TWO ESSAYS ON THE SUBSTITUTABILITY OF CASH HOLDINGS AND LINES OF CREDIT

By

MOHSEN MOLLAGHOLAMALI

Bachelor of Arts in Journalism
University of Applied Science and Technology
Tehran, Iran
2001

Master of Business Administration
Multimedia University
Cyberjaya, Malaysia
2008

Master of Science in Quanitative Financial Economics
Oklahoma State University
Stillwater, Oklahoma
2011

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
July, 2016

TWO ESSAYS ON THE SUBSTITUTABILITY OF CASH HOLDINGS AND LINES OF CREDIT

Dissertation Approved:

Dr. Ramesh P. Rao

Dissertation Adviser

Dr. Ali Nejadmalayeri

Dr. Jun Zhang

Dr. Lee Adkins

ACKNOWLEDGEMENTS

First, I would like to express my appreciation and gratitude to my mentor and advisor Professor Ramesh Rao for his invaluable advice and support during this project. He taught me how to ask relevant and controversial questions which is the foundation of noble research. His mentorship did not limit to research and he also taught me about the life as an academic in general and work ethics in an academic environment. I could not have asked for a better mentor and advisor to guide me for my dissertation.

Moreover, I want to thank my committee members: Dr. Ali Nejadmalayeri, Dr. Jun Zhang, and Dr. Lee Adkins for their deep and insightful comments and encouragement throughout this process. My sincere thanks also goes to the Department of Finance at Oklahoma State University, especially Dr. Tim Krehbiel for giving me the opportunity to join the MSQFE program and Dr. Joel Harper and Dr. John Polonchek for believing in me and admitting me to the PhD program. I also want to thank my fellow PhD students Siamak Javadi Asl, Svetlana Orlova, Adam Usman, and Namrata Saikia for all their help, support, and intellectual stimulations.

Furthermore, I would like to thank Professor LVLN Sarma who introduced me to the world of finance. His corporate finance class in Multimedia University, Malaysia, changed the direction of my life. Before his class, I knew nothing about finance and after the first few sessions, I knew that I want to become an educator and researcher in finance. He is one of the most important persons in my professional life.

Last but not the least, I would like to thank my lovely wife Tannaz for her support, encouragement, patience during my PhD studies. I would also thank my mother, my brothers and my sister. My success today is because of the accumulation of help, support, and love I got from them throughout my life.

Name: MOHSEN MOLLAGHOLAMALI

Date of Degree: JULY, 2016

Title of Study: TWO ESSAYS ON THE SUBSTITUTABILITY OF CASH HOLDINGS AND LINES OF CREDIT

Major Field: PhD in BUSINESS ADMINISTRATION-FINANCE

Abstract Essay 1: using a novel database of lines of credit from 42 countries, I study the choice between cash holdings and lines of credit in the liquidity management of the firm and examine the determinants of this choice in the international setting. The focus of this essay is to show the influence of country level variables on this choice and I find that the level of competition in the banking industry, shareholder rights, creditor rights, and rule of law have significant and positive effect on the likelihood of obtaining and utilization of lines of credit. Even when I include all these country level variables together in my model, I still find significant relationships between banking competition and rule of law on the utilization of lines of credit. Furthermore, when I aggregate all the country level governance variables, I find that both banking competition and country governance index are positively and significantly related to the likelihood of obtaining and also utilizing lines of credit in the liquidity management of the firm. The results of the main tests of the study are still robust using several different subsamples.

Abstract Essay 2: most of the studies of the choice between cash holdings and lines of credit examine how managers make this choice. My goal in this essay is to look at this choice from the point of view of shareholders and the value they place on each of these liquidity sources. The results of this essay supports the weak substitutability of cash holdings and lines of credit. My base model shows that shareholders place a positive and significant value on lines of credit, but they still place a higher value on cash holdings. I find that both cash and lines of credit are valued significantly higher among the constrained firms as opposed to unconstrained firms which suggests that the shareholders of constrained firms appreciate any type of liquidity that they can utilize. I also show that shareholders of poorly governed firms place a higher value on lines of credit as opposed to cash. When I use an aggregate measure of growth opportunities, I show that high growth firms place a higher value on both cash holdings and lines of credit. Finally, I show that shareholders place a lower value on lines of credit during the crisis as opposed to normal times. This is consistent with the findings of Sufi (2009) which suggest that the strength and consistency of cash flow are crucial on the decision to utilize cash flows.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Page

