} + \beta_4 \text{Leverage}_{it} + \beta_5 \text{Cash Flow}_{it} + \beta_6 \text{NWC}_{it} + \beta_7 \text{CAPEX}_{it} + \beta_8 \text{RD}_{it} + \beta_9 \text{DIV}_{it} + \varepsilon_{it} \quad (1)$$

For each sample country, I estimate Equation (1) employing the Fama-MacBeth (1973) approach.[7] Specifically, I estimate the regressions each year and then take the average of the parameter estimates from annual regressions. I compute t-statistics for the regression coefficients using the Newey and West (1987) procedure that is robust to autocorrelation out to three lags. I refer to this specification as the *baseline* regression thereafter. The firm characteristics employed are industry cash flow volatility (CFVOL), logarithm of real firm size in 2008 US dollar (LSIZE), market-to-book ratio (MTB), leverage, cash flow to assets, net working capital to assets (NWC), capital expenditure to assets (CAPEX), R&D expenses to sales (RD) and a dividend dummy variable (DIV) that takes a value of 1 for positive dividend payout in that year, and 0 otherwise.

The results presented in Panel A of Table 1.3 indicate that the signs of coefficients on firm size, market-to-book ratio, leverage, net working capital, capital expenditures, R&D expense ratio and cash flow volatility are mostly homogeneous across countries. For example, the

[7] Given that cross-sectional cash holdings are affected by the same factors such as business cycle and borrowing costs, our data might exhibit cross-sectional clusters. The Fama-MacBeth (1973) approach addresses cross-sectional clusters of observations or cross-sectional dependence among firms.

coefficients on R&D and market-to-book ratios are significantly positive in all regressions supporting the view that cash holdings are built up by firms with growth opportunities and high informational asymmetry to mitigate costs of foregoing profitable investments when terms in external markets are unfavorable. Also, the positive signs on cash flow volatility in all countries support the argument that firms hoard cash to hedge against future cash flow risks, in contrast to Pinkowitz and Williamson (2001) who find that the cash flow volatility variable is insignificant for Japan during their sample period (1971-1994). My findings imply that during 1990s and 2000s Japanese cash holdings became responsive to business risk.

In addition, the point estimates on the leverage variable are significant and negative across all seven countries supporting Baskin's (1987) argument that the cost of investing in liquid assets increases with debt financing and corroborates results in Kim et al. (1998), and Opler et al. (1999). This finding of a negative association between leverage and cash holdings fails to support Acharya et al.'s (2007) prediction that firms' cash balances serve as a substitute for borrowing capacity. Not only is the impact of leverage and net working capital on cash holdings similar in sign across countries, but also the coefficients' magnitudes on these variables have remarkably little variability among different countries.

In contrast, I observe non-homogeneity across countries in the relevance of dividends and cash flow. The point estimates on the cash flow variable are negative and significant in UK and Germany but insignificant in remaining countries. The mixed results on the cash flow variable are also documented by previous research (Opler et al., 1999; Pinkowitz and Williamson, 2001). The negative sign on cash flow in UK and Germany is in support of Kim et al.'s (1998) argument that the higher the ability of the firm to generate internal cash flows, the lower the level of liquid assets.

Table 1.3 Regressions for determinants of corporate cash holdings

The table reports regression estimates for the determinants of corporate cash holdings for seven industrialized countries over 1991-2008 period employing key firm characteristics for independent variables. The dependent variable is cash and marketable securities to total assets. Independent variables are: industry cash flow volatility (CFVOL), natural logarithm of real firm total assets (LSIZE), market-to-book ratio (MTB), leverage, cash flow to assets (Cash Flow), net working capital to assets (NWC), capital expenditure to assets (CAPEX), R&D to sales (RD), and dividend dummy (DIV) that takes a value of 1 when firm-year observation displays positive dividend payout and 0 otherwise. Panel A presents results from regressions based on Fama-Macbeth's (1973) model. t-statistics are computed using the Newey and West (1987) procedure robust to autocorrelation out to three lags. Panel B shows results using both firm and year fixed effects where t-statistics are based on standard errors robust to clustering by firm.

Panel A: Fama-Macbeth (1973) regressions

	Australia		Canada		France		Germany		Japan		UK		US	
Variable	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**
Intercept	0.281	15.07	0.238	24.67	0.248	32.13	0.285	8.88	0.299	10.88	0.177	8.57	0.342	14.26
CFVOL	0.049	0.71	0.578	8.30	0.576	3.43	0.057	0.54	1.550	7.28	0.452	4.12	1.098	8.59
LSIZE	-0.012	-10.78	-0.005	-5.18	-0.007	-12.70	-0.010	-5.44	-0.009	-4.29	0.000	-0.31	-0.008	-4.38
MTB	0.029	11.60	0.017	7.76	0.020	6.70	0.023	6.06	0.032	5.42	0.024	8.28	0.007	4.62
Leverage	-0.287	-11.30	-0.330	-32.50	-0.293	-27.49	-0.325	-17.03	-0.244	-15.32	-0.332	-18.33	-0.421	-57.96
Cash Flow	0.030	1.68	-0.015	-1.07	0.054	0.89	-0.088	-3.30	0.025	0.42	-0.032	-3.27	0.004	0.53
NWC	-0.190	-10.92	-0.190	-9.98	-0.174	-14.48	-0.184	-15.40	-0.190	-15.93	-0.214	-20.38	-0.273	-22.76
CAPEX	-0.115	-5.77	-0.352	-14.44	-0.346	-7.46	-0.193	-7.44	-0.638	-10.75	-0.244	-7.41	-0.449	-21.14
RD	0.187	2.31	0.087	4.34	0.430	6.55	0.397	10.70	0.628	21.24	0.171	4.65	0.040	19.89
DIV	-0.024	-4.03	-0.034	-6.32	0.014	6.83	0.012	2.23	0.011	2.61	-0.033	-4.94	-0.046	-21.87
R^2	0.396		0.441		0.314		0.389		0.269		0.382		0.433	
N	7,506		7,520		7,230		7,007		25,980		18,394		66,375	

Panel B: Fixed effects regressions

	Australia		Canada		France		Germany		Japan		UK		US	
Variable	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**
CFVOL	-0.009	-0.23	0.011	0.20	-0.172	-2.08	-0.304	-4.62	0.127	1.04	-0.179	-9.41	-0.160	-9.51
LSIZE	-0.032	-11.80	-0.010	-4.04	0.003	1.48	-0.007	-2.50	0.008	4.79	-0.014	-9.41	-0.005	-5.35
MTB	0.014	11.78	0.006	5.78	0.012	8.41	0.020	13.34	0.009	8.92	0.007	12.05	0.003	25.79
Leverage	-0.255	-17.65	-0.243	-19.69	-0.181	-16.11	-0.226	-19.53	-0.155	-26.41	-0.249	-29.97	-0.265	-64.83
Cash Flow	0.001	0.19	0.034	4.77	0.082	5.60	0.018	1.55	0.053	4.62	0.021	4.35	0.026	15.05
NWC	-0.148	-10.87	-0.144	-10.11	-0.202	-19.09	-0.166	-16.36	-0.254	-43.19	-0.231	-28.03	-0.224	-50.90
CAPEX	-0.171	-8.27	-0.182	-10.32	-0.224	-9.40	-0.148	-6.44	-0.251	-16.59	-0.311	-16.62	-0.264	-27.71
RD	0.020	6.01	0.016	6.39	0.105	2.81	-0.063	-1.55	0.200	5.86	0.042	11.90	0.014	20.60
DIV	-0.010	-1.80	0.001	0.27	0.002	0.73	-0.001	-0.36	0.000	-0.03	-0.003	-1.07	0.006	2.57
R^2	0.454		0.506		0.347		0.486		0.429		0.445		0.490	
N	7,378		7,454		7,213		6,992		25,910		18,242		65,786	

The dividend status variable has a significantly negative association with cash holdings in the US, UK, Canada and Australia, consistent with the precautionary and transaction-based demand for cash holdings and suggesting that dividend payers with track records in the capital markets are less likely to be financially constrained and as a result have lesser need to maintain high cash reserves. However, in Germany, Japan and France, the association is positive and significant**.** Pinkowitz and Williamson (2001) document a similar finding for Japan and Germany, and attribute this to the fact that firms in Japan and Germany pay dividends only in unusually profitable years**.** Given that the majority of firms in these three countries are dividend payers during my sample period, the evidence is more consistent with the argument that Japan and Germany's bank-centered systems, where close connections with banks reduce informational opaqueness, rendering financially constrained firms (non-dividend payers) less motivated to hold precautionary cash.

Given that firms with negative net income are more likely to be financially constrained, I further test the financial constraint model of cash holdings by including in the regression of Equation (1) a dummy variable, Neg, which takes a value of 1 if the firm has negative net income, and 0 otherwise. I then estimate the regressions separately using pooled data for (a) market-oriented countries (Australia, Canada, UK and the US) and (b) bank-centered countries (France, Germany and Japan). In unreported results, I find that the coefficient on Neg for the former four countries is positive and significant (0.023, t=16.79) while it is negative and significant for the latter three countries (-0.016, t=-9.46), confirming the finding from dividend

coefficient analysis that the well-documented financial constraint effect of cash holdings in the US does not apply to countries in bank-centered systems.[8]

Interestingly, the magnitude of the coefficients exposes large differences among countries in how cash policy is set. For example, the coefficients on CFVOL and R&D variables have the largest variability across the seven countries with Japan's coefficients on CFVOL (1.55) and R&D (0.64) being by far the highest while the cash flow volatility coefficient for Australia (0.049) is the lowest of the seven countries.[9] There are a number of plausible explanations for this disparity in the magnitude of these coefficients. First, Australia is unique among the sample countries in that a large fraction of its economy is in the development of natural resources where risk can be easily hedged with derivatives while Japanese firms specialize in industries that are less hedgeable. Therefore, even though Australia has the highest cash flow volatility among sample countries, the trivial correlation between cash holdings and cash flow risk for Australia is consistent with the argument that derivatives' use and cash reserves are substitutes in hedging business risk.[10,11] Alternatively, Australian firms may have a proclivity to bear greater risk, while Japanese firms may have a propensity toward being more conservative in setting cash policy because of scant appetite for risk. Hofstede (2001), who documents uncertainty avoidance across national cultures, establishes that among my seven sample countries, Australia ranks low on the uncertainty avoidance scale while Japan is classified as the most risk-averse. My findings fit this

[8] We estimate Eq. (1) with Neg variable for each country separately and find positive and significant coefficients on Neg in Australia, Canada, UK, and US, but significantly negative estimates for France, Germany and Japan.

[9] We test the significance of the differences in coefficients on cash flow volatility (CFVOL) and R&D expenses between Japan and other countries and find Japan's coefficients to be significantly higher (CFVOL difference=0.805, t=1.69; R&D difference=0.581, t=13.84) relative to all other countries together. Similarly, the coefficient on CFVOL is significantly lower in Australia than in all other countries (difference=-0.538, t=-3.79).

[10] While Australian firms specializing in natural resources may hedge some of their exposure to commodity price movements, that by no means necessarily implies that our measure of variability will be low since our metric assesses volatility across a number of years that have exhibited large movements in commodity prices.

[11] Gizychi and Lowe (2000) report an increased use of derivatives to manage risks in Australia since the second half of the 1990s.

pattern of uncertainty avoidance. Another plausible story is that Japanese firms favor accumulating larger cash balances per unit of risk for strategic reasons to maintain their incumbent leadership and to allow them to innovate faster than their rivals (Benoit, 1984). The high coefficients on CFVOL and R&D for Japan lend support to the notion that Japanese firms exploit the strategic component of cash policy. These three explanations are not mutually exclusive and hence, to some extent, each is applicable. To sum up, while my results document that these countries are fairly consistent in their utilization of some variables toward setting cash holdings policies (eg., leverage and NWC), they differ on their strategies of how much cash to keep when it comes to risk and information asymmetry.

1.5.2. Robustness checks

I run a series of robustness checks to validate the above findings. I first estimate both firm and time fixed effects for Equation (1) to address potential cross-sectional dependence across firms and serial correlations within firm, which may be induced by the use of the rolling eight-year cash flow volatility. Panel B of Table 1.3 shows that coefficients generally remain unchanged with few exceptions. For instance, the coefficients on cash flow become positive and significant for all countries in the fixed effects regressions. Similar to previous research on US samples, the signs on cash flow volatility flip in most sample countries in fixed effects specifications. The dividend dummy coefficients become insignificant for most sample countries due to little within-firm variation.

A second potential concern is that the increasing coverage of smaller firms by Worldscope may increase the median industry cash flow volatility even though real business conditions do not get riskier. To address this, I redo the analysis using market-value-weighted and book-value-

weighted measures of industry cash flow risk and find that my inferences remain unchanged using these alternative metrics, albeit the coefficients on cash flow risk are generally lower.[12]

I also estimate regressions of the *change* in cash on the *changes* in explanatory variables. One advantage of this specification is to remove unobserved heterogeneity over time and avoid omitted variable biases. In untabulated results, I find that the signs on most variables are fairly homogeneous across countries with the exception of the dividend status variable. The increases in cash flows and decrease in net working capital and capital expenditures contribute to the surge in cash in all countries, supporting the pecking order theory of cash holdings. Consistent with earlier findings, Japan still has the highest coefficients on the changes in cash flow volatility and R&D expenses.

In addition, I re-estimate the baseline regressions using the logarithm of cash ratio as the dependent variable. The signs of the coefficients are largely identical to baseline regression for all countries, but the R-squares are slightly lower. I explore the sensitivity of my results to leverage and NWC by estimating a reduced model without these two variables since they respond to the same conditions as cash balances. My findings are robust to this specification but the coefficients on cash flow risk increase substantially for all countries.

1.6. International evidence on the determinants of time trends in cash holdings

The analysis in the above section exposes subtle variations in how firms in different countries set up cash policy. I next investigate the causes of secular cash pattern by exploring whether the observed trend can be explained by changing firm attributes across countries and whether the correlations between firm attributes and cash holdings have changed over time. To do so, I

[12]We also use a firm-level risk measure which results in losing more than 20% of the observations since younger firms do not have the needed data to compute this variable. This, of course, changes the composition of the sample to be weighted more heavily toward larger and more established firms. When using this risk measure, we obtain a positive but substantially lower coefficient on cash flow risk.

employ three different strategies: regression specifications with intercept change, time trend, and both slope and intercept changes. Then I execute out-of-sample analysis to examine the unexplained cash holdings in each of subsequent years relative to the base period (1991-1996). Next, I explore the contribution of specific factors to the change in cash balances over the sample period. Finally, I address Worldscope sample coverage, new listings and sample homogeneity concerns.

1.6.1. Changing firm attributes and changes in cash holdings

1.6.1.1. Analysis of intercept changes

My analyses so far consider how firm characteristics influence cash holdings. I now extend the analysis by allowing for an intercept change to detect whether a demand shift in cash holdings occurs over time, i.e., I test whether the cash pattern is explainable by changes in firm attributes or not. To do that, I incorporate in the baseline regression specification two indicator variables which would permit intercept shifts for 1997-2002 and 2003-2008 periods represented by P(97-02) and P(03-08) respectively. These indicator variables also serve another purpose—they control for the deregulation period in Japan which spanned 1989 to 1995. The coefficients on these two indicator variables are of interest—significantly positive coefficients would suggest that the cash pattern is not fully explainable by changing firm characteristics. In contrast, negative coefficients imply that factors unrelated to firm characteristics cannot explain the increases in cash holdings.

The coefficients and significance of firm characteristics in Panel A of Table 1.4 remain almost unaltered after controlling for the two time periods. The findings reveal that after controlling for firm characteristics, there is a significant downward shift in demand for cash in the US, Japan, Canada and France for both subperiods, a significant downward shift in UK and

Table 1.4 Regressions determining whether changing firm attributes explain changes in cash holdings

The table presents regressions explaining whether changing firm attributes explain changes in cash holdings for seven industrialized countries over 1991-2008 period employing key firm characteristics for independent variables. The dependent variable is cash and marketable securities to total assets. Firm characteristics are industry cash flow volatility (CFVOL), natural logarithm of real firm total assets (LSIZE), market-to-book ratio (MTB), leverage, cash flow to assets (Cash Flow), net working capital to assets (NWC), capital expenditure to assets (CAPEX), R&D to sales (RD) and dividend dummy (DIV) that takes a value of 1 when the firm-year observation displays positive dividend payout and 0 otherwise. Panel A reports results from regressions with key firm characteristics and two indicator variables denoting two subperiods (1997-2002 and 2003-2008). In Panel B, time trend variable, YEAR, is included in addition to key firm characteristics. In Panel C, a variable ending with number 1 represents the interaction term of the variable with P(97-02) and a variable ending with 2 denotes the interaction term of the variable with P(03-08). t-statistics are based on standard errors robust to clustering by firm.