CHAPTER I

A TEST OF SUBSTITUTABILITY OF CASH HOLDINGS AND LINES OF CREDIT: A CROSS-COUNTRY PERSPECTIVE

Introduction and Motivation

Recent literature on liquidity management in corporate finance has focused on the choice between cash holdings and lines of credit and their substitutability (Shockley and Thakor (1997); Holmström and Tirole (1998); Sufi (2009); Jiménez, Lopez, and Saurina (2009); Yun (2009); Campello, Giambona, Graham, and Harvey (2011); Acharya, Almeida, and Campello (2013); Acharya, Almeida, Ippolito, and Perez (2014), etc.). Much of this literature has focused on the U.S., which limits our understanding of the relative use of lines of credit and the choice between cash holdings and lines of credit in environments different from the U.S. In studies that focus on this choice in U.S., the environment is the same for all firms. In other words, most of the firms in U.S. are subject to the same legal system, regulations, competitive environment, political and economic uncertainty, etc. However, when one moves from a single country analysis to an international setting, she witnesses considerable variation in these characteristics that can have a bearing on the choice of liquidity not evident from single country studies. Examining other economies is important in understanding this choice for at least three reasons:

(1) it allows me to test macro factors that theory suggests have an important bearing on liquidity management practice but cannot be effectively tested in a single country setting, (2) it can potentially mitigate endogeneity issues that arise in a single country framework but are less likely in a multi-country setting, and (3) it can help me establish the universality of factors that deemed important in explaining liquidity practice more firmly.

The theoretical model of Shockley and Thakor (1997) assumes a competitive credit market in which commitments provide a social welfare benefit by removing frictions in the market. This model suggest that the competition among the banks can influence the availability to and utilization of lines of credit by firms. Campello et al. (2011) state that during the financial crisis, firms choose not to use lines of credit when they have enough internal funds, implying a cost wedge between these two sources of funds. Therefore, an implications of these studies is that the increased competition among the banks will reduce the cost wedge between the cash and lines of credit, hence making the lines of credit more attractive. However, when studying liquidity choice in only one country (i.e. U.S.), one cannot capture the effect of lower or higher bank competition in the overall accessibility of lines of credit. On the other hand, when examining this choice in the international setting with considerable cross sectional variation in the competitiveness, strength, and popularity of banking industry, one may be able to better explain the liquidity management of firms within those countries.

Furthermore, managers and shareholders may have conflicting preferences between cash and lines of credit, therefore the mix of these sources of liquidity is likely to be influenced by corporate governance. Yun (2009) study the effect of a change in corporate governance on the choice between cash and lines of credit and finds that a significant change in the corporate governance practices is associated with changes in the use of line of credit relative to cash for firms in that environment. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) study the country level differences in the legal systems and their influence on investor protection and their findings imply that country level differences in legal systems and investor protection, either strengthen or lessen the quality of

corporate governance in different countries. Furthermore, Doidge, Karolyi, and Stulz (2007) study how country characteristics influence firms' corporate governance and find that country characteristics explain much more of the variance in corporate governance ratings than observable firm characteristics. They also find that firm characteristics explain almost none of the variation in governance ratings in less-developed countries and that access to global capital markets sharpens firms' incentives for better governance. The results of Yun (2009),La Porta et al. (1998), and Doidge et al. (2007) taken together, imply that the choice between cash and lines of credit has to be different from one country to another depending on country level characteristics such as legal systems and strength of investor protection laws.

Prior studies find that more constrained firms have less access to lines of credit but Sufi (2009) states that lack of access to credit line is a more statistically powerful measure of financial constraints than traditional measures and argues that firms with access to lines of credit are not financially constrained. This finding suggests potential endogeneity between the access to lines of credit and being financial constrained. More specifically, do firms without access to lines of credit become financially constrained or are they financially constrained because they cannot get lines of credit? Put it differently, it is possible that financial constraints prohibits firm from accessing lines of credit than lack of access to lines of credit leads to financial constraints. This endogeneity is less likely an issue in an international sample where financial constraints vary across countries and maybe considered exogenous to firms at the country level.