Panel A: Intercept change regressions

	Australia		Canada		France		Germany		Japan		UK		US	
Variable	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**
Intercept	0.286	12.64	0.260	9.87	0.269	11.25	0.348	11.62	0.360	23.73	0.222	15.02	0.366	35.46
CFVOL	0.150	4.00	0.540	6.40	0.137	0.97	0.358	3.27	1.153	4.60	0.072	1.36	0.616	20.98
LSIZE	-0.012	-7.39	-0.005	-2.77	-0.007	-4.55	-0.013	-6.95	-0.011	-10.76	0.000	-0.30	-0.005	-5.80
MTB	0.024	11.35	0.015	6.86	0.019	5.88	0.027	8.34	0.045	16.77	0.020	15.87	0.004	10.36
Leverage	-0.356	-18.95	-0.341	-16.83	-0.308	-13.95	-0.370	-17.94	-0.270	-25.96	-0.359	-21.02	-0.451	-59.79
Cash Flow	-0.005	-0.50	-0.022	-1.54	-0.027	-0.79	-0.125	-5.09	-0.063	-2.54	-0.053	-5.02	0.012	3.53
NWC	-0.189	-10.50	-0.175	-8.25	-0.156	-9.29	-0.208	-11.53	-0.175	-14.67	-0.214	-13.72	-0.266	-34.96
CAPEX	-0.087	-3.63	-0.329	-13.50	-0.264	-6.62	-0.196	-4.84	-0.515	-14.93	-0.233	-7.41	-0.425	-26.38
RD	0.042	5.61	0.051	8.36	0.578	6.17	0.471	6.99	0.677	9.72	0.097	12.58	0.039	27.82
DIV	-0.032	-5.07	-0.034	-4.94	0.012	2.29	0.000	-0.03	0.006	1.73	-0.045	-8.68	-0.056	-17.66
P(97-02)	0.004	0.58	-0.011	-1.72	-0.010	-2.20	-0.005	-1.02	-0.051	-13.98	-0.001	-0.17	-0.021	-9.62
P(03-08)	0.015	1.97	-0.036	-4.66	-0.010	-1.59	-0.012	-1.87	-0.082	-18.18	-0.011	-2.19	-0.043	-13.62
R^2	0.414		0.437		0.300		0.426		0.295		0.383		0.441	
N	7,506		7,520		7,230		7,007		25,980		18,394		66,375	

Panel B: Time trend regressions

	Australia		Canada		France		Germany		Japan		UK		US	
Variable	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**
YEAR	0.002	3.18	-0.003	-5.40	-0.000	-0.00	-0.000	-0.20	-0.005	-15.66	-0.002	-5.82	-0.001	-4.41
R^2	0.453		0.504		0.346		0.484		0.423		0.443		0.489	

Panel C: Intercept and slope changes

	Australia		Canada		France		Germany		Japan		UK		US	
Variable	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**	**Coef.**	**t-Stat.**
Intercept	0.224	4.717	0.253	4.516	0.262	5.199	0.151	3.888	0.166	4.466	0.103	4.715	0.503	30.45
CFVOL	-0.092	-0.491	0.538	2.683	1.072	2.377	0.032	0.041	-2.625	-2.503	0.707	3.467	0.523	3.34
LSIZE	-0.010	-3.154	-0.004	-1.085	-0.009	-2.731	0.004	1.666	0.005	1.773	0.003	2.376	-0.013	-10.90
MTB	0.035	5.011	0.016	4.426	0.014	1.612	0.018	1.929	0.013	1.425	0.028	13.155	0.006	3.66
Leverage	-0.170	-5.853	-0.352	-9.232	-0.270	-7.272	-0.203	-7.358	-0.205	-7.499	-0.272	-11.097	-0.366	-33.84
Cash Flow	0.048	1.044	-0.001	-0.039	0.209	2.754	-0.089	-0.826	-0.049	-0.454	-0.002	-0.090	0.055	3.75
NWC	-0.203	-5.302	-0.172	-4.254	-0.236	-6.608	-0.176	-5.348	-0.175	-5.259	-0.205	-9.503	-0.386	-29.16
CAPEX	-0.167	-2.988	-0.382	-7.668	-0.487	-6.866	-0.581	-5.667	-0.556	-5.541	-0.292	-5.500	-0.190	-7.78
RD	0.049	1.805	0.085	2.699	0.241	1.386	0.578	3.277	0.651	3.646	0.155	14.369	0.032	9.86
DIV	-0.008	-0.697	-0.036	-2.717	0.021	2.414	0.036	4.800	0.033	4.372	-0.023	-2.874	-0.016	-4.24
P(97-02)	0.056	1.116	-0.065	-1.042	-0.001	-0.028	0.122	3.429	-0.185	-2.27	0.155	6.391	-0.152	-8.47
CFVOL1	0.311	1.583	0.233	1.029	-0.958	-2.146	-0.445	-0.597	0.307	0.312	-0.487	-2.337	0.326	2.00
LSIZE1	0.000	0.038	0.004	0.832	0.002	0.754	-0.009	-3.922	-0.009	-3.880	-0.006	-3.531	0.013	9.80
MTB1	-0.017	-2.183	-0.004	-1.060	0.001	0.144	0.019	2.073	0.020	2.245	-0.012	-5.124	-0.004	-2.61
Leverage1	-0.172	-4.538	0.011	0.265	-0.052	-1.374	-0.060	-2.383	-0.064	-2.552	-0.117	-3.767	-0.063	-5.01
Cash Flow1	-0.078	-1.647	-0.012	-0.296	-0.264	-2.993	0.063	0.583	0.032	0.293	-0.052	-1.819	-0.009	-0.58
NWC1	0.055	1.250	-0.025	-0.545	0.097	2.697	0.046	1.499	0.038	1.218	-0.043	-1.453	0.078	5.58
CAPEX1	0.124	1.907	0.056	0.999	0.322	4.202	0.145	1.416	0.120	1.196	-0.033	-0.528	0.166	5.46
RD1	-0.008	-0.414	-0.031	-0.945	0.317	1.902	-0.034	-0.220	-0.070	-0.440	-0.050	-3.120	0.002	0.51
DIV1	-0.023	-1.470	0.002	0.108	-0.014	-1.351	-0.037	-4.752	-0.033	-4.256	-0.029	-2.866	-0.030	-6.68
P(03-08)	0.114	2.144	-0.001	-0.008	-0.014	-0.243	0.185	4.607	-0.102	-1.22	0.110	3.925	-0.116	-5.73
CFVOL2	0.199	1.044	-0.057	-0.256	-1.053	-2.152	2.307	2.835	1.882	1.803	-0.653	-3.103	0.283	1.64
LSIZE2	-0.003	-0.721	-0.004	-0.812	0.002	0.662	-0.022	-8.144	-0.022	-8.232	-0.005	-2.557	0.009	6.29
MTB2	-0.009	-1.162	0.003	0.483	0.012	1.123	0.034	3.596	0.042	4.428	-0.008	-2.679	-0.004	-2.40
Leverage2	-0.221	-5.848	0.018	0.383	-0.036	-0.799	-0.089	-3.093	-0.088	-3.084	-0.088	-2.589	-0.037	-2.40
Cash Flow2	-0.037	-0.771	-0.028	-0.667	-0.251	-2.791	0.023	0.202	-0.010	-0.088	-0.046	-1.575	-0.009	-0.59
NWC2	0.004	0.092	0.014	0.296	0.099	2.338	-0.027	-0.779	-0.013	-0.378	0.014	0.455	0.076	4.72
CAPEX2	0.070	1.116	0.076	1.322	0.162	1.678	0.054	0.511	0.041	0.393	0.188	2.817	0.097	2.74
RD2	-0.005	-0.192	-0.039	-1.232	0.392	1.903	0.164	0.922	0.080	0.439	-0.068	-4.722	0.007	1.78
DIV2	-0.029	-2.032	0.002	0.106	-0.009	-0.741	-0.032	-3.692	-0.032	-3.694	-0.010	-0.954	-0.012	-2.22
R^2	0.416		0.442		0.308		0.437		0.332		0.392		0.451	
N	7,506		7,520		7,230		7,007		25,980		18,394		66,375	

Germany for the later period (2003-2008), and a positive and significant demand shift for cash in the later period in Australia.

In the case of Japan, other factors unrelated to firm characteristics induce cash holdings to decline by 0.05 in 1997-2002 period and again by 0.08 in 2003-2008. This dramatic decline occurring over the 15-year period post financial deregulation indicates the enormity of rent-extraction by Japanese banks before financial reforms. By the end of my sample period, cash policy in Japan has morphed into one that is more economically oriented as cash reserves leveled off. In an unreported result, I estimate baseline regressions for each of the three subperiods for Japan and find that R-square increases from 0.18 in 1991-1996 to 0.37 in 2003-2008, reaching the a similar level as other developed countries. This finding confirms the notion that cash policy in Japan became more economically oriented from 2003 onward. I also estimate the value of cash reserves in Japan for each subperiod using a modified Fama-French (1998) model (detailed later). Interestingly, the marginal value of cash in Japan during 1991-1996 period is only $0.42, suggesting that investors discounted the value of cash when Japanese firms were obligated to hold excessive amounts in cash balances. In the two later periods, cash value increases steadily ($0.57 for 1997-2002; $1.08 for 2003-2008), reflecting more optimal cash holdings by Japanese firms over time.

My results for Japan complement Pinkowitz and Williamson (2001) and Rajan and Zingales (1995), who document that Japanese firms historically held elevated levels of cash. However, regulatory financial reforms in Japan enacted during 1989-1995 enabled firms to reduce their reliance on bank financing. The combination of evidence from univariate and multivariate analysis indicates that Japan exhibits some uniqueness among sample countries with regard to the cash holdings policy. My analysis provides support to the notion that the cash policy in

Japanese firms was far less economically oriented during deregulation period. A broader implication that can be drawn from this evidence is that institutional structures influence firms' liquidity policy.

1.6.1.2. Time trend analysis

I next utilize another approach to test demand shift for cash by including a time trend variable, YEAR, as an independent variable in the baseline regressions. There are two advantages for this regression specification. First, my analysis thus far indicates that both the dependent variable and explanatory variables exhibit certain trending over time. Thus the inclusion of a time trend variable will detrend the variables to avoid potentially spurious results. Second, allowing for the trend in the regressions explicitly recognizes that cash reserves may be changing over time for reasons essentially unrelated to firm attributes.

Panel B of Table 1.4 provides the regression estimates with time trend variable. The findings are interesting as they draw a completely different picture of the pattern in cash holdings than the one discussed earlier. For example, the coefficients on YEAR reveal that cash holdings decrease the most in Japan at a rate of 0.50%, followed by Canada (0.30%), UK (0.20%) and the US (0.10%). The cash ratio does not change in France and Germany while Australia is the only country with a positive and significant coefficient on the time trend variable. The significant declines in cash reserves across most countries seem to suggest that improved efficiencies in handling cash and developments in financial engineering reduce transaction and precautionary needs to hold cash. Further, the additional evidence in Panel B suggests that time-varying firm attributes documented earlier explain the positive and significant shifts in corporate cash holdings for all countries except Australia. However, the results in Panel B show an increase in cash holdings of only 0.20%, compared to 0.92% before controlling for firm characteristics,

suggesting that even though time-varying firm characteristics explain most of the cash holdings' changes, other factors unrelated to known firm characteristics are also behind the changes in Australian corporate cash holdings. In the case of Japan, the decline of 0.20% in cash holdings reported earlier understates the drop in cash reserves, which amounts to 0.50% after controlling for firm characteristics. If I assume that the decline in cash holdings from the US, Canada, and UK (mean of about 0.20%) is due to improved efficiencies in cash management, I can infer that the drop in cash balances in Japan due to deregulation is approximately 0.30% per year.

1.6.1.3. Analysis of slope and intercept changes

The analysis in the previous section provides hints that the evolution in firm attributes over time is behind the upward trend in corporate cash holdings in most, but no all, sample countries when allowing for intercept change. It may be the case that the relation between firm attributes and cash ratios has changed over time and this change causes the intercept change. To further test this, I interact the two indicator variables, P(97-02) and P(03-08), with each explanatory variable from my baseline regression. The analysis essentially tests whether there are both slope and intercept changes. This is equivalent to estimating a regression separately for each of the three subperiods.

I obtain several remarkable findings reported in Panel C of Table 1.4. First, full-blown chow tests, which test the significance of both period indicator variables and interaction terms, indicate that there are structural changes over time for all sample countries except Canada. Examination of coefficients indicates no significant changes in the link between cash ratio and firm characteristics in subsequent periods for Canada. Even though for France the coefficients for firm variables in subsequent periods are similar to the base period (1991-1996), they are significant for a number of the variables bolstering the importance of some firm attributes to cash

ratio. In conjunction with significant intercept changes for US firms, I also observe a significant shift in slopes in the same direction as predicted for cash flow volatility, leverage, R&D expenses and dividend as well as a significant shift in slopes *opposite* to predicted direction for firm size, market to book, net working capital and capital expenditures, which implies that US firms choose to increase cash reserves as firm attributes evolve toward a more risky profile. In addition, the drop in US cash holdings attributed to change in intercept associated with the two period indicator variables is much larger (-0.15 and -0.12) than that in Panel A of Table 1.4. The remaining countries are positioned between sharp slope shift in the US and no shift in Canada. These results point to changes in managerial views on the importance of firm attributes for cash policy decisions. However, the significance of these changes is limited given that the model's explanatory power with both intercept and slope changes does not improve significantly relative to the model with only intercept change.

Second, the coefficients on the two indicator variables fall into three groups: (a) negative and significant (US and Japan), (b) negative and insignificant (Canada and France), and (c) positive and significant (UK, Germany and Australia). The first two outcomes for the indicator variables (a and b) imply that factors other than firm characteristics cannot explain the secular increases in cash holdings—confirming my earlier findings. For the third group, the positive and significant coefficients on indicator variables suggest that after allowing for structural changes in the determinants of cash holdings, other factors contribute to the secular increase in cash holdings. In Japan, the negative but insignificant coefficient on the indicator variable, P(03-08), suggests that the decline in cash holdings due to diminishing power of banks levels off in 2003-2008 period. Finally, the negative coefficient on cash flow volatility in the period of 1991-1996 in Japan reflects unresponsiveness of firms to business risk when setting cash policy. However, the

significant increase in the impact of cash flow volatility on cash holdings supports my previous finding that cash policy at Japanese firms has become more economically oriented in the 2000s.

1.6.2. Out-of-sample analysis

The combination of tests in the above section show that firms in the US, Canada, Japan and France actually maintain less liquid assets in later years relative to the base period after considering the changes in firm characteristics while cash balances in Australian firms increase beyond levels expected from changes in firm attributes. The evidence in Germany and UK is mixed since I obtain significant cash increases in only one of three tests. In this section, I use out-of-sample analysis, first, to demonstrate the unexplained cash holdings in subsequent years relative to the base period, and second, to provide a further test on whether the increases in cash holdings are explainable by changing firm attributes. To achieve this, I employ Fama-Macbeth (1973) approach to estimate baseline regressions for base period (using specification in Table 1.3), and then apply the coefficients to the later years to compute the predicted cash ratio. The deviations of actual cash from predicted cash ratios, henceforth referred to as deviations, are reported in Table 1.5. Positive deviations imply the existence of unexplained cash holdings in that year, suggesting that changing firm characteristics cannot explain the cash trend.

The results in Table 1.5 highlight that in most years occurring after base period the deviations are positive and significant in Australia and Germany with the under-prediction averaging 2.9% of assets in Australia and 4.1% in Germany pointing to an increase in cash reserves in the later years. For the UK, the average deviation is small in magnitude (0.5%) with significant positive deviations occurring only intermittently. Meanwhile, the average deviation indicates that firms in France (-0.5%), Canada (-1.2%), Japan (-6.3%), and the US (-1.6%) in aggregate did not hold higher cash than expected over the 1997-2008 period. In Japan, the change in firm characteristics

Table 1.5 Deviations of actual cash holdings from predicted cash ratios

This table presents the deviations of actual cash holdings from predicted cash ratios for seven industrialized countries from 1997 to 2008. Fama- Macbeth (1973) model is estimated for base period 1991-1996 with cash ratio as dependent variable and explanatory variables include industry cash flow volatility (CFVOL), natural logarithm of real firm total assets (LSIZE), market-to-book ratio (MTB), leverage, cash flow to assets (Cash Flow), net working capital to assets (NWC), capital expenditure to assets (CAPEX), R&D to sales (RD) and dividend dummy (DIV) that takes a value of 1 for the firm-year observation when dividend payout is positive 0 otherwise. The coefficients from base period are then applied to the corresponding independent variables in subsequent years for each firm to obtain predicted cash ratio. The actual cash holdings are cash and marketable securities to total assets. The reported values are cross-sectional average of differences between predicted cash holdings and actual cash ratios.

	Australia		Canada		France		Germany		Japan		UK		US	
Year	Devia.	t-Stat	Devia.	t-Stat	Devia.	t-Stat	Devia.	t-Stat	Devia.	t-Stat	Devia.	t-Stat	Devia.	t-Stat
1997	0.003	0.42	0.019	2.11	-0.004	-0.76	0.004	0.81	-0.046	-15.27	0.008	2.19	0.005	2.04
1998	-0.009	-1.46	0.003	0.30	-0.003	-0.57	0.005	1.00	-0.052	-17.70	-0.002	-0.57	-0.019	-7.32
1999	-0.013	-1.84	-0.023	-3.21	-0.009	-1.75	0.030	4.14	-0.046	-15.11	0.022	5.12	-0.045	-14.45
2000	0.023	2.78	-0.021	-2.43	-0.009	-1.69	0.054	7.01	-0.050	-21.98	-0.001	-0.13	-0.017	-6.13
2001	0.026	3.73	-0.025	-2.97	-0.009	-1.80	0.037	5.80	-0.074	-35.85	0.014	2.44	-0.019	-6.19
2002	0.034	4.85	-0.020	-2.71	-0.008	-1.65	0.048	6.87	-0.068	-32.42	0.008	1.58	-0.021	-6.99
2003	0.033	5.12	-0.016	-2.17	-0.003	-0.54	0.052	7.35	-0.071	-33.43	0.003	0.53	-0.023	-6.84
2004	0.039	6.04	-0.020	-2.79	-0.010	-2.03	0.059	8.42	-0.074	-35.42	0.002	0.42	-0.016	-5.00
2005	0.047	7.44	-0.017	-2.65	-0.006	-1.25	0.059	8.25	-0.067	-31.22	0.001	0.22	-0.014	-4.03
2006	0.057	9.08	-0.014	-2.16	-0.005	-0.91	0.052	7.31	-0.067	-31.37	-0.005	-1.01	-0.016	-4.84
2007	0.053	7.89	-0.012	-1.56	-0.002	-0.44	0.041	6.84	-0.068	-32.83	0.015	3.22	-0.008	-2.32
2008	0.058	8.53	0.000	-0.01	0.003	0.60	0.046	7.10	-0.067	-32.20	-0.004	-0.83	-0.003	-0.81

induces a positive trend in cash holdings, but the effect is not strong enough to counteract the declining trend induced by the diminishing power of banks. The collective evidence so far suggests that even though all countries (except Japan) exhibit similar secular cash patterns to the US and experience similar evolution in firm attributes, changing firm attributes in Australia and Germany cannot completely explain the rise in cash balances. The analysis indicates that other factors contribute to the observed cash pattern. These other factors could include agency costs, external financing costs, macro-economic changes or even other firm-specific factors which are not characterized in the current prevailing model on the determinants of cash holdings.

1.6.3. The impact of evolution in firm attributes on increases in cash holdings

In this section, I analyze how changes in firm characteristics contribute to the *increases* in corporate cash holdings in each sample country. I focus on how changes in firm characteristics affect the increases in cash ratios since I document an increase in cash holdings in six out of seven countries. My procedure proceeds as follows. First, I run Fama-Macbeth (1973) regressions over the base period (1991-1996) and obtain coefficients for each independent variable. Then I multiply the mean value for each independent variable over this subperiod by the corresponding coefficient (from step 1) to obtain the contribution of each variable to the cash ratio for base period**.** I repeat the same process for the subperiod 2003-2008. Finally, I compute the difference in the contribution of each variable to cash holdings between these two subperiods and corresponding t-statistics.

The results presented in Table 1.6 demonstrate that sample countries exhibit a strong commonality in the influence of firm-specific factors on the increases in cash holdings. The four most important factors common to sample countries are the change in net working capital, the change in R&D, the change in cash flow volatility, and change in growth options. The change in

Table 1.6 Determinants of Changes in Cash Holdings

This table presents the contributions of firm characteristics to cash holdings for the periods 1991-1996 and 2003- 2008, as well as the difference in the contribution of each characteristic between the two periods. I estimate a model of cash holdings separately for 1991-1996 and 2003-2008 periods using Fama-Macbeth (1973) approach and apply the coefficients obtained to each corresponding variable to estimate the contribution of each variable to the cash holdings in each period.