Therefore, this essay examines the determinants of the choice between cash and lines of credit for firms around the world. The only papers that study this choice among different countries are the survey studies of Lins, Servaes, and Tufano (2010), Campello et al. (2011), and Campello, Giambona, Graham, and Harvey (2012). To the best of our knowledge, this is the first study that focus on the determinants of this choice in an international setting using a large dataset on international lines of credit obtained from Capital IQ (CIQ).

The main goal of this essay is to examine whether these determinants of the choice between cash and lines of credit in U.S. are systematically shared by other countries in the world. In other words, the optionality and commitments of lines of credit might be different in countries around the world which raise several questions: Are the main determinants of the choice between cash and lines of credit which are proven to be relevant for US market, still relevant for other countries? Are the factors that determine this choice in U.S. stronger or weaker in other countries? Could these cross country differences intensify or lessen the effects of these determinants that are important in US market? Can it be the case that the determinants of liquidity be different in countries around the world?

Literature Review

Firms need liquidity to manage their day to day operations, honor their contractual obligations, and invest in valuable growth opportunities when they arise. However, as stated by Demiroglu and James (2011) while public firms can access the capital market to obtain liquidity when they need it, most of the times problems of high transaction costs and asymmetric information prevents them from doing so. Consequently, they reserve some liquidity as an insurance for future needs. Below, we are going to review some studies that examine different sources of liquidity both in U.S. and in international settings.

Liquidity and Cash Holdings

In a frictionless market, firms can fund all positive NPV projects, which means they do not rely on internal capital for their investment and growth. However, in an imperfect capital market setting, external funds might not be available to most firms when growth opportunities arise. These limitations in accessing the external capital markets for some firms might lead to reduced investments, lower future growth, and reduced operating performance and firm value. Consequently, to solve the external funding problem some firms invest in internal sources of funds, namely, cash and marketable securities.

Most of the studies in the area of corporate liquidity management focus on the cash holdings of the firms. The literature on cash holdings flourished after Opler, Pinkowitz, Stulz, and Williamson (1999) mostly because of the growing interest on the rising balances of cash and marketable securities held by US firms. In their seminal paper, Opler et al. (1999) study the determinants of corporate cash holdings and the optimal level of cash. They further investigate whether the large amounts of cash held by U.S. firms is justified.

According to the theory, the ultimate goal of the management should be to maximize shareholder value, therefore, in the context of liquidity management, it boils down to the question of whether the increase in cash holdings is a value enhancing activity. In their tests of trade-off and pecking order theories of cash holdings, Opler et al. (1999) find that the trade-off theory of cash holdings (i.e. balancing the costs and benefits of holding cash) cannot be dismissed as irrelevant and it makes important predictions. Therefore, they find that the determinants of the optimal level of cash holdings are empirically relevant. However, as it was pointed out by popular media and shareholder activists, there are some firms that hold dramatically more cash than what is suggested by the trade-off model.

Opler et al. (1999) suggest that firms hold cash to ensure they will be able to take advantage of growth opportunities when their cash flows are low. They refer to this as the precautionary motive for cash holdings. According to their results, firms with stronger growth opportunities, riskier cash flows, and restricted access to external sources of capital, hold more cash. They show that firms with large amount of excess cash, acquired it through the accumulation of internal funds and spending in new projects and acquisitions is only slightly higher for these firms.

Bates, Kahle, and Stulz (2009) follow the footsteps of Opler et al. (1999) and test several motives for the increased cash holdings of US firms since 1980s and examine whether this evolution of cash can be explained by changes in unknown determinants of cash holdings. They show that the increase in the cash holdings in U.S. is concentrated among the firms that do not pay dividends, firms in more

recent IPO cohorts, and firms in industries with the most increase in industry volatility of cash flows. They show that the main reasons for the increase in the cash holdings are that inventories have fallen, cash flow risk for firms have increased, capital expenditures have fallen, and R&D expenditures have increased. According to the authors, precautionary motive would be a plausible explanation for this significant increase in the cash holdings.

Almeida, Campello, and Weisbach (2004) use an alternative method to study the cash holding behavior of US firms. Instead of focusing on the change in real decisions of firms that might be caused by changes in cash flows, they study the cash flow sensitivity of cash. Since capital market imperfections affect the investments of constrained firms most, they manage their liquidity to maximize firm value. Therefore, financial constraints of a firm can be captured by cash flow sensitivities of cash. In other words, the main question of their study is, what proportion of current cash flows saved by a (un)constrained firm? Their argument is that the propensity to save from cash inflows is positive for the constrained firms, but is indistinguishable from zero for the unconstrained ones. Overall, the set of constraint firms show positive and significant sensitivities of cash, while unconstrained firms' insignificant values.

One of the major assumptions in corporate finance is that managers make decisions to maximize the wealth of shareholders and based on above studies, the increased level of cash that is held by firms is viewed as a wealth maximizing practice especially for constrained firms. There is also a possibility that it is derived by the agency problems and entrenched management. As it is mentioned in Opler et al. (1999), firms with greater managerial preference for risk reduction and discretion, hold more cash than would be required to maximize shareholder value. Further, Jensen (1986) demonstrates that firms with high levels of cash holdings are more likely to acquire other firms and their acquisitions are more likely to destroy shareholder value. Hence, some studies attempt to address the agency problem of cash holdings by focusing on corporate governance practices of the firms. For example Harford, Mansi, and Maxwell (2008) use corporate governance metrics based on antitakeover

provisions and inside ownership to study the cash holdings of U.S. firms. Their results show that firms with poor corporate governance hold less cash and prefer share repurchases to dividends compared to their counterparts. Finally, they show that U.S. firms with poor corporate governance choose to spend cash quickly on acquisitions and capital expenditures instead of hoarding it.

Considering the findings of Porta, Lopez-de-Silanes, Shleifer, and Vishny (2000), and Dittmar, Mahrt-Smith, and Servaes (2003), Harford et al. (2008) suggest that country level granting and enforcing of shareholder rights is perhaps more important than firm level attempts to limit shareholder rights. They show that in the U.S., managers who appear to be entrenched, act in a way to avoid drawing the attention of activists and raiders. Thus, in a country such as the U.S., with strong shareholder protection and strong enforcement law, measures of managerial entrenchment may be better viewed as signals of managers' propensity toward self-interested action rather than as indications of their complete invulnerability to oversight.

Ginglinger and Saddour (2007) examine the relation between cash holdings, corporate governance and financial constraints among the French firms and find that firms with strong shareholder rights hold more cash which is contrary to the predictions of agency theory. Furthermore, Chen, Chen, Schipper, Xu, and Xue (2012) show that after an exogenous positive shock to the corporate governance of Chinese-listed firms (the split share structure reform in China), their average cash holdings significantly decreased. They show that the reduction in cash holdings is greater for firms with poor corporate governance and facing financial constraint before the reform.

Evidence mentioned above show that there is not a clear consensus in international studies such as Harford et al. (2008), Ginglinger and Saddour (2007), Chen et al. (2012) which focus on a single country to explain the cash holdings of the firms.

Overall, the common theme in cash holdings studies is that firms (especially the financially constrained ones) use cash holdings as a major source of liquidity and therefore, use cash as a precautionary reserve for the time that cash flows are low and investor opportunities are abundant. In the next section, we look at lines of credit as another source of liquidity for firms.

Liquidity and Lines of Credit

Even though cash is considered the king in corporate liquidity management, it is not the only source of liquidity and firms usually use a combination of sources to honor their contractual obligations. In their seminal paper, Opler et al. (1999) state that "firms may choose to insure themselves against losses by holding liquid assets besides cash, and by having lines of credit available." This statement implies that lines of credit are one of the main substitutes for cash in the liquidity management of the firm. Consequently, they should be considered as one of the determinant of cash holdings the same way we consider net working capital as a measure of liquid asset substitutes in models of optimal cash holding.