Country	CFVOL	LSIZE	MTB	Leverage	Cash Flow	NWC	CAPEX	RD	DIV
Australia									
1991-1996	-0.003	-0.132	0.054	-0.033	0.003	-0.008	-0.014	0.007	-0.004
2003-2008	0.016	-0.150	0.057	-0.065	-0.002	0.001	-0.007	0.015	-0.015
Difference	0.019	-0.018	0.003	-0.032	-0.005	0.009	0.007	0.008	-0.011
t_statistics	6.49	-3.59	0.34	-18.40	-0.73	22.64	2.60	5.25	-2.88
Canada									
1991-1996	0.023	-0.056	0.031	-0.085	-0.001	-0.011	-0.037	0.005	-0.017
2003-2008	0.051	-0.088	0.037	-0.061	0.001	-0.001	-0.033	0.008	-0.011
Difference	0.027	-0.032	0.005	0.024	0.002	0.010	0.004	0.003	0.006
t_statistics	31.14	-11.87	57.82	6.85	5.37	3.31	3.49	4.14	1.07
France									
1991-1996	0.031	-0.107	0.025	-0.061	0.019	-0.016	-0.030	0.001	0.016
2003-2008	0.002	-0.079	0.037	-0.064	-0.001	-0.004	-0.015	0.013	0.008
Difference	-0.029	0.028	0.011	-0.003	-0.020	0.012	0.014	0.012	-0.008
t_statistics	-342.77	9.57	2.13	-2.34	-11.28	6.73	6.72	54.72	-15.40
Germany									
1991-1996	-0.004	-0.017	0.031	-0.057	-0.003	-0.023	-0.011	0.004	0.025
2003-2008	0.024	-0.154	0.035	-0.075	-0.003	-0.012	-0.013	0.016	-0.002
Difference	0.028	-0.137	0.003	-0.018	0.000	0.011	-0.002	0.012	-0.027
t_statistics	138.84	-34.44	2.52	-6.28	-0.04	4.73	-2.09	5.02	-12.04
Japan									
1991-1996	0.011	-0.097	0.009	-0.052	0.005	0.007	-0.043	0.005	0.024
2003-2008	0.057	-0.215	0.065	-0.065	-0.003	-0.002	-0.019	0.011	0.004
Difference	0.046	-0.118	0.057	-0.013	-0.009	-0.009	0.024	0.005	-0.019
t_statistics	38.91	-12.37	11.60	-1.36	-0.87	-11.72	3.26	4.70	-11.36
UK									
1991-1996	0.032	0.042	0.042	-0.048	0.000	-0.008	-0.019	0.006	-0.014
2003-2008	0.010	-0.018	0.058	-0.064	0.001	0.002	-0.005	0.012	-0.017
Difference	-0.022	-0.060	0.016	-0.016	0.001	0.010	0.014	0.006	-0.003
t_statistics	-5.05	-46.72	2.73	-8.06	0.10	11.39	16.04	6.16	-0.49
US									
1991-1996	0.052	-0.193	0.031	-0.083	0.000	-0.043	-0.035	0.006	-0.016
2003-2008	0.063	-0.065	0.008	-0.081	-0.001	-0.011	-0.027	0.013	-0.010
Difference	0.011	0.128	-0.023	0.002	-0.001	0.031	0.008	0.007	0.006
t_statistics	11.16	62.18	-3.33	0.79	-0.09	168.04	13.74	11.19	5.65

net working capital ranks as the top four contributing factors in all sample countries except Japan while the change in R&D expenses to sales dominates in five countries except Canada and the

US. The change in cash flow volatility ranks in the top four in the US, Canada, Germany, Japan and Australia while the change in market-to-book ranks in the top list in Canada, UK, Germany and Japan. In UK and France, the effect of cash flow volatility on cash holdings decreases from 1991-1996 to 2003-2008, while the impact of growth options on cash holdings decreases in the US. The above findings suggest that the determinants for cash changes cluster on variables that relate to risk such as growth opportunities, R&D outlays, and industry cash flow volatility.[13]

1.6.4. Worldscope sample coverage, new listings, and sample homogeneity across countries

One concern is that the time trend in cash holdings that I document could be a result of expanding Worldscope coverage over time of smaller firms that have a tendency to hold more liquid assets. By beginning my study period in 1991, I try to avoid this bias. Nonetheless, if a significant expansion in Worldscope coverage occurs after 1991, this would tilt my results to empirically find an upward trend in cash reserves when none exists. The selection bias is ameliorated to the extent that a fraction of the added firms to Worldscope reflect newly listed companies. To explore possible Worldscope coverage bias, I conduct a number of tests.

First, I re-estimate my analysis for US firms using Compustat data over the same time period and compare these to Worldscope estimates. Since Compustat coverage of US firms is complete, it is free from selection bias. I present the comparison results in Panel A of Table 1.7. The data on cash ratios reveals that Worldscope coverage approximates the Compustat data around 1994. Despite the difference in early coverage between Worldscope and Compustat, the time trends in cash holdings are qualitatively identical for both samples with growth rate of cash

[13] Our results for the US are similar to those reported by Bates et al. (2009) as three of top four most important variables are the same even though their time period somewhat differs from ours and they apply a different methodology. Consistent with their findings, we also document that the firm size effect wanes in the US in the 2000s.

Table 1.7 Analyses of Worldscope coverage, and sample homogeneity across countries

Panel A of this table tests Worldscope sample coverage bias by comparing estimates for US firms using the Worldscope data with those from Compustat database. Deviation is the cross-sectional average of differences between actual and predicted cash ratios, which are obtained by applying Fama-Macbeth (1973) coefficients estimated over the period of 1991-1996 to the corresponding variables in subsequent years. *Growth* is estimated from the regression of mean yearly cash ratio on variable "YEAR" from 1991 to 2008. . Panel B reports percentage of firms in each size deciles for each sample country. All firm-year observations for seven countries are pooled together and sorted into deciles based on book value of assets in 2008 US dollars.

Panel A: Worldscope vs. Compustat for US firms

	Worldscope sample			Compustat sample		
Year	**Cash**	**Deviation**	**t-Stat**	**Cash**	**Deviation**	**t-Stat**
1991	0.136			0.158		
1992	0.143			0.167		
1993	0.153			0.178		
1994	0.158			0.162		
1995	0.165			0.177		
1996	0.192			0.199		
1997	0.196	0.005	2.036	0.198	0.006	2.465
1998	0.201	-0.019	-7.320	0.184	-0.002	-0.704
1999	0.221	-0.045	-14.451	0.207	-0.008	-2.949
2000	0.209	-0.017	-6.134	0.209	-0.008	-2.755
2001	0.215	-0.019	-6.186	0.212	-0.022	-7.124
2002	0.214	-0.021	-6.988	0.210	-0.019	-6.374
2003	0.231	-0.023	-6.841	0.228	-0.014	-4.385
2004	0.240	-0.016	-5.002	0.246	-0.009	-2.801
2005	0.238	-0.014	-4.027	0.245	-0.012	-3.717
2006	0.235	-0.016	-4.835	0.246	-0.011	-3.341
2007	0.230	-0.008	-2.321	0.244	-0.011	-3.218
2008	0.210	-0.003	-0.813	0.224	-0.005	-1.593
Growth	0.577%			0.520%		

Panel B: Size distribution

	Australia	Canada	France	Germany	Japan	UK	US
Deciles	Pctg	Pctg	Pctg	Pctg	Pctg	Pctg	Pctg
Smallest	27.16	12.42	8.21	6.80	0.43	12.50	12.13
2	15.87	13.58	14.32	10.93	2.11	13.69	10.93
3	10.98	12.32	12.15	11.94	4.88	13.22	10.63
4	8.90	10.67	11.05	11.67	8.66	10.28	10.26
5	7.33	9.95	9.27	11.04	12.01	9.08	9.59
6	6.58	8.99	9.40	9.88	15.17	6.79	9.07
7	6.26	8.48	7.91	8.52	16.09	6.37	9.19
8	5.77	7.64	7.45	8.42	15.61	6.50	9.59
9	6.06	9.08	8.42	8.85	13.53	8.22	9.71
Largest	5.10	6.88	11.82	11.96	11.52	13.35	8.90

ratio being 0.58% for Worldscope sample and 0.52% for Compustat firms (based on time trend regressions for full sample period).

In addition, if the Worldscope coverage bias drives my findings, I would expect to observe lower predicted cash ratios and correspondingly higher deviations of actual cash from the predicted cash. The results in columns 3 and 6 in Table 1.7 show that the deviations of actual cash from the predicted cash ratios obtained using coefficients from the base period are almost the same for both samples in subsequent years. Since the upward trend documented with Compustat data yields similar inferences when using Worldscope data, this provides some reassurance that my findings are not due to biases related to expanding Worldscope coverage.[14]

To test the effect of new additions to the sample either due to new listings or to expanding Worldscope coverage, I analyze the change in cash holdings for subsample firms from base period 1991-1996 (referred to as constant sample) by calculating cash ratios and deviations of actual cash from predicted cash for constant subsample of firms. For brevity, I do not report the results in the table. The findings show that constant sample firms exhibit upward trends in cash balances in Australia, Canada, Germany and the US—albeit at a lower pace than the total sample—while cash holdings remain unchanged in France and decline in UK. In Japan, the constant sample firms decrease their cash balances more substantially than the total sample. Deviations of actual cash from predicted cash yield similar inferences. For example, US deviations are wider for constant sample firms than for the whole sample, indicating that the former sample firms hold even lower cash than predicted. In Germany, even though the total

[14] I compare the cash ratio and leverage values from Global Vantage for 1991 obtained by Rajan and Zingales (1995) for six sample countries common between our study and theirs to those from Worldscope. We find that for four out of six countries, the cash ratios for Worldscope firms are higher and the leverage is lower, an indication that by 1991 Worldscope has already incorporated more small firms in its composition than Global Vantage.

sample firms hold substantially more cash than predicted in recent years, the constant sample exhibits modest positive deviations. The evidence suggests that the documented cash pattern is to some extent driven by firms entering the sample after 1996, consistent with previous findings on cash holdings in US (Bates et al., 2009) and dividend policy (Denis and Osobov, 2008).

Since firm size is an important determinant of cash holdings, I now turn to examine the possible bias induced by heterogeneity in size distribution of companies covered by Worldscope across countries. To explore sample homogeneity, I pool all firms from the seven countries and sort them into deciles based on their real size in 2008 US dollars. As the data in Panel B of Table 1.7 shows, the size distribution of sample firms exhibits homogeneity across countries except for Japan, with a preponderance of firms larger than the median value, and Australia, which has more small firms with value lower than median.

1.7. Analysis of agency motives and other factors behind the changes in corporate cash holdings

1.7.1. Tests of agency motive

In the previous sections, I document that while the time-varying firm-specific factors can fully explain the cash patterns in some countries, for other countries a portion of the secular trend remains unexplainable. In this section, I investigate whether the secular change in cash holdings can be attributable to agency motives. As articulated by Jensen (1986), managers have incentives to increase cash holdings to serve their self-interests. I tackle the agency problems in two ways.[15] In the first test, I examine the association between growth opportunities and excess cash over time. I argue that in the presence of managerial opportunism in setting cash

[15] I analyze whether firms take advantage of temporarily favorable conditions of external financing to build up cash buffers by regressing change in cash on funds from external financing and funds from operations. We find that German firms exhibit the greatest keenness to take advantage of lower costs of external financing to accumulate cash reserves irrespective of firm size, suggestive of agency motive where German firms have inclinations to build up cash whenever there is an opportunity to do so.

Table 1.8 Distribution of excess cash over time by growth opportunities

This table reports excess cash (XCash) for three subperiods for firms with low and high growth opportunities. Excess cash is the residual from regression of cash ratio on industry cash flow volatility (CFVOL), natural logarithm of real firm size (LSIZE), market-to-book ratio (MTB), leverage, cash flow to assets (cash flow), net working capital to assets (NWC), capital expenditure to assets (CAPEX), R&D to sales (RD) and dividend dummy (DIV). The reported number is mean excess cash for each subperiod. Each year, firms are classified in growth opportunities group based on the median value of market-to-book ratio of that year within each country.

		Australia		Canada		France		Germany		Japan		UK		US	
MTB	Period	XCash	t-Stat	XCash	t-Stat	XCash	t-Stat	XCash	t-Stat	XCash	t-Stat	XCash	t-Stat	XCash	t-Stat
Low market-to-book firms	1991-1996	-0.007	-1.90	0.005	1.39	0.003	1.14	0.006	2.07	0.060	9.29	-0.008	-4.33	-0.016	-12.38
	1997-2002	-0.010	-2.71	-0.007	-2.13	0.002	0.88	0.002	0.56	0.006	4.78	-0.005	-2.10	-0.021	-16.65
	2003-2008	-0.003	-1.01	-0.030	-10.17	-0.002	-0.77	0.004	1.20	-0.013	-13.48	-0.018	-7.59	-0.028	-18.29
High market-to-book firms	1991-1996	-0.017	-3.15	0.020	3.47	0.010	2.30	-0.003	-1.00	0.037	16.47	0.013	5.30	0.028	15.47
	1997-2002	-0.012	-2.48	0.017	3.23	-0.008	-2.72	-0.001	-0.35	0.004	2.59	0.011	3.88	0.021	11.42
	2003-2008	0.018	4.86	0.011	2.87	0.001	0.45	-0.006	-1.57	-0.006	-4.23	0.008	2.93	0.019	10.65

policy, firms would choose to accumulate cash instead of disbursing it out to shareholders even if they do not have good investment opportunities. Excess cash in firms with superior investment prospects are more likely to be put to good uses than in firms with poor opportunities. Therefore, firms with low growth opportunities holding higher levels of excess cash relative to firms with high growth opportunities is taken as a sign of agency motivation. To test this conjecture, I group sample firms in each country for each year by the median value of market-to-book ratio for that year. For each firm, I compute excess cash using the residuals from the regressions in Panel A of Table 1.3, then estimate the mean excess cash for each of the two groups for the three subperiods.

Three points emerge from the results reported in Table 1.8. First, in the US, UK, and Canada, firms with high growth options consistently hold positive excess cash while firms with poor growth opportunities maintain negative excess cash over all three subperiods, indicating that the agency motive does not play a role in the increases in cash holdings in these countries. Likewise, the evidence does not support an agency motive in Australia and France. Second, German firms with poor growth opportunities hold positive excess cash relative to firms with superior investment opportunities, suggestive of an agency motive behind the secular cash pattern. Finally, while both high and low growth option firms in Japan hold positive excess cash in the first two subperiods—with low growth options firms holding more—the trend reverses in the most recent period which implies that the suboptimal cash levels at Japanese firms induced by rent-extraction had a greater impact on low growth firms.

In the second test, I investigate the value of change in cash over the recent two subperiods. Since I am interested in the secular changes in cash, I focus on the value of *change* in cash, not the value of the level of cash. Specifically, I examine whether an additional dollar in cash in

firms with excess cash contributes less to a change in firm value relative to firms that experience a decline in cash balances after controlling for firm characteristic changes. I reason that since increasing cash reserves beyond justifiable levels facilitates extraction of private benefits, investors would place lower value on the cash increase. I use a positive (negative) deviation of actual cash holdings from the predicted cash ratios estimated from the coefficients of the base period to denote an increase (decrease) in cash holdings after accounting for changing firm attributes. Guided by previous literature, I use a modified version of Fama and French's (1998) model to estimate the value of change in cash. The regression specification is as follows:

$$\begin{aligned}\frac{MV_{i,t}}{TA_{i,t}} \equiv\ & \beta 0 + \beta 1\frac{E_{i,t}}{TA_{i,t}} + \beta 2\frac{dE_{i,t}}{TA_{i,t}} + \beta 3\frac{dE_{i,t+2}}{TA_{i,t}} + \beta 4\frac{RD_{i,t}}{TA_{i,t}} + \beta 5\frac{dRD_{i,t}}{TA_{i,t}} + \beta 6\frac{dRD_{i,t+2}}{TA_{i,t}} \\ & + \beta 7\frac{D_{i,t}}{TA_{i,t}} + \beta 8\frac{dD_{i,t}}{TA_{i,t}} + \beta 9\frac{dD_{i,t+2}}{TA_{i,t}} + \beta 10\frac{I_{i,t}}{TA_{i,t}} + \beta 11\frac{dI_{i,t}}{TA_{i,t}} + \beta 12\frac{dI_{i,t+2}}{TA_{i,t}} \\ & + \beta 13\frac{dNA_{i,t}}{TA_{i,t}} + \beta 14\frac{dNA_{i,t+2}}{TA_{i,t+2}} + \beta 15\frac{dMV_{i,t+2}}{TA_{i,t}} + \beta 16\frac{dC_{i,t}}{TA_{i,t}} + \beta 17\frac{dC_{i,t+2}}{TA_{i,t}} \\ & + \beta 18\frac{dC_{i,t}}{TA_{i,t}} * PosDev + \beta 19 * PosDev + \varepsilon_{i,t} \qquad (2)\end{aligned}$$

where $X_{i,t}$ is the level of variable X in year t, $dX_{i,t}$ is the change in the level of X from year t-2 to year t, $dX_{i,t+2}$ indicates a change of X from year t to year t+2, $MV_{i,t}$ is the market value of firm i at the end of year t calculated as the stock price times outstanding shares plus book value of short-term and long-term debt, $NA_{i,t}$ is the book value of total assets minus cash and marketable securities, $E_{i,t}$ is earnings before extraordinary items plus interest, $RD_{i,t}$ is R&D expenditure, $D_{i,t}$ is common dividends, $I_{i,t}$ is interest expense, $C_{i,t}$ is cash and marketable securities which corresponds to cash holdings, $TA_{i,t}$ is the book value of total assets, PosDev is a dummy variable which takes a value of 1 if the actual cash is greater than the predicted cash ratio, and 0 otherwise. My interest is in coefficients β_{16} and β_{18}. If agency conflicts are behind the changing cash policy, the magnitude of β_{16} should be small while β_{18} would take on a negative sign, indicating that market participants place lower value on every additional dollar increase in cash.

Table 1.9 Regressions for the value of change in cash from 1997 to 2008

This table reports the value of change in cash (estimated from Fama-French (1998) model) for the period 1997-2008. X_t is the level of variable X in year t, dX_t is the change in the level of X from year t-2 to year t, and dX_{t+2} is the change in the level of X from year t to year t+2. All variables are scaled by total assets in year t. E_t is earnings plus interest, $R\&D_t$ is R&D expenses, I_t is interest expenses, D_t is dividend, MV_t is market value, C_t is cash and marketable securities, and PosDev is dummy variable that takes a value of 1 if the deviation of actual cash ratio from predicted cash holdings' ratio is positive and 0 otherwise. The dependent variable is MV_t.