The key theoretical rationale for having lines of credit is their ability to insure against future liquidity shocks. Specially, a firm which has greater arrival of growth opportunities in low cash flow states of nature, may need liquidity to take advantage of them. Boot, Thakor, and Udell (1987) state that in a setting like this, lines of credit can be efficient instruments in providing the needed liquidity. Holmström and Tirole (2000) suggest that firms prepare for these low cash flow states of nature either by holding cash and very liquid marketable securities or by utilizing lines of credit. Lines of credit are a popular source of liquidity so that according to the Survey of Terms of Business Lending released by Federal Reserve conducted in May 2015, 91.5% of all commercial and business loans in U.S. made by domestic banks are made under some sort of commitment (i.e. lines of credit).

However, lines of credit have some shortcomings too. Although lines of credit are designed to protect borrowers against negative cash flow shocks, due to existence of covenants, this insurance is not

complete. Sufi (2009) is one of the first studies that highlight the role of covenants in accessibility of lines of credit. He examines the determinants of the choice between cash holdings and lines of credit and finds that they are viable source of liquidity, only for firms that have and can maintain high cash flows. In other words, most of the times lines of credit are contingent on maintenance of cash flow sensitive covenants, hence they are poor substitutes of cash for the liquidity purposes. Consequently, firms with low cash flows hold more cash as a buffer, because lines of credit might not be available for them when most needed. In short, he states that utilization of credit line access depends on the financial health of the firm.

Acharya et al. (2014) propose and test a model of corporate liquidity management that is consistent with the weak substitutability of line of credit and cash, and use of lines of credit not only for precautionary motives but also for financing future growth opportunities. This theory considers lines of credit as a form of monitored insurance. In this study they try to explain liquidity seeking behavior of firms, especially in the presence of exogenous pressures. They argue that lines of credit can be understood as a form of monitored liquidity insurance, which controls illiquidity-seeking behavior by firms through bank monitoring and credit line revocation.

Campello et al. (2011) use financial crisis as a natural experiment to study the interaction of internal (cash) and external (line of credit) liquidity and their impact on real corporate decisions such as capital investment, technology spending, and employment. In other words, they are investigating how the financing and investing behavior of a firm changes in times of limited credit. In their survey of 397 CFOs from US, they find that small, private, non-investment grade, and unprofitable firms had significantly higher ratio of lines of credit to assets. Also, their univariate test shows a negative correlation between lines of credit and cash balances. Firms with higher cash holdings and strong cash flows, drew fewer funds from their lines of credit. Firms choose not to use lines of credit when they have enough internal funds, implying a cost wedge between these two sources of funds. Overall, since during financial crisis firms face hardship in accessing financial markets by issuing securities,

they find that lines of credit ease the impact of financial crisis on investments and other real decisions, such as technology and employment.

However, what happened during financial crisis for the US firms might be an everyday phenomenon for firms in some other countries. For example, in poorly developed financial markets, it can be really expensive to issue debt or equity. Therefore, studying the liquidity among countries with poor financial market development and comparing that with well developed countries, would be an extension of Campello et al. (2011). In other words, studying the liquidity choice in developed and underdeveloped financial markets is similar to comparing the liquidity choice during financial crisis with normal times.

Most of the studies that examine the liquidity management of the firms are focused on the US market. In the next section, I am going to review the literature that focuses on cross country differences in corporate liquidity managements.

International Evidence on Liquidity

Denis and McConnell (2003) state that legal and regulatory issues play a relatively small role in single country studies of international corporate finance. Particularly, they state that most of the single country studies of corporate governance focus on specific legal issues such as state of incorporation or anti-takeover statutes in different states within a country. The effects of more general underlying system of corporate laws and regulations on corporate governance are not generally considered in these studies. This is not surprising given that there can be little or no variability in such factors in a sample of firms from a single country. Denis and McConnell (2003) suggest that the variability in international legal structures and the ability to measure it provide greater opportunities for comparative corporate governance studies.

La Porta et al. (1998) (LLSV) is one of the first papers that focus on the influence of different legal systems on corporate governance. They base their analyses on the argument that the value of

securities is not derived from their cash flows but from the "rights to cash flows" and control of the firm that are granted to investors. They also assert that these rights become more important in the presence of agency problems. Furthermore, they argue that the significant and strength of these rights depend on legal rules of the jurisdiction in which securities are issued. In some countries shareholders maybe more protected than creditors and vice versa or none have good protection. In short, their results show that the extent to which a country's laws protect investor rights are fundamental determinants of the ways in which corporate finance and corporate governance evolve in that country.

Doidge et al. (2007) develop and test a model of how country characteristics influence firms' costs and benefits in implementing measures to improve their own governance and transparency. Depending on the measure of governance ratings, they find that country characteristics explain much more of the variance in governance ratings (ranging from 39% to 73%) than observable firm characteristics (ranging from 4% to 22%). They also show that firm characteristics explain almost none of the variation in governance ratings in less-developed countries and that access to global capital markets sharpens firms' incentives for better governance.

One of the first studies that specifically focus on the influence of agency problems and corporate governance on liquidity management of the firm in an international setting is Dittmar et al. (2003). In their sample of more than 11,000 firms from 45 countries, they find a strong support for the importance of corporate governance in determining cash levels and state that agency problems are of primary importance in determining cash holdings. They compare average cash holdings of firms in different countries by taking into account various shareholder protection and capital market development measures and find that in the countries with weak investor protection and underdeveloped capital markets, firms have twice as much cash as the firms in countries with good investor protection. This shows that in these countries shareholders do not have the power to limit the discretionary balances of cash that is available to managers.

An alternate explanation is that LOCs are more expensive in these countries yielding a preference for cash. That is, the findings observed by Dittmar et al. (2003) can be explained in the context of the cost wedge between cash and lines of credit. Since lines of credit were ignored in the study, their findings with respect to cash holdings and investor protection may not be conclusive.

Kalcheva and Lins (2007) find some evidence that controlling managers hold more cash and that this relation is stronger when country level shareholder protection is weak. Kusnadi and Wei (2011) examine the role of legal protection on the cash management policies of international firms around the world. Also they explore whether the effect of financial constraints on cash management policies as documented by Almeida et al. (2004) differ from firms in different countries. Using data from 29 countries, they find that firms from countries with strong legal protection are more likely to decrease their cash holdings as a result of an increase in cash flow than are firms from countries with weal legal protection. This finding is consistent with the notion that effective legal systems ease firms' access to the external capital markets. Consequently, firms in countries with strong legal protection of investors face fewer restrictions in raising external capital and these are less likely to save cash from current cash flows to fund their future investments than are their counterpart in counties with weak legal protection.

To test whether legal protection of investors or financial development are more important in influencing the cash flow sensitivity of cash, they include both the legal protection variables and the measure if financial development in the regression specifications. They find that legal protection is related to the cash flow sensitivity of cash, whereas they do not find evidence that financial development plays an incremental impact in influencing the cash flow sensitivity of cash. Therefore, they argue that the legal protection of investors rather than financial development is the first order effect in influencing international firms' cash management policies. Overall, they find that financially constraint firms have higher propensity to save cash only in countries with low legal protection of investors. These conclusions can be made more robust by examining utilization of lines of credit

across countries. It is possible that the greater propensity to save cash from cash flow in low investor protection could be due relatively more expensive lines of credit than due to a weak legal protection argument.

The international evidence on the choice between cash and lines of credit and the determinants of the use of lines of credit is limited to survey studies due to data limitations. Lins et al. (2010) conduct a survey study of 204 CFOs from 29 countries and investigate whether and why firms from around the world use lines of credit versus cash for their corporate liquidity. However their sample mostly consists of large firms in their respective countries and industries and they do not differentiate them based on levels of investor protection of their countries. They find that when CFOs have high future external funding needs or believe their equity is undervalued, they choose to have higher amounts of credit line. Another important reason for CFOs to hold lines of credit is the certainty of funding for acquisition purposes. In contrast, they state that the only prominent reason for holding non-operational (excess) cash is that it acts as a buffer against future cash flow shortfalls. Excess cash seems to hedge against the possibility that frictions prevent firms from funding its current operations in potential bad time. In other words, Lins et al. (2010) find that lines of credit are mostly held for growth options while excess cash is held as a general purpose insurance. In line with the findings of Sufi (2009), less than half of CFOs in their survey believe that excess cash and lines of credit are substitutes. Those who consider them substitutes are the CFOs of more profitable firms, with fewer potential agency problems.