	Australia		Canada		France		Germany		Japan		UK		US	
Variable	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat	Coef.	t-Stat
E_t	-0.869	-6.62	0.479	2.51	1.394	5.45	0.483	3.02	1.487	13.68	-0.877	-7.19	-1.457	-19.13
dE_t	0.152	2.70	0.132	1.31	0.238	1.70	0.149	2.86	0.169	2.86	0.314	4.57	0.408	10.85
dE_{t+2}	-0.486	-7.97	0.383	3.43	0.807	6.43	0.115	1.39	0.742	13.40	-0.741	-11.52	-0.366	-15.33
dNA_t	-0.188	-4.20	0.129	2.12	0.195	4.00	0.085	2.32	0.254	15.26	-0.013	-0.29	0.177	5.17
dNA_{t+2}	0.174	7.81	0.525	17.44	0.480	16.57	0.694	30.37	0.567	38.69	0.315	14.10	0.658	48.58
$R\&D_t$	2.945	2.57	8.535	10.01	-0.049	-0.07	-0.152	-0.23	0.310	1.07	2.428	4.26	5.982	18.29
$dR\&D_t$	8.028	7.71	-2.184	-3.10	-0.700	-1.03	1.069	2.26	0.712	2.73	2.201	4.12	0.402	1.57
$dR\&D_{t+2}$	5.906	7.06	6.072	10.44	1.524	3.22	-0.343	-0.75	1.099	4.02	7.422	17.10	5.356	27.59
I_t	-0.583	-0.22	-5.011	-2.34	-3.363	-1.65	1.210	0.77	6.095	6.31	2.921	1.33	2.851	3.57
dI_t	-1.742	-1.16	-0.265	-0.16	-0.445	-0.33	-2.435	-2.53	-11.169	-14.82	0.329	0.23	-7.239	-11.89
dI_{t+2}	2.919	2.70	1.126	1.83	0.977	0.91	-3.648	-3.97	-0.088	-0.08	3.283	2.96	-2.528	-9.18
D_t	8.520	6.11	0.489	0.28	12.160	7.97	3.069	3.13	-1.242	-1.12	13.212	9.94	7.848	3.86
dD_t	4.342	6.40	0.888	1.11	7.094	9.80	1.318	2.76	11.224	16.74	7.005	8.66	2.777	2.04
dD_{t+2}	2.107	1.84	1.809	1.12	-1.076	-0.84	-0.418	-0.60	7.732	8.55	1.056	1.07	3.259	1.26
dMV_{t+2}	-0.106	-12.51	-0.277	-21.45	-0.335	-31.56	-0.489	-41.47	-0.430	-101.83	-0.188	-29.50	-0.233	-73.50
dC_t	0.630	6.94	1.662	18.10	0.872	10.48	0.491	5.28	0.725	23.05	1.241	20.26	1.684	53.13
dC_{t+2}	0.363	2.89	0.672	3.52	0.435	2.61	0.322	3.68	0.435	11.34	0.559	4.02	1.514	17.49
dC_t * PosDev	0.035	0.14	0.422	1.82	0.208	1.03	-0.292	-2.01	0.061	1.03	0.445	2.75	-0.260	-2.52
PosDev	-0.226	-4.23	-0.094	-1.59	-0.072	-2.65	-0.115	-4.67	0.003	0.41	-0.236	-6.18	-0.291	-8.53
R^2	0.308		0.326		0.395		0.389		0.451		0.399		0.327	
N	2,640		2,732		3,518		3,565		18,030		7,391		28,127	

Table 1.9 reports the results for Equation (2). Based on the value of a one-dollar change in cash (β_{16}), firms in the US ($1.68), Canada ($1.66) and UK ($1.24) experience the highest change in firm value with an additional dollar of cash buildup contributing the least to a change in firm value in Germany (0.49). More crucially, I find that in Germany the value of a one-dollar increase in cash is substantially lower in firms which hold more cash than predicted ($0.20) when compared to firms maintaining lower than predicted cash holdings ($0.49), the difference significant at 5% level.[16] This evidence points to an agency motive behind the cash buildup in Germany. In combination, the two tests confirm that the agency motive plays a crucial role in the substantial increase in cash holdings in Germany.

1.7.2. Tests of relevance of other factors for Australia

The existence of unexplained cash holdings and little evidence of an agency motive in Australia suggest that other factors contribute to the rise in cash balances. These other factors include external financing costs, macro-economic changes or even other firm-specific factors which are not characterized in the current prevailing model on the determinants of cash holdings. To address the case of Australia, I conduct three additional tests by augmenting the baseline regression with proxies for industry competition, external financing costs and capital market developments and re-estimating the regression strategies allowing for intercept change, time trend, and both intercept and slope changes. For brevity, I present in Table 1.10 only the results for variables of interest for intercept change and time trend regressions.

Morellec and Nikolov (2009) find that the intensity of industry competition can explain the secular increase in cash holdings in the US. So I add the Herfindahl Index estimated as the

[16] Interestingly, the data also shows a negative coefficient on β_{18} for the US. However, when considering the impact of both β_{16} and β_{18}, the value of one-dollar change in cash in firms that hold higher than predicted cash levels still garners one of the highest changes in firm value ($1.42) among sample countries.

Table 1.10 Regressions on relevance of other factors to the change in cash holdings in Australia

This table presents regressions testing whether intensity of industry competition, external financing costs, and capital market development are capable of explaining changing cash holdings in Australia over 1991-2008 period. Dependent variable is cash and marketable securities to total assets. Firm characteristics included in regressions are industry cash flow volatility, natural logarithm of real firm total assets, market-to-book ratio, leverage, cash flow to assets, net working capital to assets, capital expenditure to assets, R&D to sales and dividend dummy. Industry competition (HFDL) is estimated as the squared root of the squared sales market share of all firms in an industry sector. External financing cost is proxied by bank lending rate (LendRate). The capital market development variables are credit provided to the private sector (PrivCrd), stock market capitalization (MktCap), and bond market capitalization (BondCap), normalized by gross domestic product (GDP). Two indicator variables, P(97-02) and P(03-08), denote two subperiods (1997-2002) and (2003-2008) respectively and YEAR is time trend variable. For brevity, the coefficients of firm characteristics are unreported. t-statistics are based on standard errors robust to clustering by firm.

	Industry Competition				**External Financing Costs**				**Capital Market Development**			
Variable	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**	**Coef.**	**t-Stat**
P(97-02)	0.004	0.58			0.007	0.77			-0.011	-1.55		
P(03-08)	0.015	1.97			0.017	2.04			-0.014	-1.26		
YEAR			0.002	2.55			0.002	3.55			-0.005	-1.67
HFDL	0.056	3.90	0.057	3.98								
LendRate					0.003	1.17	0.005	2.15				
PrivCrd									0.001	2.30	0.002	2.15
MktCap									0.000	0.48	0.000	-0.17
BondCap									-0.118	-0.42	0.178	0.48
R^2	0.411		0.415		0.414		0.414		0.411		0.411	
N	7,506		7,506		7,506		7,506		7,506		7,506	

squared root of the squared sales market share of all firms in an industry sector into the baseline regression and redo the analyses. Table 1.10 shows that industry competition has a significant and positive link to cash holdings; however, the addition of this variable has no bearing on the time trend and period indicator variables. Second, I control for the lending rate, obtained from World Bank's World Development Indicators, as a proxy for external financing costs in the baseline regression. The findings demonstrate a positive relationship between external financing costs and cash holdings; however, the inclusion of this macro variable does not impact conclusions from firm characteristic variables and time variables.

In the last test, I ask whether developments in the Australian financial system are behind the cash pattern. The Australian financial markets underwent major deregulation in the mid-1980s

which intensified competition among financial institutions, giving rise to losses in the financial sector in early 1990s and correspondingly diminishing the credit available to nonfinancial firms. A series of financial reforms and the acceptance of the recommendations of Wallis Inquiry Report (1997) brought about changes in the regulatory environment which fueled the growth of direct and indirect financing in Australia since the second half of the 1990s (Gizycki and Lowe, 2000). To model whether these macro-economic changes contribute to the changes in cash ratios, I augment Equation (1) with three additional variables representing capital market developments in Australia: domestic credit provided to the private sector (PrivCrd), stock market capitalization (MktCap) and bond market capitalization (BondCap), all normalized with gross domestic product (GDP). These measures, collected from World Banks' World Development Indicators, are standard proxies for market development in the literature.

The findings reveal that while the signs and significance of other variables remain unchanged, the time trend variable and period indicator variables become negative or insignificant, suggesting that developments in the domestic credit market add explanatory power to the changes in cash balances in Australia. In particular, I find that the credit provided to the private sector in the earliest period (1991-1996) of 64% of GDP is by far the shallowest debt market among my sample countries an indication of lack of full access to credit by Australian firms. The Australian credit sector expanded sharply by 2003-2008 when it accounted for 108% of GDP. The marked increase in the depth of the credit markets has a significant impact on corporate cash balances suggesting that Australian firms' cash balances were at a curtailed level in the beginning of my sample period due to market conditions—more succinctly, the secular upward cash trend seems to be driven by a cash deficiency during the earlier part of my sample period. This argument is bolstered by the fact that Australia has the lowest mean cash ratio in the

base period (8.4%) among sample countries. My findings are consistent with the perspective that functioning and development of financial markets can have a pronounced impact on cash policy.

1.8. Conclusion

This chapter documents compelling evidence that the secular upward trend in corporate cash holdings observed for the US extends to a sample of industrialized countries for 1991-2008 period, with the exception of Japan where firms experience a substantial decline in cash balances—i.e., the cash pattern is almost systemic in industrialized countries. The secular cash trend is accompanied by substantial leverage declines in all countries with Japanese firms deleveraging the most. The unique situation in Japan is due to rent extraction behavior of its powerful banking sector, which forced Japanese corporations to hold large cash balances during the 1980s. My evidence highlights that Japanese firms' cash policies have become more economically oriented since the 2000s.

I also find that firms across sample countries exhibit, on the one hand, commonality in the determinants of cash holdings, suggesting that the correlation between firm attributes and cash holdings documented in the US is not spurious, and on the other hand, differences in their cash policies, pointing to a uniqueness of cash decisions in each country. My analysis reveals that firm attributes evolve substantially over the past two decades in all seven countries. Sample firms become smaller and riskier, and shift away from investing in inventory and physical capital toward investing in R&D projects. In a nutshell, corporations in these industrialized countries have undergone major changes, which have driven firms to elevate their cash balances for precautionary purposes. Despite this convergent evolutionary change in firm attributes across countries, the changes in modeled firm characteristics can explain the increases in cash only in

some countries, namely, Canada, France, and the US. Firms in Australia and Germany increase their cash balances beyond levels expected from the evolution in known firm attributes.

The analysis from a battery of tests on whether the agency motive drives the secular pattern in cash reserves provides evidence that German firms' cash policy setting suffers from agency problems. In the case of Australia, my tests show that the upward cash pattern is driven by shallow private credit markets which curtailed corporate cash holdings during the earlier period of my study. My analysis highlights that the functioning of the financial system is crucial to corporate cash policy as shown in Japan and Australia.

Chapter 2: Agency Conflict and Corporate Cash Holdings Around the World: New Evidence

2.1. Introduction

The elevated levels of corporate cash holdings can be detrimental to shareholders because of possible value-destroying uses of available funds. Free cash flow theory contends that sizable cash reserves facilitate insiders' extraction of private benefits at the expense of outside shareholders through overinvestment when interests between insiders and outside shareholders diverge (Jensen (1986) and Jensen and Meckling (1976)).[17] As cash holdings account for an increasingly greater portion of corporate assets,[18] the adverse effect on shareholders' wealth of misallocation of internal funds can be substantial. This chapter explores the impact of agency conflict on the *use* of liquid assets and the resulting impact on firms' profitability, and in so doing, addresses three questions. Does agency conflict have any bearing on the level of cash? How does the agency conflict affect the dissipation of cash, as well as how do agency costs of excess cash influence the firm's investment decisions? And to what extent the use of excess cash and the presence of agency conflict together impinge on firms' operating performance?

I employ country-level investor protection mechanisms to proxy for agency conflict between insiders, controlling shareholders or managers, and outside shareholders. One benefit of investigating the connection between agency conflict and cash holdings in the international setting is the ability to take advantage of the large and multifaceted variations in agency costs across countries, which are unavailable to single-country studies. Prior research has shown that

[17] In countries with dispersed ownership structure, the separation of ownership and control arises from the free rider problem faced by atomistic shareholders due to the control of the firm by professional managers. However, in countries with concentrated ownership structures, where controlling shareholders own a disproportional share of control rights, the divergence between cash flow rights and control rights are at the root of agency costs.

[18] Bates et al. (2009) report that US firms' cash holdings have doubled from 1980 to 2006 and Iskandar-Datta and Jia (2010) document that this upward trend in cash reserves is also exhibited in other industrialized countries.

the legal structures represent a fruitful approach to understand corporate governance and agency conflicts. The expropriation of minority shareholders' wealth by insiders is at the core of agency conflict in many countries. Investor protection mechanisms such as laws and their enforcement, to a large extent, are the key governance levers through which outside investors are protected from insider expropriation. To capture a broader and more complete scope of investor protection, I extend previous research by using both the content of legal rights granted to minority shareholders by law and the quality of enforcement of these rights to depict governance systems.

Cash holdings can serve as financial slack that diminishes the transaction costs of raising funds. Firms may also hold precautionary cash to avoid foregoing future positive NPV projects when external financing is expensive. If cash policy is based solely on economic fundamentals, there should be no connection between agency conflict and cash holdings. However, the free cash flow theory suggests that self-interested managers have incentives to increase the amount of assets under their control and, therefore, cash is often retained or invested inefficiently rather than disbursed to shareholders. La Porta et al. (2000a) find evidence supporting this argument by documenting that weaker investor protection is associated with lower dividend payouts. The implication of this finding is that firms under weaker external governance structures retain a greater portion of their earnings. Whether these large retained earnings ultimately translate into high levels of cash reserves depends on the tradeoff between convenience and empire-building preferences of managers or controlling shareholders. If self-interested managers value empire-building the most, I would observe quicker dissipation of cash and correspondingly a lower cash level when external investor protection is weak, and vice versa.

Previous studies examining agency conflict and corporate cash holdings for the US report contradictory evidence. Opler et al. (1999) find little evidence that excessive cash reserves are

wasted in the US. Similarly, Mikkelson and Partch (2003) report that firms with persistent large cash holdings do not squander the resources and therefore, the large excess cash reserves do not hinder firms' performance. In contrast, Blanchard et al. (1994) show that self-interested managers retain and invest cash windfalls inefficiently and Harford (1999) finds evidence that managers waste excess cash on poor acquisitions. Both Dittmar and Mahrt-Smith (2007) and Harford et al. (2008) find that entrenched managers deplete excess cash, but they differ on whether this dissipation dampens firms' operating performance. Attributing the mixed evidence in the US to the lack of insufficient variation in the agency conflict across firms, several authors take the issue to the international setting. For example, Dittmar et al. (2003) examine the relation between shareholder rights and cash holdings and document a negative link while Kalcheva and Lins (2007) investigate both country-level and firm-level agency conflict and cash holdings and find that the quality of external investor protection per se has no significant bearing on cash holdings. Both of these studies' conclusions are based on one-year samples which may be a factor behind the contradictory results. These findings contrast with the US evidence documented by Harford et al. (2008) that as firm-level shareholder rights increase, cash reserves increase. Another line of literature examining the valuation effect of cash demonstrates that the market discount the value of cash when investors are not well protected (Kalcheva and Lins (2007) and Pinkowitz et al. (2006)). These studies, while instructive, do not provide the direct channel through which cash reserves and investor protection together impinge on firm value.

More importantly, Spamann (2009) finds coding errors in the original anti-director rights index from La Porta et al. (1998), which is utilized by these earlier studies. He reports that several empirical results derived with the original anti-director rights index do not hold with corrected values. As such, whether the evidence from previous small sample studies is

generalizable and whether those results hold using the rectified index is an important empirical question. These issues leave the question of how agency conflict affects firms' cash policy largely unanswered. In this study, I revisit the connection between investor protection and the cash level using a large sample of cross-sectional and time-series micro-level data spanning 13 years and new shareholder rights indices for 41 countries. I also explicitly address the valuation channel by examining the effect of investor protection on the use of excess cash and the resulting effect on operating performance. As far as I know, I am the first to investigate the deployment of excess cash in the international setting. Using 115,945 firm-year observations of 18,192 firms from 41 countries for the period 1996-2008 and controlling for various firm-level characteristics and country-level proxies for external financing opportunities, I report novel evidence that firms in countries with weaker corporate governance do not hold more cash than firms operating in countries with stronger governance regimes. These findings are in stark contrast to previous evidence (Dittmar et al. (2003)) that controlling shareholders invest more in liquid assets when external governance constraints are weak.

Firms operating in weak legal structures are reluctant to disburse cash to shareholders (LLSV (2000a)). To explore why firms in countries with weak legal systems do not hold higher levels of cash, I investigate the dissipation of excess cash and the investment behavior of my sample firms. My analysis reveals that firms in countries where investors are not well protected dissipate more of their excess cash. Furthermore, I find that firms are prone to overinvest when they have positive excess cash, and that this effect is magnified in countries with poor external corporate governance.

The greater sensitivity of investment to internal funds in countries with weak legal systems may be attributable to under-developed financial markets in these countries (Love (2003)) rather

than a reflection of agency conflicts in the form of overinvestment incentives (Jensen (1986)). To distinguish between the agency costs explanation and the financing constraint explanation for my findings, I investigate whether the use of cash affects firms' operating performance. Ultimately, investment decisions should impact firm profitability whether higher levels of investment are detrimental (due to overinvestment) or beneficial (as firms compensate for shallow and under-developed markets). My analysis indicates that excessive cash holdings are negatively related to firms' profitability in countries where shareholder rights are weak. Strong external governance can partially reverse the negative effect of excess cash on firms' operating performance. The results support the notion that greater sensitivity of investments to excess cash for firms in countries with weak legal structures reflects managerial overinvestment behavior, rather than shallow capital markets. The findings lead us to conclude that the inefficient use of excess cash impedes firms' performance, giving rise to legitimate cause for concern on the part of outside shareholders about large cash reserves. The overall evidence is generally consistent with the managerial empire building hypothesis.

My cross-country evidence on the relation between corporate governance and the level of cash is more in line with findings for the US documented by Harford et al. (2008) who show that as shareholder rights increase, cash balances increase**.** They interpret their findings as the consequences of entrenched managers' quick dissipation of cash to avoid being targeted by empowered shareholders for holding too much unused cash. In contrast, my findings suggest that the driving force behind the dissipation of cash is the unconstrained overinvestment incentive associated with weak external governance mechanisms. My study in this chapter contributes to the literature in two important ways. First, I add to the research on corporate cash holdings by providing an overall picture of how agency conflict comes into play in corporate cash policies.

Prior research attempts to explore this issue from generally three different angles: the association between corporate governance and cash level, the relation between corporate governance and real consequences of cash positions, and the link between corporate governance and the value of cash. In this paper, I document new evidence that poor investor protection is not actually associated with high cash holdings as previously thought. This new finding reconciles the previously contradictory evidence between international and US studies. In addition, by using a large sample spanning 13 years and taking advantage of considerable variation in the quality of external corporate governance, I present evidence that the combination of excess cash and poor corporate governance does not bode well for shareholders. Furthermore, my study provides insights into how governance mechanisms affect the value of cash, revealing that the previously documented value loss of liquid assets in weaker governance countries can be attributed to inefficient use of excess cash and misallocation of capital.

Second, my study contributes to the research relating country-level corporate governance to firm value. Previous research establishes that poor corporate governance causes a significant discount in firm value (Claessens et al. (2002) and La Porta et al. (2002)). The earlier literature attributes this value loss primarily to outright diversion of assets by controlling shareholders (La Porta et al. (2002), and Shleifer and Wolfenzon (2002)). Recent literature (Albuquerue and Wang (2008)) argues that controlling shareholders under weak external constraints have stronger incentives to overinvest because they are able to derive greater private benefits in larger firms, and that distorted investments reduce firm value. I provide empirical evidence in support of this conjecture by showing that the confluence of weaker governance and excess cash result in profligate spending on inefficient investments. My findings suggest that non-value-maximizing

overinvestment is an agency issue not only in rich common law countries (La Porta, et al. (2000b)), but also in countries with weaker legal systems.

This chapter is structured as follows. In section 2.2, I develop my hypotheses. I present sample construction and variable measurements in section 2.3. In section 2.4, I examine the relation between external governance structures and cash holdings. I then proceed to examine the link between corporate governance, dissipation of excess cash and investments in section 2.5. I explore whether the use of excess cash hinders firms' profitability in section 2.6, and in section 2.7 I conclude.

2.2. Hypothesis development

One of the earliest rationales for maintaining cash reserves is that it affords the firm financial slack that diminishes transaction costs of raising funds by issuing debt or equity, selling assets or cutting dividends. More importantly, firms may hold cash reserves to avoid forgoing future investment opportunities when external financing is prohibitively costly. If managers serve the best interests' of shareholders, they will optimize cash holdings by balancing the marginal costs of investing in liquid assets against the marginal costs of being short of funds. In this framework, cash balances in firms under weaker corporate governance should be indistinguishable from those of firms under stronger governance structures. I refer to this as the Irrelevance Hypothesis.