Campello et al. (2012) is similar to Campello et al. (2011) but with a focus on European countries and draws similar conclusions. In their survey of 600 CFO from European countries, they distinguish these countries based on whether they are a bank-based or a market-based economy and they find that firms that are small, private, junk-rated and less profitable drew their lines of credit more than their large, public, and investment grade counterparts. Access to lines of credit boost corporate investment plans during the crisis, but mostly for firms with large cash holdings. In contrast firms without lines

of credit cut investments to increase their cash savings. Also, their evidence on the availability of lines of credit, drawdown activity, and pricing suggest that bank credit did not dry up during the crisis.

There are also some studies that examine the effect of national cultures (Chen, Dou, Rhee, Truong, and Veeraraghavan (2015)), languages (Chen, Cronqvist, Ni, and Zhang (2015)), etc. on cash holdings, however, in this study we will focus on the cross country differences in legal systems and strength of banking sector.

Hypothesis Development

Shokely and Thakor (1997) develop a theoretical model that explains the contract design features of bank loan commitments. This model shows that the complex structure of lines of credit contracts is important when bank faces borrower adverse selection and moral hazard problems. According to this theory, banks impose high enough fees on their lines of credit contracts in order to attract good and average quality firms and dissuade bad firms from getting lines of credit. Their model assumes a competitive credit market in which commitments provide a social welfare benefit by removing the frictions in the market. Also they state that lines of credit are an integral part of relationship banking. Campello et al. (2011) find that in their sample which covers financial crisis period, firms choose not to use lines of credit when they have enough internal funds, implying a cost wedge between these two sources of funds because of the fees involved in accessing the lines of credit whereas holding cash has not explicit costs or fees.

Therefore, the theory of Shokely and Thakor (1997) implies that the higher the competition among banks in the lines of credit market, the lower would be the costs and fees of accessing lines of credit, which in turn minimizes the cost wedge between cash and lines of credit, making lines of credit more attractive and accessible for firms.

However, when one studies the determinants of utilization of lines of credit in only one country, where the level of competition among banks and the culture of relationship banking is the same for all firms, the study is not going to shed much light on the determinants of the choice firms make in their liquidity management. On the other hand, when one investigates this choice in the international market, she is going to witness considerable cross sectional variation in the competitiveness, strength, and popularity of banking industry and culture of relationship banking. Therefore, I propose to test the determinants of the choice between cash and lines of credit in an international setting to provide a better understanding of the competitive credit markets and the importance of relationship banking.

Demirgüç-Kunt (2004) differentiate the economy types based on the importance of stock market capitalization and compare it with the size of banking sector. However, this measure that is used by some studies focuses on the relative size of the debt market to stock market and therefore, some countries with strong banking system but larger stock market are categorized as a market based economy. Consequently, this measure underestimates the power and competition of banking system in countries like U.S. Therefore, I use Lerner Index as a measure of competition in the banking industry in each country obtained from Demirgüç-Kunt and Martínez Pería (2010). Therefore, in a country with a competitive banking industry, one would expect to see more prevalence of lines of credit as a source of liquidity for firms.

H_1: firms in countries with competitive banking industry would have higher levels of lines of credit

Management and shareholders may have conflicting preferences between cash and lines of credit, therefore the mix of these sources of liquidity is likely to be influenced by corporate governance. Yun (2009) Study the effect of a change in corporate governance on the choice between cash and lines of credit and finds that a significant change in the corporate governance practices (i.e. a state-

level changes in anti-takeover protection) is associated with changes in the use of lines of credit relative to cash for firms in that environment.