Self-interested managers have incentives to increase the amount of assets under their control which suggests that cash is retained or invested inefficiently rather than disbursed to shareholders. Consistent with this argument, La Porta et al. (2000a) cross-country analysis provides evidence that weaker external governance is associated with lower dividend payouts. The implication of this finding is that firms under weaker governance structures retain a greater portion of their earnings. Whether these large retained earnings ultimately translate into high

levels of cash reserves depends on the tradeoff between convenience and empire-building preferences of controlling shareholders. Since cash policy is not simply the flip side of dividend policy, it cannot be inferred from La Porta et al.'s (2000a) findings that cash level is higher in countries with weaker shareholder rights.

On the one hand, large cash reserves provide controlling shareholders with the convenience and freedom from scrutiny by the capital market (Easterbrook (1984)). In addition, controlling shareholders may hold on to cash to reduce the likelihood of financial distress and possible loss of control. Insider shareholders may also hoard cash to facilitate the diversion of liquid assets into private benefits and the consumption of perquisites (La Porta et al. (2002)). If controlling shareholders put greater value on the convenience of cash reserves, they are more likely to stockpile cash when the constraints imposed by the external governance are weak. In this case, I should observe a higher cash level in firms from countries where investors are not well protected. Dittmar et al. (2003) find evidence consistent with this convenience prediction.

Alternatively, agency cost theory argues that managers have excessive taste for running large firms and that empire-building preferences will cause managers to spend available funds and misallocate resources through inefficient investments (Jensen and Meckling (1976), Jensen (1986)).[19] This leads to the prediction that investments are increasing in internal resources—that is, excess cash will tempt firms to overinvest. Pawlina and Renneboog (2005) establish that the extent of entrenchment at firm level is associated with higher investment-cash flow sensitivity. Given that the private benefits of control are higher under weaker shareholder rights, controlling shareholders may have stronger incentive to distort investments to pursue their self-interests. If

[19] One of the channels that the investment in real assets expands the scope and asset base of the firm is through the "asset multiplier." When real assets increase, collateral is augmented, facilitating external financing. This in turn allows the firm to make more investments.

these arguments are borne out, I expect the positive link between excess cash and investments to be amplified in countries with weaker claimant rights—higher tendency to deplete cash more quickly by spending it on inefficient investments. As a result, if managers' first-order preference is empire building, I should observe that firms under poor governance mechanisms do not hold higher levels of cash.

In sum, if firms' cash decisions are only based on the economic incentives, there should be no connection between the proxies for agency conflict and the level of cash after controlling for transaction costs and precautionary motive of cash holdings. Conversely, if agency conflict plays a role in cash policy, I should observe a significant influence of governance metrics on cash level. A negative link between agency conflict and cash level implies a preference for empire building while a positive connection reflects that managers favor holding cash for convenience and flexibility.

2.3. Sample and data

2.3.1. Sample construction

I collect financial data from Worldscope database for all firms between 1985 and 2008 for 49 countries. Then I apply the following screening criteria. I exclude firms that have missing information on the method of reporting long-term investments in which they have interest in excess of 50% and firms that do not consolidate their major subsidiaries. I also require observations to have non-missing values on the following variables: total assets, sales, book value of equity, cash and marketable securities, capital expenditures, working capital, dividends, long term debt, cash flow and market capitalization. To avoid measurement errors, observations with negative values on total assets, sales, book value of equity, cash and marketable securities are deleted. I also exclude financial services and utilities firms, where cash policies are

influenced by statutory capital requirements and other government regulations. To be included in the analysis, information on external governance indices and capital market development must also be available.

Given the concern that the large representation of US observations may bias the overall results, I exclude US firms from my sample.[20] I choose 1996 as the start year because firm coverage in Worldscope before 1985 is sparse and I need 10 years data to estimate industry cash flow volatility. After imposing the above sample requirements, I am left with 115,945 firm-year observations for 18,192 firms from 41 countries. The subsequent various analyses may have different observations due to missing values of certain variables.

2.3.2. Cash holdings and other firm specific variables

In this section, I define the variables that I use to measure the level of cash and the determinants of cash holdings. I use the ratio of cash and marketable securities to total assets as my measure of cash. While cash scaled by net assets (total assets less cash and marketable securities) or cash scaled by sales can be used to measure cash, I find extreme outliers in these two alternative measures. Nonetheless, I use these two measures to serve as robustness checks. To proxy for investment opportunities, I use market-to-book ratio (MTB) estimated as (book value of total assets - book value of equity + market value of equity) scaled by total assets. I use R&D expenses to sales (RD) to proxy for information asymmetry and costs of financial distress. This variable takes a value of zero for firms with missing R&D expense information. I measure firm size as the logarithm of the book value of total assets, which is stated in US dollars in 2008 prices for all countries. Using the procedure employed by prior research, I calculate cash flow

[20] The US has total firm-year observations of 52,264 during my sample period, accounting for 45% of total observations for all other countries. Another rationale for excluding US firms is the fact that the market for corporate control in the US is strongest among all countries and such a powerful disciplinary mechanism can have a significant impact on managerial behavior regarding cash policy.

volatility (CFVOL) as the median standard deviation of industry cash flows of the previous ten years.[21]

I measure cash flow as earnings after interest, taxes and common dividends but before depreciation scaled by book value of total assets. Net working capital (NWC) is calculated as the ratio of current assets less current liabilities less cash and marketable securities to total assets. I use a dummy variable (DIV) that takes a value of one if the firm has a positive dividend payout and zero otherwise. Leverage is computed as long term debt plus short term debt divided by total assets. I scale capital expenditures by total assets (CAPEX) to represent the firm's investment needs. To alleviate the effect of outliers, I winsorize firm-level financial data at the 1 percent in both tails of each variable. The descriptive statistics for firm and country level data for each country in my sample are presented in Appendix A.

2.3.3. Governance metrics and other country-level variables

I gauge the quality of external corporate governance by both the legal rights granted to minority shareholders by law and the enforcement of these rights. Specifically, I measure the rights granted to minority shareholders with the corrected anti-director rights index (C-ADRI) from Spamann (2009) and the revised anti-director rights index (R-ADRI) developed by Djankov et al. (2008). I obtain the rule of law index (RuLaw) and expropriation risk index (Exprop) from La Porta et al. (1998). The corrected anti-director rights index corrects the coding errors and ambiguities of the original anti-director rights index. Both corrected and revised indices take values from 0 to 6, with 6 representing the highest legal protection offered to minority

[21] I rely on Industry Classification Benchmark (ICB) for industry classification which is adopted by stock exchanges representing over 65% of world's market capitalization. ICB has a four-tiered structure: 10 industries, 19 supersectors, 41 sectors and 114 subsectors. I use supersectors to define 13 broad industries (excluding utilities and financial services).

investors.[22] The rule of law and expropriation risk indices gauge the quality of law enforcement where the former index assesses the overall quality and tradition of law and order in a country while the expropriation risk index measures the risk of outright confiscation or forced nationalization by the government, generally reflecting the government's stance toward business. In addition to using the *level* of various indices of investor protection, I classify countries according to the median of various indices and employ these dummy variables in some estimations.

Following Pinkowitz et al. (2006), I utilize three measures of external financing opportunities that reflect equity, bond and private credit market developments. Equity and bond market development are measured by equity market capitalization (MktSize) and bond market capitalization (BonSize), respectively, while private credit market development (CrdSize) is measured by domestic credit provided by the banking sector. All three variables are scaled by gross domestic product (GDP). I obtain annual information on these variables from World Development Indicators maintained by the World Bank.

2.3.4. Measuring excess cash

I define excess cash as the cash beyond the normal level, where normal cash reflects the genuine motives to hold cash to meet operational and investment needs. I use three approaches to obtain the predicted normal cash and excess cash. First, I estimate a cash level regression for each country independently and then take the average of each coefficient. I then apply each coefficient to its corresponding variable to obtain the predicted normal cash and compute excess cash as the difference between actual cash and the predicted normal cash. I refer to excess cash

[22] Both indices are based on six shareholder rights: (1) whether the law allows shareholders to vote by mail, (2) whether shares have to be deposited prior to the general shareholders' meeting, (3) whether the law allows cumulative voting or proportional representation of minorities in the board of directors, (4) whether an oppressed minorities' mechanism is in place, (5) whether shareholders have pre-emptive rights, and (6) whether the minimum capital to call for an extraordinary meeting is greater than 10%.

estimated from this approach as ExCash(Avg). In the second approach, I pool together all countries' data, estimate a cash level regression each year, and then take the average of the parameter estimates from the annual regressions (Fama-Macbeth (1973) approach). Excess cash derived from this method is called ExCash(F-M). Third, I use random effect approach to estimate a cash level regression for pooled data of all countries and obtain the parameter estimates and excess cash, referred to as ExCash(Ran). ExCash(Avg) is utilized throughout the paper whereas the other two measures are for robustness checks. Consistent with Fresard and Salva (2009), I find that the correlation between these different measures of excess cash is high. Detailed information on the estimation of excess cash is presented in Appendix B.

2.4. Corporate governance and corporate cash holdings

2.4.1. Multivariate analysis of cash level

In this section, I empirically examine the connection between country-level investor protection metrics and cash holdings to test the hypotheses proposed earlier. If mangers serve the best interests of shareholders and make cash decisions based on economic motives, the corporate governance metrics should have no bearing on cash policy. Alternatively, if managers are motivated by self-interest and they prefer the convenience of cash reserves, the agency conflict would manifest itself through higher cash balances in economies with weak investor protection. However, if empire building is the *modus operandi* of managers, they would dissipate cash quickly by overinvesting when the constraints from external governance are weak, in which case I would observe a lower cash level in countries with weaker investor protections.

In my regression specifications, I use cash and marketable securities to total assets as the dependent variable and each of the four governance metrics are added as independent variables one at a time. A positive sign on a governance metric variable signifies a lower cash level when

shareholder rights are weaker. I control for firm characteristics by including future growth opportunities, information asymmetry, firm size, cash flow, volatility of cash flows, substitutes for cash, and ability to access the external markets. Specifically, firm-level variables employed are industry cash flow volatility, logarithm of real firm size in 2008 US dollar (LSIZE), market-to-book ratio, leverage, cash flow to assets, net working capital to assets, capital expenditure to assets, R&D expenses to sales and a dividend dummy indicating the dividend status of the firm. At the country-level, I control for external financing opportunities by including three variables which proxy for equity market development, bond market development and private credit market development. In addition, I control for differences in cash level that stems from the business cycle by including year fixed effects. I employ a country random effects specification to account for the interdependence between firms within a country.

The first four models in Table 2.1 incorporate firm-level control variables and each of four shareholder rights indices. In Models 5-8, I augment the basic model by adding country-level control variables for external financing opportunities to account for the possibility that firms hold large cash balances to counter external financing constraints. In Models 9 and 10, I include both the quality of shareholder rights and the enforcement of these rights in one model to investigate whether these two dimensions of external governance have independent effects on the decision of how much cash to hold.

I find that the firm-level variables in all models have significant coefficients with the predicted signs. In particular, industry cash flow volatility, not included in the previous studies on international cash holdings, has a positive and significant impact on cash policy in all specifications, consistent with the argument that firms hold cash to hedge against future cash flow shortfalls. Further, the coefficients on all three proxies for capital market development are

Table 2.1 Investor protection and the level of cash holdings

The table reports regression estimates relating the quality of investor protection to the level of cash holdings The dependent variable is cash and marketable securities to total assets. Key firm characteristics and country-level control variables as well as test variables are described in legend of Appendix A. All regression models include year fixed effects and are estimated using country random effect. t-statistics are reported in parenthesis. [a], [b], [c] denote statistical significant at 1%, 5%, and 10% level, respectively.

Independent Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)
Intercept	0.297[a]	0.342[a]	0.223[a]	0.291[a]	0.279[a]	0.310[a]	0.216[a]	0.273[a]	0.222[a]	0.182[a]
	(13.86)	(13.43)	(7.37)	(16.75)	(14.77)	(13.52)	(7.60)	(16.92)	(9.55)	(5.93)
CFVOL	0.011[a]	0.011[a]	0.011[a]	0.011[a]	0.149[a]	0.149[a]	0.150[a]	0.149[a]	0.149[a]	0.149[a]
	(3.14)	(3.15)	(3.13)	(3.13)	(16.18)	(16.19)	(16.24)	(16.21)	(16.20)	(16.23)
LSIZE	-0.012[a]	-0.012[a]	-0.012[a]	-0.012[a]	-0.011[a]	-0.011[a]	-0.011[a]	-0.011[a]	-0.011[a]	-0.011[a]
	(-29.47)	(-29.51)	(-29.51)	(-29.49)	(-28.25)	(-28.29)	(-28.30)	(-28.28)	(-28.20)	(-28.24)
MTB	0.011[a]	0.011[a]	0.011[a]	0.011[a]	0.010[a]	0.010[a]	0.010[a]	0.010[a]	0.010[a]	0.010[a]
	(40.82)	(40.82)	(40.80)	(40.81)	(39.16)	(39.16)	(39.15)	(39.15)	(39.16)	(39.15)
Leverage	-0.243[a]	-0.243[a]	-0.243[a]	-0.243[a]	-0.243[a]	-0.243[a]	-0.243[a]	-0.243[a]	-0.243[a]	-0.243[a]
	(-85.68)	(-85.67)	(-85.68)	(-85.67)	(-84.29)	(-84.28)	(-84.27)	(-84.27)	(-84.27)	(-84.27)
Cash Flow	0.016[a]	0.016[a]	0.016[a]	0.016[a]	0.015[a]	0.015[a]	0.015[a]	0.015[a]	0.015[a]	0.015[a]
	(10.69)	(10.70)	(10.71)	(10.70)	(10.21)	(10.22)	(10.23)	(10.23)	(10.22)	(10.22)
NWC	-0.195[a]	-0.195[a]	-0.195[a]	-0.195[a]	-0.195[a]	-0.195[a]	-0.195[a]	-0.195[a]	-0.195[a]	-0.195[a]
	(-76.77)	(-76.78)	(-76.79)	(-76.79)	(-75.70)	(-75.70)	(-75.72)	(-75.71)	(-75.71)	(-75.72)
CAPEX	-0.213[a]	-0.213[a]	-0.213[a]	-0.213[a]	-0.216[a]	-0.216[a]	-0.216[a]	-0.216[a]	-0.216[a]	-0.216[a]
	(-44.13)	(-44.12)	(-44.12)	(-44.13)	(-43.82)	(-43.82)	(-43.82)	(-43.82)	(-43.83)	(-43.82)
RD	0.022[a]	0.022[a]	0.022[a]	0.022[a]	0.022[a]	0.022[a]	0.022[a]	0.022[a]	0.022[a]	0.022[a]
	(23.75)	(23.76)	(23.74)	(23.75)	(23.23)	(23.23)	(23.21)	(23.22)	(23.21)	(23.21)
DIV	-0.004[a]	-0.004[a]	-0.004[a]	-0.004[a]	-0.003[a]	-0.003[a]	-0.003[a]	-0.003[a]	-0.003[a]	-0.003[a]
	(-4.52)	(-4.51)	(-4.52)	(-4.52)	(-3.57)	(-3.57)	(-3.57)	(-3.57)	(-3.58)	(-3.58)
CrdSize					0.044[b]	0.046[b]	0.039[c]	0.041[b]	0.037[c]	0.036[c]
					(2.14)	(2.21)	(1.91)	(1.99)	(1.77)	(1.75)
BonSize					0.032[a]	0.031[a]	0.029[a]	0.029[a]	0.029[a]	0.029[a]
					(5.94)	(5.86)	(5.34)	(5.42)	(5.40)	(5.38)
MktSize					0.028[a]	0.029[a]	0.029[a]	0.029[a]	0.028[a]	0.028[a]

					(3.33)	(3.40)	(3.44)	(3.40)	(3.27)	(3.34)
R-ADRI (level)	0.011[b]				0.010[b]				0.012[a]	0.009[b]
	(2.08)				(2.11)				(2.91)	(2.35)
C-ADRI (level)		-0.001				0.001				
		(-0.16)				(0.25)				
Exprop (level)			0.014[a]				0.012[a]			0.012[a]
			(3.93)				(3.65)			(3.84)
RuLaw (level)				0.006[a]				0.006[a]	0.007[a]	
				(2.99)				(3.01)	(3.67)	
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.298	0.297	0.298	0.299	0.306	0.303	0.303	0.304	0.310	0.310
N	115,945	115,945	115,945	115,945	112,250	112,250	112,250	112,250	112,250	112,250

positive and significant, indicating that the accessibility to external funds enhances cash holdings. This finding is not consistent with the argument that firms hold more cash because they have limited external financing opportunities; instead, it supports the agency conflict explanation that firms hold more cash when they have opportunities to do so.

With regard to the variables of my main interest, I find in Models 1 and 5 a significantly positive link between cash holdings and R-ADRI, indicating a lower cash level at firms in countries with weaker shareholder rights. In Models 2 and 6, the coefficients on C-ADRI are insignificant, consistent with the findings by Kalcheva and Lins (2007). The coefficients on the enforcement variables in Models 3, 4, 7 and 8 are positive and significant. Further, the coefficients on both R-ADRI and enforcement variables are positive and significant in Models 9 and 10, indicating independent effect of protective laws and the degree of their enforcement on cash. Taken together, the evidence from these models indicates a strong positive link between the quality of external governance and the level of cash, which contrasts with the evidence by Dittmar et al. (2003) that as shareholder rights increase, the cash reserves decrease.

2.4.2. Robustness checks

To give additional support to the results, I undertake a battery of robustness checks and present my findings in Table 2.2. In all models, I include the same firm-level variables as in Table 1. The coefficients on these variables still have the predicted signs but are not reported in Table 2 for brevity. In Model 1, I use R-ADRI and rule of law dummies instead of the level of these two variables. Consistent with the findings in the above sections, the coefficients on both variables are positive and significant.

Cross-country studies are often criticized for the possible omission of important institutional features. To ease the concern of potential omitted variable biases, I conduct four additional

Table 2.2 Robustness checks: Investor protection and corporate cash holdings

The table reports results for a series of robustness checks on the relation between investor protection and corporate cash holdings controlling for country-level control variables such as political constraint index from Henisz (2005), creditor rights index, dividend tax preference, and accounting quality. The dependent variable is the ratio of cash and marketable securities to total assets. All models are estimated using firm characteristics (unreported coefficients) described in Table 1. We classify sample countries based on the median value of each governance metric, where the governance dummy equals 1 if a country's value is above the median value. All regression models include year fixed effects and are estimated using country random effect. t-statistics are reported in parenthesis. [a], [b], [c] denote statistical significant at 1%, 5%, and 10% level, respectively.

Independent Variable	Dummy (1)	Creditor Rights (2)	Political Rights (3)	Div. Tax Preference (4)	Accounting Quality (5)	F-M (6)	1998 (7)	Exclude UK (8)	Exclude JPN/UK (9)	Exclude EastAsia (10)
CrdSize	0.031[c]	0.036[c]	0.067[a]	0.035[c]	0.015[a]	0.013[a]	0.108	0.048[a]	-0.009	0.061[a]
	(1.84)	(1.73)	(3.74)	(1.66)	(13.77)	(4.30)	(0.88)	(2.82)	(-0.36)	(3.21)
BonSize	0.023[a]	0.029[a]	0.030[a]	0.029[a]	0.041[a]	0.034[a]	0.057[b]	0.022[a]	0.023[a]	0.023[a]
	(5.39)	(5.36)	(6.01)	(5.42)	(8.84)	(7.33)	(2.17)	(5.42)	(3.90)	(5.31)
MktSize	0.023[a]	0.028[a]	0.020[c]	0.026[a]	0.015[a]	0.005	-0.020	0.020[a]	0.025[b]	0.031[a]
	(3.43)	(3.26)	(1.90)	(3.07)	(11.74)	(0.93)	(-0.18)	(3.00)	(2.57)	(4.28)
R-ADRI (dummy)	0.026[a]					0.010[a]				
	(3.14)					(3.10)				
R-ADRI (level)		0.008[c]	0.007[c]	0.012[b]	0.004[a]			0.009[b]	0.010[b]	0.009[b]
		(1.65)	(1.69)	(2.39)	(3.34)			(2.24)	(2.02)	(2.25)
C-ADRI (level)							-0.006			
							(-0.75)			
RuLaw (dummy)	0.028[a]									
	(3.36)									
RuLaw (level)		0.006[a]		0.006[a]						
		(3.46)		(2.71)						
Creditor Rights		0.006[c]								
		(1.79)								
Political Rights			-0.003							
			(-0.65)							
Div.Tax Preferences				0.022						
				(0.80)						

				(0.80)						
Accounting Quality					-0.001[a]					
					(-8.57)					
Year Dummies	Yes	Yes	Yes	Yes	Yes			Yes	Yes	Yes
R^2	0.311	0.311	0.320	0.314	0.318	0.312	0.276	0.308	0.321	0.313
N	112,250	112,147	89,827	108,264	110,058	112,250	5,350	103,415	78,260	102,880

tests by considering creditor protection, political rights, dividend tax preferences, and accounting quality. First, I augment the basic model from Table 2.1 by adding the creditor rights index compiled by La Porta et al. (1998) to investigate whether the shareholder rights capture the effect of creditor protection.[23] On the one hand, because high creditor protection is associated with large private credit markets and low costs of debt financing, higher creditor protection predicts lower cash reserves (Djankov et al. (2007) and Bae and Goyal (2009)). One the other hand, high creditor rights impose expensive financial distress costs on management and controlling shareholders, allowing high liquidity holdings to serve as insurance against future default. Consistent with the latter notion, the coefficient on creditor rights index in Model 2 indicates a positive and significant link between creditor rights and cash level.

Previous research documents that agency conflicts between debt and equity claimants affect firms' capital structure choice (Rajan and Zingales (1995) and Sufi (2007)), the investment decision (Nini et al. (2007)), and dividend policies (Brockman and Unlu (2009)). My findings indicate that the agency costs of debt also have bearing on corporate liquidity policies. More importantly, after controlling for creditor rights, the coefficients on R-ADRI and rule of law index are still significantly positive, confirming the effect of shareholder rights and their enforcement on cash level.

Second, in Model 3 I consider the effect of the political constraint index, obtained from Henisz (2005), on cash holdings. Qi et al. (2010) show that greater political rights are associated with lower costs of debt financing. While I do not find political rights to have any bearing on the cash decision, the inclusion of this variable does not change my inferences for shareholder rights.

[23] The index, which ranges from 0 to 4, is comprised of four creditor rights variables. These four variables include whether the reorganization procedure imposes an automatic stay on the assets, whether secured creditors are paid first, whether creditor consent is needed to file for reorganization, and whether management can stay during reorganization. The higher the number on this index, the greater is the creditors' power in case of default.

Third, I include dividend tax preferences (obtained from La Porta et al. (2000a)) in Model 4 to account for the possible influence of disadvantageous dividend taxes on the decisions to hold cash. This variable measures the advantage of dividends over capital gains after accounting for taxes. The coefficient on dividend tax preference is not significant; however, the inclusion of this variable does not affect the relevance of both R-ADRI and rule of law index on cash level. And lastly, I take the quality of accounting information into consideration since this factor has been found to be associated with the cost of capital (Lambert et al. (2007)). The coefficient on this variable in Model 5 is negative and significant, consistent with the notion that high accounting quality reduces the need to hold large internal funds. The coefficient on R-ADRI remains unchanged.

Further, I employ a different estimation technique. To account for the cross-sectional clusters, I use Fama-Macbeth (1973) approach to re-estimate Model 1 and compute t-statistics for the regression coefficients using the Newey and West (1987) procedure that is robust to autocorrelation out to three lags. Model 6 indicates that the coefficient on R-ADRI (0.018) is significantly positive. Using cross-country data for 1998, Dittmar et al. (2003) draw the conclusion that firms under weaker investor protections have a tendency to build more cash reserves than their counterparts in countries with stronger shareholder rights. I replicate their analysis using only 1998 data from my sample in Model 7. The coefficient on C-ADRI is negative, consistent with Dittmar et al.'s finding, but insignificant in my sample.[24] This result is also consistent with Kalcheva and Lins (2007), who document a negative but insignificant coefficient on shareholder rights using data for 1996.

[24] The difference may be attributable to different sources of data, model specification, and governance metrics (they use original anti-director rights index from La Porta et al. (1998)).

In Models 8 through 10, I address the sample selection issues. Japan and UK have the largest representations in my sample and the East Asia had experienced the currency crisis during my sample period. To address concerns that these events may drive my findings, I create three subsamples by first excluding UK, and then both Japan and UK, and finally Indonesia, Malaysia, the Philippines, and Thailand from the sample, and then redo the basic analysis. For these subsamples, the results in Models 8, 9 and 10 remain unchanged with the R-ADRI variable positive and statistically significant.

I also conduct additional tests using alternative measures of both dependent and independent variables. I use the natural logarithm of cash and marketable securities to total assets, cash ratio scaled by net assets, cash ratio scaled by sales and industry-adjusted cash ratio as dependent variables and obtain quantitatively similar findings. I also use market-value-weighted, book-value-weighted and mean industry cash flow volatility as alternative measures of cash flow risk, and the inferences remain unaltered.[25]

Collectively, this first set of results provide evidence that firms under weaker external governance do not hold higher levels of cash, when governance measure reflects the granting of shareholder rights. Moreover, when governance metric is the quality of the enforcement of these rights, firms in poorer governance countries actually hold lower levels of cash. My evidence so far does not support the irrelevance and convenience hypotheses. However, to conclude whether my findings are consistent with the empire-building hypothesis, I need to explicitly investigate whether firms under weaker external governance have excessive spending, especially on investments, when they hold excess cash.

[25] If I include the US in the sample and replicate the regression analysis of Model 5 in Table 1, the coefficient on revised anti-director rights index is still positive and significant at 10% level.

2.5. Corporate governance, dissipation of excess cash and investment

To provide direct evidence on the role of empire building hypothesis on cash, I investigate how external governance affects the *use* of cash. Specifically, I explore whether firms form countries with weaker governance mechanisms spend more excess cash than firms from stronger investor protections. Then, I analyze the relation between excessive cash holdings, governance metrics, and firms' investments.

2.5.1. Corporate governance and dissipation of excess cash

To investigate how shareholder rights affect how much cash firms dissipate, I depict how much of excess cash remains in each of five years following the year with positive excess cash. In particular, I treat the year with positive excess cash as year zero (t=0), and calculate the median of the ratio of value of excess cash from each of year t+1, t+2, t+3, t+4, and t+5 to year 0. In unreported results, I find that firms dissipate their excess cash more quickly when country-level shareholder rights are not well defined. For example, in the first year following the year with positive excess cash, firms from countries with poor investor protection use between 25%-30% of their excess cash while firms from countries with strong investor protections only dissipate 5% of excess cash. This finding for high shareholder rights countries is consistent with the evidence for the US documented by Opler et al. (1999) and Dittmar et al. (2007). At the end of year five, firms under weak investor protections dissipate 70%-75% of their excess cash while their counterparts from strong shareholder rights countries use 60%-65% of excess cash.

To further characterize the dissipation behavior of firms from different governance regimes, I conduct regression analysis for a subsample of firms with positive excess cash at year t where the dependent variable is the change in excess cash from year t to t+1 (excess cash at year t+1 minus excess cash at year t). The independent variables include governance metrics and the

Table 2.3 Investor protection and dissipation of cash

The table reports the regression results testing the relation between the quality of investor protection and the dissipation of cash using a subsample of firms with positive excess cash at year t. The dependent variable is the future change in excess cash estimated as excess cash at year t+1 minus the value at year t. In Models 1-4, the measure of excess cash, ExCash(Avg), is obtained through averaging the coefficients from regressions for each country. In Model 5, the measure of excess cash is obtained through estimating Fama-Macbeth (1973) regression for the pooled data for all countries (ExCash(F-M)). In Model 6, the measure of excess cash is obtained through the random effects regression for the pooled data (ExCash(Ran)). Industry average change in excess cash is estimated as median value of industry change in excess cash on a yearly basis. The governance metrics employed are as described in Table 1. I classify sample countries based on the median value of each governance metrics, and the governance dummy equals to 1 if a country's value is above the median value. All regression models include year fixed effects. t-statistics based on standard errors robust to clustering by firms are reported in parenthesis. [a], [b], [c] denote statistical significant at 1%, 5%, and 10% level, respectively.

			ExCash (Avg)		ExCash (F-M)	ExCash (Ran)
Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Intercept	-0.035[a]	-0.033[a]	-0.026[a]	-0.026[a]	0.010[a]	-0.019[a]
	(-21.43)	(-21.45)	(-16.49)	(-16.02)	(3.60)	(-8.43)
Industry Average Change in Excess Cash	1.090[a]	1.072[a]	1.151[a]	1.151[a]	0.057	0.995[a]
	(7.90)	(7.77)	(8.27)	(8.27)	(0.47)	(9.47)
R-ADRI (dummy)	0.016[a]					
	(14.17)					
C-ADRI (dummy)		0.019[a]				
		(21.26)				
Exprop (dummy)			0.002[c]			
			(1.64)			
RuLaw (dummy)				0.002[c]		
				(1.70)		
R-ADRI (level)					0.001[c]	0.001[a]
					(1.87)	(2.99)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.010	0.012	0.005	0.005	0.002	0.005
N	39,865	39,865	39,865	39,865	43,633	54,340

contemporaneous industry average change in excess cash to control for varying industry cash needs due to growth opportunities and business risks. I also control for time trends by including year dummies. I am interested in the coefficients of the various governance metrics—a positive sign implies less dissipation of cash from year t to year t+1 in better governance regimes. For each governance metric, I estimate one regression to distinguish between high and low investor

protection and present the results in Models 1 through 4 in Table 1.3. In Models 5 and 6, I re-estimate Model 1 using two alternative measures of excess cash.

Consistent with Dittmar and Mahrt-Smith (2007), my results show that industry average change in excess cash has significant explanatory power for the change in excess cash at firm level in all models. More importantly, the coefficients on all governance metrics in all specifications are positive and significant, indicating that firms under strong investor protection spend less cash than firms under weak shareholder rights. Further, my inferences remain the same when I measure excess cash using the average of coefficients from regressions for each country independently or when using Fama-Macbeth approach or random effects for pooled data of all countries.

2.5.2. Corporate governance, excess cash and investment

Firms may deploy excess cash to capital expenditures, R&D expenses, acquisitions, paying down debt or dividend payments. Clearly, the dissipation of cash does not automatically translate into wasteful use of resources. The use of excess cash can result in reduced firm value through overpaying for acquisitions, or through inefficient investments, thereby reducing ongoing operating performance. Given that I am interested in whether excessive cash holdings impact firms' operating performance, I focus my analysis in this section on how external governance and excess cash together affect firms' total investments, defined as the sum of capital expenditures and R&D expenses scaled by total assets.[26]

To do this, I estimate a series of regressions for the subsample of firms with positive excess cash by relating the future change in total investments to excess cash. To control for industry effect, I adjust the total investments by global industry median value on a yearly basis.

[26] I do not examine capital expenditures and R&D expenses separately because the accounting rules to expense or capitalize capital expenditures and R&D expenses varies across countries (Flower and Ebbers (2002)).

Table 2.4 Investor protection and investments

This table analyzes the investment behavior of firms from different governance countries using a sample of firms with positive excess cash at year t-1. The dependent variable is the change in industry-adjusted total investment estimated as sum of capital expenditures and R&D expenses scaled by total assets. I adjust total investment by global industry value estimated as the median of country median each year. Additional country-level control variable included here is lending rate. I classify sample countries based on median value of each governance metrics, and the governance dummy equals 1 if a country's value is above the median. In Model 7, all the variables except for governance dummy are included as differences. In Models 1-4 and 7, the measure of excess cash is obtained through averaging the coefficients from regressions for each country (ExCash(Avg)). In Model 5, excess cash is obtained through estimating Fama-Macbeth (1973) regression for pooled data for all countries (ExCash(F-M)). In Model 6, excess cash is obtained from random effects regression for pooled data (ExCash(Ran)). All models include year fixed effects and are estimated using country random effect. t-statistics are reported in parenthesis. [a], [b], [c] denote statistical significant at 1%, 5%, and 10% level, respectively.

			ExCash (Avg.)		ExCash (F-M)	ExCash (Ran)	Change in Variables
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Intercept	-0.009[a]	-0.008[b]	-0.008[a]	-0.007[b]	-0.010[a]	-0.008[a]	-0.006[a]
	(-3.22)	(-2.71)	(-2.86)	(-2.62)	(-3.74)	(-3.08)	(-4.44)
NWC / Assets	0.001	0.001	0.001	0.001	0.004[a]	0.004[a]	-0.010[a]
	(0.50)	(0.60)	(0.41)	(0.39)	(2.62)	(2.78)	(-2.93)
Leverage	-0.017[a]	-0.018[a]	-0.017[a]	-0.017[a]	-0.019[a]	-0.018[a]	0.017[a]
	(-11.26)	(-11.33)	(-11.21)	(-11.23)	(-14.32)	(-14.34)	(4.20)
LSIZE	0.001[a]	0.001[a]	0.001[a]	0.001[a]	0.001[a]	0.001[a]	-0.002[b]
	(5.60)	(5.49)	(5.41)	(5.31)	(7.30)	(6.93)	(-2.44)
Sales Growth	0.464	0.001	0.001	0.001	0.001	0.001	0.001
	(0.63)	(0.72)	(0.76)	(0.70)	(0.99)	(1.22)	(0.83)
CrdSize	-0.030[a]	-0.032[a]	-0.020[c]	-0.017	-0.049[a]	-0.055[a]	-0.113[a]
	(-2.60)	(-2.71)	(-1.80)	(-1.60)	(-4.22)	(-4.86)	(-3.97)
BonSize	-0.082	-0.001	-0.001	0.001	0.003	0.003	0.202
	(-0.02)	(-0.16)	(-0.36)	(0.29)	(0.89)	(0.93)	(0.03)
MktSize	-0.006	-0.004	-0.005	-0.004	-0.002	-0.006	0.008
	(-0.87)	(-0.54)	(-0.68)	(-0.62)	(-0.29)	(-0.86)	(1.09)
Lending Rate	-0.096	-0.111	-0.053	-0.054	-0.270[a]	-0.299[a]	-0.001[a]
	(-1.38)	(-1.56)	(-0.79)	(-0.84)	(-3.66)	(-4.09)	(-3.38)
ChgExCash							-0.025[a]
							(-7.74)
$ExCash_{t-1}$	0.043[a]	0.036[a]	0.035[a]	0.029[a]	0.046[a]	0.045[a]	0.040[a]
	(11.07)	(12.86)	(10.57)	(8.45)	(12.30)	(12.80)	(10.27)
R-ADRI	0.005[a]				0.007[a]	0.007[a]	0.003[b]
	(3.09)				(3.25)	(3.33)	(2.23)
R-ADRI * $ExCash_{t-1}$	-0.022[a]				-0.024[a]	-0.023[a]	-0.018[a]
	(-4.81)				(-5.37)	(-5.42)	(-3.90)
C-ADRI		0.008[a]					
		(3.58)					
C-ADRI * $ExCash_{t-1}$		-0.028[a]					
		(-5.50)					
Exprop			0.001				
			(0.76)				

Exprop * $ExCash_{t-1}$			-0.013[a]				
			(-2.94)				
RuLaw				-0.002			
				(-1.17)			
RuLaw * $ExCash_{t-1}$				-0.001			
				(-0.14)			
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.012	0.012	0.011	0.011	0.012	0.012	0.013
N	35,997	35,997	35,997	35,997	45,227	48,337	33,684

Specifically, I regress future change in industry-adjusted total investments (the value at year t+1 minus that at year t) on excess cash holdings at year t. For firm-level control variables, I include net working capital to total assets, logarithm of real total asset in 2008 US dollars, leverage, and sales growth. Given that investment decisions are related to the availability of funds and borrowing costs, I include in the regression specification the equity, bond and private credit market development variables as well as the lending rate. All the regressions include year dummies to control for macroeconomic factors and the business cycle. Similar to the previous analysis, I present one regression for each of the four governance metrics in Models 1 through 4 as well as for each of the two alternative measures of excess cash in Models 5 and 6 in Table 2.4. In model 7, I include all variables except for governance dummy as differences to remove the effect of all firm-level time-invariant unobserved factors on the investments. The coefficients of interest are those for excess cash at year t and the interaction of excess cash with dummy governance metrics (high shareholder rights take a value of 1). A positive sign on excess cash signifies more investments in the presence of excess cash, while a positive sign on the interaction terms imply that the overinvestment is enhanced in countries where investors are better protected.

Generally I find a negative link between the proxies for financial market development and firms' investments in Table 2.4, consistent with previous evidence that financially developed countries do not invest at a higher level (Beek et al. (2000), and Wurgler (2000)). The negative

sign on lending rate indicates that firms invest less when the financing costs are high. The point estimates on lagged excess cash are positive and significant in all models, indicating that excess cash holdings induce firms to invest more when the external constraints are weak. In terms of economic significance, a one-standard deviation increase in excess cash leads to 0.35%-0.54% increase in investments in firms operating in countries with weaker shareholder rights than their industry peers. With a mean sample industry-adjusted total investment of 2.35%, this corresponds to an economically significant 15%-23% increase in total investments on average.

The significant negative coefficients on the interaction terms between excess cash and shareholder rights metrics show that the propensity to overinvest when excess cash is available is reduced when country-level investor protection is strong. However, an F-test on the sum of coefficients on excess cash and the interaction terms suggests that the firms in countries with strong shareholder rights also display overinvestment proclivity when excess cash is at hand, but with much smaller magnitudes.[27]

2.6. Corporate governance, dissipation of excess cash and firm performance

2.6.1. Corporate governance, dissipation of excess cash and firm profitability

Given the evidence so far, I cannot conclude that the overspending behavior is due to agency conflicts. Love (2003) documents that investments are highly sensitive to the availability of internal funds when the financial markets are relatively under-developed. Since countries with weaker external governance are more likely to have poorly developed capital markets, this may prompt firms to invest more when they have excess internal funds. To distinguish between the

[27] I examine the relation between governance metrics, excess cash and dividend policy and find no significant difference in change in dividend policy across high and low investor protection countries when firms hold excess cash. One possible explanation is that share repurchases have become an increasingly important payout method and have served as a substitute for dividend payout in recent years in wealthy common law countries. However, share repurchases are viewed as illegal and are heavily taxed in some civil law countries (La Porta et al. (2000a)). Thus, the use of cash dividend payout may bias against finding a difference between the two regimes.

Table 2.5 Investor protection, dissipation of excess cash and operating performance

This table analyzes the relation between use of excess cash, operating performance and the quality of investor protections for firms with positive excess cash at year t-1. The dependent variable is industry-adjusted operating performance (ROA) estimated as earnings before interests and depreciation scaled by total assets less global industry value (median of country medians each year). The firm-level control variables are lagged industry adjusted ROA LSIZE, asset structure (property, plant and equipment/total assets) and sales growth. For interaction terms, the governance metric is a dummy equaling 1 if a country's governance value is above the median while the dissipation of excess cash (ChgExCash) is measured as $ExCash(Avg)_{t-1}$ minus $ExCash(Avg)_t$. All models include year fixed effects and are estimated using country random effect. t-statistics are in parenthesis. [a], [b], [c] denote statistical significant at 1%, 5%, and 10% level, respectively.

Independent Variable	Model (1)	Model (2)	Model (3)	Model (4)
Intercept	-0.054[a]	-0.054[a]	-0.057[a]	-0.058[a]
	(-8.10)	(-8.37)	(-8.63)	(-8.08)
Industry Adj. ROA_{t-1}	0.770[a]	0.770[a]	0.771[a]	0.770[a]
	(215.48)	(215.38)	(215.73)	(215.51)
LSIZE	0.005[a]	0.005[a]	0.005[a]	0.005[a]
	(14.09)	(14.06)	(14.10)	(14.10)
PPE / Assets	0.010[a]	0.010[a]	0.010[a]	0.010[a]
	(2.99)	(3.04)	(2.90)	(3.06)
Sales Growth	0.066[a]	0.066[a]	0.066[a]	0.066[a]
	(44.77)	(44.91)	(44.82)	(44.82)
CrdSize	-0.023	-0.028	-0.028	-0.035
	(-0.77)	(-0.97)	(-0.93)	(-1.16)
BonSize	-0.016[b]	-0.015[b]	-0.019[b]	-0.020[a]
	(-2.19)	(-2.14)	(-2.57)	(-2.62)
MktSize	-0.027	-0.025	-0.029[c]	-0.030[c]
	(-1.57)	(-1.53)	(-1.73)	(-1.74)
$ExCash_{t-1}$	-0.056[a]	-0.056[a]	-0.034[a]	-0.056[a]
	(-10.59)	(-10.59)	(-4.77)	(-10.62)
ChgExCash	-0.118[a]	-0.118[a]	-0.104[a]	-0.159[a]
	(-14.02)	(-17.71)	(-16.72)	(-8.79)
R-ADRI	0.001			0.006
	(0.21)			(1.02)
R-ADRI * ChgExCash	0.031[b]			0.064[a]
	(2.69)			(3.70)
C-ADRI		0.006		
		(0.99)		
C-ADRI * ChgExCash		0.100[a]		
		(6.12)		
Exprop			0.011[b]	
			(2.12)	
Exprop * ChgExCash			0.043[a]	
			(4.58)	
RuLaw				0.010[c]
				(1.65)

RuLaw * ChgExCash				0.044[b]
				(2.53)
Year Dummies	Yes	Yes	Yes	Yes
R2	0.557	0.559	0.558	0.558
N	38,578	38,578	38,578	38,578

agency costs explanation and the financing constraint explanation for my findings, I investigate the extent to which the dissipation of excess cash impacts firms' profitability taking the investor protection environment and capital market developments into consideration. The decision to deploy internal funds is of primary importance to firm performance. If the higher levels of investments documented in the previous section represent misallocation of resources and hence, are harmful to equity holders, I should be able to detect how the choice of spending excess cash impinges on firm performance.

To gauge how the investment behavior in the presence of excess cash affects firm performance, I regress firms' operating performance on excess cash at the beginning of the year, the dissipation of excess cash ($ExCash_t$-$ExCash_{t-1}$), shareholder rights metrics, and the interaction of dissipation of excess cash with shareholder rights variables. I use industry-adjusted operating performance to control for industry effects, measured as earnings before depreciation and interests scaled by total assets (ROA) less the global industry's median value for that year. I control for firm size, asset structure and sales growth at the firm level. I also include the three capital market development variables, lagged industry-adjusted operating performance to account for the persistence of performance, as well as year dummies to control for the effect of the business cycle. To alleviate the concern of within-country dependence, I estimate all the regression specifications with country random effects. Given that my main objective is to test whether the dissipation of excessive cash holdings affects firms' performance, I estimate the regression analysis for the subsample of firms with positive excess cash.

The results for the link between external governance, the dissipation of excess cash and firms' profitability are reported in Table 2.5. Across all four models, the lagged industry-adjusted operating performance has significant explanatory power for current firm performance, indicating persistence in operating performance. The coefficients on governance metrics are insignificant in two of the four models (except for the expropriation risk index) at 5% level. The results are generally consistent with Dittmar et al. (2007) and Mikkleson and Partch (2003) in that governance is unrelated to firms' profitability. Also, the coefficients on the one-year lagged excess cash for all four models are significantly negative, suggesting a negative association between holding excess cash and firms' future profitability across legal regimes.

In Model 1, the significant coefficient on the dissipation of excess cash (ChgExCash = $ExCash_{t-1}$ - $ExCash_t$) of -0.118 (t=-14.02) points to a negative association between the dissipation of excess cash and firms' future profitability. However, the coefficient on the interaction term of dissipation of excess cash with R-ADRI dummy (high shareholder rights take a value of 1) is negative and significant (0.031, t=2.69), offsetting about one-third of the negative effect of dissipation of excess cash on firms' profitability. An F-test indicates that the sum of coefficients on dissipation of excess cash and the interaction term is still negative and significant, indicating that the dissipation of excess cash has negative repercussions even for firms established in countries with strong shareholder rights. The results in the remaining models are similar to those in Model 1. For example, the coefficient on dissipation of excess cash is 0.118 (t=17.71) and the sum of coefficients on dissipation and interaction term (0.018, p-value=0.62) is insignificant when the external governance is proxied by C-ADRI while the corresponding numbers are 0.104 (t=16.72%) and 0.061(p-value=0.00) when we use expropriation risk index as proxy for governance. In terms of economic significance, a one-standard deviation dissipation of excess

cash is associated with up to a 1.46% reduction of firms' operating performance relative to its industry in weak governance regime while the corresponding number is 0.75% when the legal structure is strong. Given that the mean return on assets in our sample firms is 7.36%, these reductions are equivalent to 10% to 20% change in the profitability.

In Model 4, which includes the rule of law index, R-ADRI, and the interaction of these two variables with dissipation of excess cash, the coefficient on dissipation of excess cash remains significantly negative (-0.159, t=8.79), and the estimates on both interaction terms are positive and significant. This implies that both shareholder rights and the enforcement of these rights constitute independent forces in the impact of excess cash on firms' profitability. In all cases except for C-ADRI, the positive and significant coefficients on the interaction terms of excess cash with the governance metric variable do not completely offset the adverse impact of excess cash on firms' performance. The overall evidence points to an adverse effect of the use of excess cash on firms' profitability, and that weak shareholder rights magnify this effect. This evidence corroborates the finding of Dittmar and Mahrt-Smith (2007) in the US, but is consistent with the results documented by Mikkelson and Partch (2003) and Harford et al. (2008).

2.6.2. Robustness checks

To validate my findings, I conduct a battery of robustness checks and present the results in Table 2.6. In Model 1, I use the total sample, instead of the subsample of firms with positive excess cash, and re-estimate the regression with R-ADRI as the governance metric. The coefficients on both lagged excess cash and dissipation of excess cash are still negative and significant, but have a smaller magnitude. Moreover, the high quality of shareholder rights can cancel out half of the negative effect of dissipation of excess cash on firms' profitability. In Models 2 and 3, I use two alternative measures of excess cash, estimated using random effects

and Fama-Macbeth (1973) approach for pooled data. The inferences are similar to those obtained from Model 1 in Table 2.5. The results are unaltered in Model 4, where I use raw operating performance rather than the industry-adjusted metric.

In Models 5 and 6 I test the impact of holding excess cash on firms' profitability. Specifically in model 5 I regress industry-adjusted operating performance on lagged excess cash, revised anti-director rights, the interaction term of lagged excess cash with governance metric, and other same control variables as the models in Table 2.5. The significantly negative coefficient on lagged excess cash of -0.113 (t=-15.13) signifies a adverse impact of holding excess cash on firm's performance and translates into a reduction of 1.43% in operating performance (ROA) relative to its industry in countries with poor shareholder rights. In Model 6 I test whether the excess cash holdings have lingering effect by re-estimating Model 5 in Table 2.6 using operating performance at year t+1 (ROA_{t+1}) as the dependent variable**.** The significant coefficient on excess cash, -0.047, indicates that the impact of positive excess cash on performance lasts at least for two years in countries with poor investor protections. The positive and significant coefficient on the interaction term of excess cash with the shareholder governance metric in both models suggests that the effect is partly, but not completely, cancelled out in countries with strong shareholder rights.

In sum, there is persuasive evidence that the use of excess cash by firms operating in systems typified by weak shareholder protection leads to poor corporate performance. In most cases, high quality of shareholder rights partly alleviates the negative effect of excess cash on profitability, leaving a smaller, but still significant, reduction in operating performance. The findings lead us to conclude that the spending of excess cash on investments impedes firms' performance, giving rise to legitimate concerns of outside shareholders about the large cash build-up. The results also

Table 2.6 Robustness checks: Investor protection, dissipation of excess cash and operating performance

This table reports the results of a series of robustness checks on the relation between excess cash, operating performance and the quality of investor protection. The dependent variable for Models 1-3 and Model 5 is industry-adjusted operating performance at year t estimated as earnings before interests and depreciation scaled by total assets minus global industry value (median of country medians each year). The dependent variable for Model 4 is raw operating performance and for Model 6 it is industry-adjusted ROA at year t+1. Firm and country level control variables are as described in Tables 5 and 1. I classify sample countries based on the median value of R-ADRI, where the governance dummy equals 1 if a country's value is above the median value. In Models 1, 4, 5 and 6, the measure of excess cash is obtained through averaging the coefficients from regressions for each country (ExCash(Avg)). In Model 2, the measure of excess cash is obtained from the random effect regression for the pooled data (ExCash(Ran)) while in Model 3, excess cash is obtained through Fama-Macbeth (1973) regression for the pooled data for all countries (ExCash(F-M)). The dissipation of excess cash (ChgExCash) is measured as excess cash at year t-1 minus excess cash at year t. All models include year fixed effects and are estimated using country random effect. t-statistics are reported in parenthesis. [a], [b], [c] denote statistical significant at 1%, 5%, and 10% level, respectively.

	Total	**ExCash**	**ExCash**	**Raw**	**Holding ExCash**	
	Sample	**(Ran)**	**(F-M)**	**ROA_t**	**$InROA_t$**	**$InROA_{t+1}$**
Independent Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Intercept	-0.049[a]	-0.046[a]	-0.046[a]	-0.037[a]	-0.050[a]	-0.033[a]
	(-13.21)	(-9.03)	(-8.55)	(-5.49)	(-7.46)	(-5.29)
Industry Adj. ROA_{t-1}	0.794[a]	0.805[a]	0.807[a]	0.770[a]	0.771[a]	0.748[a]
	(364.71)	(256.91)	(246.86)	(214.85)	(213.62)	(198.95)
LSIZE	0.004[a]	0.004[a]	0.004[a]	0.005[a]	0.005[a]	0.002[a]
	(22.78)	(15.89)	(14.89)	(14.82)	(14.32)	(6.57)
PPE / Assets	0.017[a]	0.015[a]	0.014[a]	0.012[a]	0.001	0.031[a]
	(11.61)	(6.40)	(5.56)	(3.70)	(0.44)	(9.31)
Sales Growth	0.055[a]	0.061[a]	0.061[a]	0.066[a]	0.064[a]	0.001
	(63.08)	(51.34)	(49.26)	(44.85)	(43.53)	(0.59)
CrdSize	-0.062[a]	-0.048[b]	-0.042[c]	-0.025	-0.021	-0.010
	(-3.90)	(-2.09)	(-1.75)	(-0.85)	(-0.71)	(-0.39)
BonSize	-0.013[a]	-0.010[c]	-0.011[c]	-0.015[b]	-0.016[b]	-0.024[a]
	(-3.14)	(-1.69)	(-1.77)	(-2.10)	(-2.10)	(-3.93)
MktSize	-0.017	-0.025[c]	-0.020	-0.030[c]	-0.024	-0.014
	(-1.57)	(-1.86)	(-1.41)	(-1.73)	(-1.43)	(-0.96)
$ExCash_{t-1}$	-0.010[a]	-0.043[a]	-0.045[a]	-0.057[a]	-0.113[a]	-0.047[a]
	(-4.02)	(-10.09)	(-9.87)	(-10.76)	(-15.13)	(-6.14)
ChgExCash	-0.061[a]	-0.195[a]	-0.187[a]	-0.117[a]		
	(-11.33)	(-25.71)	(-23.61)	(-13.87)		
R-ADRI	0.002	0.002	0.001	0.001	-0.004	-0.003
	(0.59)	(0.46)	(0.31)	(0.28)	(-0.73)	(-0.83)
R-ADRI * ChgExCash	0.025[a]	0.080[a]	0.078[a]	0.029[b]		
	(3.29)	(7.87)	(7.31)	(2.52)		
R-ADRI * $ExCash_{t-1}$					0.056[a]	0.031[a]
					(5.80)	(3.21)

Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.538	0.566	0.566	0.563	0.557	0.567
N	91,659	52,711	48,483	38,662	39,207	31,440

imply that the greater sensitivity of corporate investments to excess cash in firms operating in countries with weaker institutions is due to agency conflicts, rather than shallow capital markets.

The strong negative link between the use of excess cash and firms' profitability in countries where shareholders are not well protected indicates that the depletion of excess cash in such countries signifies inefficient investments. The combination of evidence documented in this study supports empire-building hypothesis that cash stockpiles can be misallocated by managers. The findings also suggest that the agency conflict of cash holdings manifest primarily through the use of cash, rather than the hoarding of cash, as previously documented by Dittmar et al. (2003).

2.7. Conclusion

Using cross-sectional and time series data and taking advantage of sizable variation in the quality of external governance mechanisms across countries, I document the first empirical evidence in the international setting that firms overinvest when holding excessive cash reserves and the proclivity of overinvestment is magnified when investors are not well protected. The greater overinvestment inclinations drive down the cash level, which makes firms operating in weaker governance structures—exemplified by shareholder rights and the enforcement of these rights—do not hold higher levels of cash, contrasting with the previous evidence that firms invest more in liquid assets when shareholder rights are poorer. I then show empirically that the inefficient use of cash dampens firms' operating performance. Thus my analysis highlights that weak country-level governance considerably impacts the use of liquid assets and the investment

behavior of the firm, which in turn affects the firm's performance in economically important magnitudes.

The findings of the influence of external corporate governance mechanisms on overinvestment behavior have important implications in the international context. Previous literature on international corporate governance asserts that agency problems manifest principally through non-value-maximizing investment choices in wealthy common law countries; in contrast, it has been argued that in countries with weak governance constraints, the agency conflict lies in extracting private benefits of control through asset diversions (Shleifer and Vishny (1997), and Shleifer and Wolfenzon (2002)). My analysis provides empirical evidence consistent with Albuquerue and Wang's (2008) model which predicts that firms governed by weaker governance structure have stronger incentives to overinvest in order to extract more private beneifts in the future.

My findings bring the relation between managerial entrenchment and cash policy in the international context in line with that of the US evidence. However, the driving forces seem to differ. While the evidence in Harford et al. (2008) that US firms with entrenched managers hold less cash is attributed to managers dissipating cash quickly to avoid being targeted by outside shareholders, my evidence indicates that firms hold less cash because controlling shareholders value empire-building and they can do so with little fear when the external governance is weak. My finding that large cash reserves are problematic, combined with the evidence by La Porta et al. (2000a) that firms pay lower dividends when shareholder rights are not well defined, suggest that the true entrenchment is that of controlling shareholders retaining a larger portion of earnings and misallocating the funds.

APPENDIX A: DESCRIPTIVE STATISTICS FOR 41 COUNTRIES

This appendix provides summary statistics for a sample of 115,945 firm-year observations from 41 countries over 1996-2008 period. Sample obtained from Worldscope database excludes financials and utilities. All firm-level numbers are averages of annual median values. Cash ratio is cash and marketable securities scaled by total assets. CFVOL is estimated as the median of industry cash flow volatility over the past ten years. Size is the book value of assets in 2008 US dollars (millions). Market-to-Book ratio (MTB) is estimated as (book value of total assets - book value of equity + market value of equity) scaled by total assets. Leverage is computed as long term debt plus short term debt divided by total assets. Cash flow is earnings after interest, taxes and common dividends but before depreciation scaled by total assets. Net working capital (NWC) is calculated as current assets less current liabilities less cash and marketable securities to total assets. CAPEX is capital expenditures scaled by total assets. R-ADRI represents revised anti-director index from Djankov et al. (2008). C-ADRI is corrected anti-director index from Spamann (2009). Expropriation risk index (Exprop) and rule of law index (RuLaw) are from La Porta et al. (1998). CrdSize represents credit provided by banking sector. BonSize is bond market capitalization whereas MktSize is stock market capitalization. All these three variables are scaled by domestic gross product (GDP) and the statistics reported are mean of annual values.

Country	No. of Firms	Cash Ratio	CFVOL	Firm Size	MTB	Leverage	Cash Flow	NWC	CAPEX
Argentina	426	0.048	0.051	1349	1.06	0.249	0.067	-0.007	0.06
Australia	6,951	0.079	0.096	113	1.417	0.164	0.044	-0.001	0.043
Austria	591	0.084	0.028	351	1.175	0.245	0.078	0.035	0.058
Belgium	1,081	0.077	0.04	284	1.247	0.252	0.078	0.009	0.058
Brazil	1,677	0.099	0.047	555	1.038	0.268	0.057	-0.014	0.055
Canada	6,465	0.048	0.061	156	1.36	0.199	0.062	0.018	0.06
Chile	1,020	0.038	0.029	373	1.06	0.225	0.059	0.059	0.05
Columbia	130	0.054	0.028	1390	0.928	0.085	0.055	0.025	0.031
Denmark	1,314	0.071	0.042	160	1.269	0.261	0.078	0.063	0.051
Egypt	67	0.098	0.024	1273	1.456	0.361	0.085	-0.08	0.067
Finland	1,367	0.079	0.04	208	1.323	0.235	0.076	0.065	0.056
France	6,011	0.098	0.035	178	1.262	0.209	0.069	0.036	0.039
Germany	5,975	0.079	0.048	223	1.234	0.18	0.067	0.086	0.045
Greece	1,080	0.054	0.036	304	1.415	0.263	0.061	0.077	0.05
HongKong	6,108	0.154	0.061	133	1.031	0.157	0.04	0.007	0.031
India	3,856	0.031	0.032	118	1.095	0.316	0.071	0.092	0.055
Indonesia	1,664	0.096	0.065	372	1.068	0.36	0.058	0.008	0.046
Ireland	561	0.104	0.034	351	1.391	0.247	0.066	0.002	0.039
Israel	745	0.123	0.038	364	1.248	0.253	0.046	0.014	0.038
Italy	1,989	0.088	0.031	410	1.215	0.243	0.057	0.046	0.034
Japan	21,602	0.128	0.019	423	1.046	0.242	0.041	-0.007	0.029
Jordan	61	0.143	0.039	226	1.414	0.147	0.071	0.062	0.068
Korea	3,830	0.085	0.029	618	0.905	0.349	0.051	-0.047	0.044
Malaysia	6,857	0.071	0.037	113	1.074	0.223	0.049	0.044	0.034
Mexico	1,015	0.052	0.042	1075	1.14	0.239	0.073	0.029	0.041

Netherland	1,612	0.053	0.033	490	1.377	0.225	0.085	0.064	0.048
NewZealand	791	0.025	0.036	91	1.329	0.243	0.057	0.043	0.05
Norway	1,581	0.11	0.053	202	1.3	0.282	0.063	-0.011	0.061
Pakistan	267	0.065	0.041	174	1.256	0.268	0.067	-0.024	0.057
Peru	225	0.05	0.064	355	1.109	0.25	0.085	0.018	0.055
Philippine	782	0.063	0.048	220	0.959	0.258	0.05	-0.018	0.046
Portugal	502	0.037	0.031	523	1.102	0.332	0.062	-0.021	0.041
Singapore	4,780	0.127	0.041	113	1.107	0.184	0.053	0.026	0.038
SouthAfrica	2,797	0.094	0.048	382	1.316	0.126	0.092	0.032	0.053
Spain	1,077	0.058	0.026	810	1.312	0.232	0.072	0.003	0.043
Sweden	2,686	0.098	0.067	79	1.491	0.163	0.066	0.065	0.037
Switzerland	1,994	0.115	0.03	225	1.277	0.209	0.078	0.079	0.04
Thailand	2,534	0.056	0.05	115	1.012	0.321	0.066	-0.004	0.039
Turkey	826	0.07	0.069	618	1.393	0.183	0.094	0.082	0.062
UK	10,915	0.088	0.056	96	1.443	0.142	0.054	-0.002	0.037
Venezuela	133	0.055	0.045	305	0.719	0.121	0.06	0.039	0.032

Country	R-ADRI	C-ADRI	Exprop Risk	RuLaw	CrdSize	BonSize	MktSize
Argentina	2	3	5.91	5.35	0.368	0.064	0.379
Australia	4	4	9.27	10	1.007	0.478	1.069
Austria	2.5	4	9.69	10	1.263	0.404	0.26
Belgium	3	2	9.63	10	1.198	0.404	0.688
Brazil	5	5	7.62	6.32	0.763	0.123	0.429
Canada	4	4	9.67	10	1.639	0.294	1.058
Chile	4	5	7.5	7.02	0.839	0.19	0.96
Columbia	3	4	6.95	2.08	0.417	0.004	0.221
Denmark	4	4	9.67	10	1.381	1.213	0.599
Egypt	3	2	6.3	4.17	1	0	0.537
Finland	3.5	4	9.67	10	0.675	0.242	1.255
France	3.5	5	9.65	8.98	1.083	0.405	0.781
Germany	3.5	4	9.9	9.23	1.373	0.463	0.478
Greece	2	3	7.12	6.18	0.937	0.035	0.624
HongKong	5	4	8.29	8.22	1.412	0.168	3.416
India	5	4	7.75	4.17	0.562	0.012	0.523
Indonesia	4	2	7.16	3.98	0.513	0.018	0.273
Ireland	5	4	9.67	7.8	1.29	0.167	0.6
Israel	4	3	8.25	4.82	0.785	0	0.672
Italy	2	2	9.35	8.33	1.032	0.429	0.441
Japan	4.5	5	9.67	8.98	3.001	0.444	0.766
Jordan	1	3	6.07	4.35	0.942	0	1.334
Korea	4.5	4	8.31	5.35	0.921	0.537	0.554

Malaysia	5	4	7.95	6.78	1.69	0.401	1.493
Mexico	3	2	7.29	5.35	0.358	0.109	0.268
Netherland	2.5	4	9.98	10	1.592	0.541	1.121
NewZealand	4	5	9.69	10	1.202	0	0.401
Norway	3.5	4	9.88	10	0.833	0.234	0.482
Pakistan	4	5	5.62	3.03	0.412	0	0.292
Peru	4.5	4	5.54	2.5	0.204	0.036	0.361
Philippine	4	4	5.22	2.73	0.632	0.006	0.502
Portugal	2.5	3	8.9	8.68	1.355	0.277	0.419
Singapore	5	4	9.3	8.57	0.847	0.176	1.781
SouthAfrica	5	5	6.88	4.42	1.654	0.125	1.877
Spain	5	5	9.52	7.8	1.377	0.333	0.774
Sweden	3.5	4	9.4	10	1.099	0.449	1.082
Switzerland	3	3	9.98	10	1.763	0.372	2.393
Thailand	4	4	7.42	6.25	1.382	0.132	0.503
Turkey	3	4	7	5.18	0.432	0	0.264
UK	5	4	9.71	8.57	1.482	0.171	1.417
Venezuela	1	2	6.89	6.37	0.165	0.007	0.074

APPENDIX B: MEASURING EXCESS CASH

Following previous studies, I define excess cash as the cash beyond the normal level of cash held for genuine motives to meet operations and investment needs. I use various specifications of the following regression model to estimate the normal cash.

$$\text{Cash ratio}_{it} = \beta_0 + \beta_1 \text{CFVOL}_{it} + \beta_2 \text{LSIZE}_{it} + \beta_3 \text{MTB}_{it} + \beta_4 \text{Leverage}_{it} + \beta_5 \text{Cash Flow}_{it} + \beta_6 \text{NWC}_{it} + \beta_7 \text{CAPEX}_{it} + \beta_8 \text{RD}_{it} + \beta_9 \text{DIV}_{it} + \beta_{10} \text{CrdSize} + \beta_{11} \text{BonSize} + \beta_{12} \text{MktSize} + \beta_{13} \text{R-ADRI} + \text{Year Dummies} + \text{Firm Fixed Effects} + \varepsilon_{it} \quad (1.B)$$

Firm-level variables are intended to capture the transaction costs and precautionary motive of cash holdings. I include year dummies to account for the fact that cash holdings are affected by macroeconomic conditions and the business cycle. I apply firm fixed effect since some firms may hold high level of cash for idiosyncratic reason. Because corporate cash policy is affected by institutional differences, I include three capital market development variables and R-ADRI as predictors of cash level to avoid possible model misspecification.

I use three different specifications and estimation techniques to obtain the predicted normal cash. First, given that firms from different countries may hold cash for different reasons, I estimate equation above (without country-level variables) separately for each country and then take the average of coefficient of each variable. I apply the coefficients to corresponding variables to obtain the predicted normal cash and define excess cash as the difference between actual cash and predicted normal cash. Following previous research, I do not subtract the estimated firm specific effects when computing excess cash as firm fixed effects do not capture the transaction cost and precautionary motives of cash holdings. Second, I employ Fama-Macbeth (1973) approach to estimate a pooled regression of Equation (1.B) (without year dummies and firm-fixed effects) by estimating the model each year and then take the average of

the parameter estimates from annual regressions. Third, I estimate a pooled random effects regression of Equation (1.B) (without firm fixed effects). As argued by Fresard and Salva (2009), the effect of institutional structures on firms' cash level is not justified for genuinely operational and investment reasons. Therefore, I do not deduct their estimated effects when computing excess cash.

REFERENCES

Acharya, V., Almeida, H., Campello, M., 2007. Is cash negative debt? A hedging perspective on corporate financial policies. *Journal of Financial Intermediation* 16, 515-554.

Albuquerue, R., Wang, N., 2008. Agency conflicts, investment and asset pricing. *Journal of Finance* 63, 1-40.

Almeida, H., Campello, M., Weisbach, M., 2004. The cash flow sensitivity of cash. *Journal of Finance* 59, 1777-1804.

Bae, K., Goyal, V., 2009. Creditor rights, enforcement, and bank loans. *Journal of Finance* 64, 823-860.

Baskin, J., 1987. Corporate liquidity in games of monopoly power. *Review of Economics and Statistics* 69, 312-319.

Bates, T., Kahle, K., Stulz, R., 2009. Why do U.S. firms hold so much cash than they used to? *Journal of Finance* 64, 1985-2021.

Beck, T., Levine, R., Loayza, N., 2000. Finance and the sources of growth. *Journal of Financial Economics* 58, 261-300.

Benoit, Jean-Pierre, 1984. Financially constrained entry in a game with incomplete information. *Rand Journal of Economics* 15, 490-499.

Blanchard, O. J., Lopez-de-Silanes, F., Shleifer, A., 1994. What do firms do with the cash windfalls? *Journal of Financial Economics* 36, 337-360.

Booth, L., Aivazian, V., Demirgue-Kunt A., Maksimovic V., 2001. Capital Structure in Developing Countries. *Journal of Finance* 56, 97-129.

Brandt, M., Brav, A., Graham, J., Kumar, A., 2009. The idiosyncratic volatility puzzle: Time trend or speculative episodes*? Review of Financial Studies* (forthcoming).

Brockman, P., Unlu, E., 2009. Dividend policy, creditor rights, and the agency costs of debt. *Journal of Financial Economics* 92, 276-299.

Campbell, J, Lettau, M., Malkiel, B., Xu, Y., 2001. Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk. *Journal of Finance* 56, 1–43.

Campello, M., Graham, J., Harvey, C., 2010. The real effects of financial constraints: Evidence from a financial crisis. *Journal of Financial Economics* 97, 470-487.

Claessens, S., Djankov, S., Fan, J., Lang, L., 2002, Disentangling the incentive and entrenchment effects of large shareholdings. *Journal of Finance* 57, 2741–2771.

Denis, D., Osobov, I., 2008. Why do firms pay dividend? International evidence on the determinants of dividend policy. *Journal of Financial Economics* 89, 62-82.

Dittmar, A., Mahrt-Smith, J., 2007. Corporate governance and the value of cash holdings. *Journal of Financial Economics* 83, 599–634.

Dittmar, A., Mahrt-Smith, J., Servaes, H., 2003. International corporate governance and corporate cash holdings. *Journal of Financial and Quantitative Analysis* 38, 111–133.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2008. The law and economies of self-dealing. *Journal of Financial Economics* 88, 430-465.

Djankov, S., McLiesh, C., and Shleifer, A., 2007. Private credit in 129 countries. *Journal of Financial Economics* 84, 299-329.

Easterbrook, F., 1984. Two agency-cost explanation of dividends. *American Economic Review* 74, 650-659.

Fama, E., MacBeth, J., 1973. Risk, return, and equilibrium: empirical tests. *Journal of Political Economy* 81, 607-636.

Fama, E., French, K., 1998. Taxes, financing decisions, and firm value. *Journal of Finance 53*, 819–843.

Fama, E., French, K., 2001. Disappearing dividends: changing firm characteristics or lower propensity to pay? *Journal of Financial Economics* 60, 3-43.

Flower, J., Ebbers, G., 2002. *Global financial reporting*. New York, NY: Palgrave.

Fresard, L., Salva, C., 2009. The value of excess cash and corporate governance: Evidence form U.S. cross-listings. *Journal of Financial Economics* 98, 359-384.

Gizycki, M., Lowe, P., 2000. The Australia financial system in the 1990s: The Australia economy in the 1990s, Proceedings of a Conference, Reserve Bank of Australia, Sydney, 180-215.

Harford, J., 1999. Corporate cash reserves and acquisitions. *Journal of Finance* 54, 1969-1997.

Harford, J., Mansi, S., Maxwell, W., 2008. Corporate governance and a firm's cash holdings. *Journal of Financial Economics* 87, 535–555.

Henisz, W., 2005. The Political Constraint Index Data Set. Wharton, University of Pennsylvania.

Hofstede, G., 2001. Culture's consequences, comparing values, behaviors, institutions, and organizations across nations. Newbury Park, CA: Sage Publications; Second edition.

Iskander-Datta, M., Jia, Y., 2010. Why do firms hold so much cash: The international evidence. Working paper (Wayne State University).

Jensen, M., Meckling, W., 1976. Theory of firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3, 305-360.

Jensen, M., 1986. Agency costs of free cash flow, corporate finance and takeovers. *American Economic Review* 76, 323-329.

John, T., 1993. Accounting measures of corporate liquidity, leverage, and costs of financial distress. *Financial Management* 22, 91-100.

Kalcheva, I., Lins, K., 2007. International evidence on cash holdings and expected agency problems. *Review of Financial Studies* 20, 1087-1112.

Kim, C., Mauer, D., Sherman, A., 1998. The determinants of corporate liquidity: Theory and evidence. *Journal of Financial and Quantitative Analysis* 33, 335-359.

Lambert, R., Leuz, C., Verrecchia, R., 2007. Accounting information, disclosure, and the cost of capital. *Journal of Accounting Research* 45, 385-420.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1998. Law and finance. *Journal of Political Economy* 106, 1113-1155.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 2000a. Agency problems and dividend policies around the world. *Journal of Finance* 55, 1-33.

La Porta, R., López-de-Silanes, F., Shleifer, A., Vishny, R.W., 2000b. Investor protection and corporate governance. *Journal of Financial Economics* 58, 3–27.

La Porta, R., López-de-Silanes, F., Shleifer, A., Vishny, R.W., 2002, Investor protection and corporate valuation. *Journal of Finance* 57, 1147–1170.

Lins, K., Servaes, H., Tufano, P., 2010. What drives corporate liquidity? An international survey of cash holdings and lines of credit. *Journal of Financial Economics* (forthcoming).

Love, I., 2003. Financial development and financing constraints: International evidence from the structural investment model. *Review of Financial Studies* 16, 765-791.

Mikkelson, W., Partch, M., 2003. Do persistent large cash reserves hinder performance? *The Journal of Financial and Quantitative Analysis* 38, 275-294.

Morellec, E., Nikolov, B., 2009. Cash holdings and competition. Working paper.

Myers, S., Majluf, N., 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, 187-221.

Myers, S.C., Rajan, R.G., 1998. The paradox of liquidity. *Quarterly Journal of Economics* 113, 733-771.

Newey, W., West, K., 1987. A simple, positive definite, heteroskedasticity and autocorrelation consistent covariance matrix. Econometrica 55, 703-708.

Nini, G., Smith, D., Sufi, A., 2007. Creditor control rights and firm investment policy. *Journal of Financial Economics* 92, 400-420.

Opler, T., Pinkowitz, L., Stulz, R., Williamson, R., 1999. The determinants and implications of corporate cash holdings. *Journal of Financial Economics* 52, 3–46.

Pawlina, G., Renneboog, L., 2005. Is investment-cash flow sensitivity caused by agency costs or asymmetric information? Evidence from the UK. *European Financial Management* 11, 483-513.

Pinkowitz, L., Stulz, R., Williamson, R., 2006. Do the contributions of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis. *Journal of Finance* 61, 2725-2751.

Pinkowitz, L., Williamson, R., 2001. Bank power and cash holdings: Evidence from Japan. *Review of Financial Studies* 14, 1059-1082.

Qi, Y., Roth, L., Wald, J., 2010. Political rights and the cost of debt. *Journal of Financial Economics* 95, 202-226.

Rajan, R., Zingales, L., 1995. What do we know about capital structure? Some evidence from international data. *Journal of Finance* 50, 1421-1460.

Riddick, L., Whited, T., 2009. The corporate propensity to save. *Journal of Finance* 64, 17.

Roberts, M., Sufi, A., 2007. Control rights and capital structure: An empirical investigation. *Journal of Finance* 64, 1657-1695.

Schroth, E., Szalay, D., 2009. Innovation races and the strategic role of cash holdings: Evidence from pharmaceutical patents. Working paper, University of Lausanne and Swiss Finance Institute.

Shleifer, A., Vishny, R.W., 1997. A survey of corporate governance. *Journal of Finance* 52, 737–783.

Shleifer, A., Wolfenzon, D., 2002. Investor protection and equity markets. Journal *of Financial Economics* 66, 3–27.

Spamann, H., 2009. The "antidirector rights index" revisited. *Review of Financial Studies* 23, 467-486.

Wurgler, J., 2000. Financial markets and the allocation of capital. *Journal of Financial Economics* 58, 187-214.

ABSTRACT

ESSAYS ON INTERNATIONAL CORPORATE CASH HOLDINGS

by

YONGHONG JIA

August 2011

Advisor: Dr. Mai Iskandar-Datta

Major: Business Administration (Finance)

Degree: Doctor of Philosophy

This dissertation is composed of two distinct chapters. The first chapter is concerned with the secular trends in corporate cash holdings and the determinants of the changing cash policies for seven industrialized countries—Australia, Canada, France, Germany, Japan, the US, and UK. In the first chapter, I document that a pronounced secular upward trend in cash holdings is almost systemic across sample countries over 1991-2008, with France exhibiting a modest rise and Japan a substantial decline. However, the driving forces underlying the cash pattern are not uniform across countries. While the evolution in firm characteristics necessitated elevated cash balances, the time-varying firm attributes explain the cash pattern only in Canada, France, UK and the US. The agency motive plays a role in the rise in cash balances in Germany, consistent with the perspective that agency problems of cash holdings primarily manifest in countries with weak external governance. My analysis highlights that the functioning of the financial system is crucial to corporate cash policy as Australia's cash pattern is driven by shallow private credit markets that curbed cash reserves during the earlier period of my study and the decelerating cash trend in Japan is ascribed to financial reforms that eliminated rent-extraction opportunities by

banks. While I document some commonality in the determinants of cash policies, some determinants are employed differently by the various countries indicating divergence in cash practices.

The second chapter focuses on the deployment of cash and the resulting effects on firms' operating performance in an international context. Using a large sample from 41 countries, I provide new and compelling evidence that firms under weak external governance structures hold less cash than firms operating under strong governance regimes, contrary to previous literature. Consistent with managerial empire building prediction, my study reveals that firms deplete their excess cash by overinvesting and this effect is exacerbated in countries with weak governance. My result of greater sensitivity of investments to excess cash support agency costs rather than financing constraint explanation. The depletion of excess cash has an adverse impact on firm performance, especially in countries with weak investor protection. These findings are significant because they imply that the agency conflict of cash holdings primarily lies in the misallocation of capital, not in its accumulation.

Key words: *Corporate finance, corporate liquidity, agency problem, Investor protection, corporate cash policy, firm performance, corporate investments*

AUTOBIOGRAPHICAL STATEMENT

YONGHONG JIA

Education
Ph.D., Business Administration with Finance Concentration, Wayne State University, 2011
M.S., Accounting, Wayne State University, 2006
M.S., Computer Science, HuaZhong Technology University, 1993
B.S., Computer Science, Harbin Institute of Technology, 1990

Dissertation
Essays on International Corporate Cash Holdings

Research Interests
Empirical corporate finance, international finance, accounting quality, earnings management, corporate disclosure, corporate governance, executive compensation

Teaching Experience
Graduate Teaching Assistant, Wayne State University, 2007-2008

Adjunct Faculty, Wayne State University, 2008-2011

Awards
American Finance Association (AFA) Doctoral Student Travel Grant (Denver, January 2011)

Best Paper Award in Corporate Finance at the Southwestern Finance Association Meeting (March, 2011) for the paper "Piercing the Corporate Veil: The Case for Clawback Provisions"

Professional Designations
China Certified Public Accountants (CPA)
China Certified Public Valuers (CPV)

Professional Associations
American Finance Association (AFA)
Financial Management Association (FMA)
Southern Finance Association (SFA)