La Porta et al. (1998) categorize the country level rules and form indices that measure the ease with which both shareholders and creditors can exercise their power against managers. The findings of their study implies that country level differences in legal systems and investor protection, either strengthen or lessen the quality of corporate governance in different countries. In other words, a poor corporate governance practice in a country with strong legal system is different with a poor corporate governance practice in a country with weak legal system. Investors of the latter are going to suffer more. Therefore one could expect to witness some variation in the popularity of lines of credit in different countries depending on their legal systems and investor protection practices.

La Porta et al. (1998) develop a shareholder protection index which is a summation of several laws and indicates the amount of power shareholders have in controlling and possibly changing the managers. La Porta et al. (1998) find that firms in countries with strong minority shareholder rights pay higher dividends, which might be an indication that shareholders power on forcing managers to return the excess cash to them. Therefore, one should expect that in a country with strong shareholder protection index firms have higher levels of lines of credit.

H_2: firms in countries with strong shareholder protection have higher levels of lines of credit

Another factor that can affect the popularity and use of lines of credit by firms is the strength of the creditor rights in a country which can get represented by the creditor rights index of (La Porta et al. (1998)). Therefore, in a country with strong creditor protection in which creditors bear lower risk, one would expect to see higher levels of lines of credit used as a source of liquidity.

H_3: firms in countries with strong creditor protection should have higher levels of lines of credit

According to La Porta et al. (1998) a strong system of legal enforcement could substitute for weak investor or creditor protection since active and well-functioning courts can step in and rescue investors abused by the management. Therefore, one would expect firms in countries with strong legal enforcement to have higher levels of lines of credit.

H_4: firms in countries with strong enforcement of law should have higher levels of lines of credit

Data and Sample

I obtain the lines of credit data from Standard and Poor's Capital IQ database which provides information on the used and unused portions of the lines of credit and it spans the period of 2002 to 2014. The main balance sheet data is obtained from Compustat Global Fundamental Annual database and the stock price and volume data is obtained from Compustat Global Security Daily database. Although there has been an effort to standardize accounting practices in the world, there are still some differences that exist in financial reporting. According to Pinkowitz, Stulz, and Williamson (2016) Compustat Global makes an effort to ease the cross country comparisons. However, one should keep in mind that, even if the accounting standards might be the same in two countries, the enforcement of these rules and other variables concerning the regulations might not be the same.

Following the literature, and due to their especial liquidity needs and regulatory environments, I eliminate all financial firms (SIC code 6000-6999) and all utilities (SIC code 4900-4999). To avoid double counting of cash holdings and lines of credit, my sample contains only the parent companies. I also remove firms which their stock price currency is different from their balance sheet currency. All variables are deflated using 2007 consumer price index obtained from the World Bank Database. Following Sufi (2009), I only keep firms with at least 4 observations because evolution of line of credit over time is of particular interest in these type of studies. Furthermore, I only keep countries with at least 10 observations per year. After applying all these filters, the database contains

information for 16,941 non-financial and non-utility firms. The full sample contains 152,982 firm-year observations from 42 countries.

Since the structure of firms in various countries are significantly different from each other (i.e. a medium size firm in US might be considered a large firm in some other country), instead of using natural logarithm of assets as a measure of size, I form size deciles within each country and fiscal year. Following Pinkowtiz et al. (2016) I remove small firms and include the top nine size deciles. Also I remove firms with negative or missing total assets. Appendix 1 provide the list, description and source of the data for the variables of interest in this study.

[Insert Table 1.1 Here]

Panel A of Table 1.1 shows the composition of the sample by fiscal year. Like any other study that uses international data, I witness an increase in the coverage of the firms over the years. My sample starts with 8,319 firms in 2002 and grows to 14,456 in 2014. Panel B of the Table 1.1 presents the geographic distribution of the sample based on S&P Capital IQ geographic region classification. Asia/Pacific region has the largest representation in the sample with 12 countries and 78,964 firm-year observations. It follows by United States and Canada with 42,971 firm-year observations and Europe with 16 countries and 23,333 firm-year observations. Latin America and Africa and Middle East have the lowest representation in the sample. Panel C reports the sample distribution by country of incorporation. United States has the largest representation in the sample with 36,880 firm-year observations followed by Japan with 25,752 firm-year observations and China with 14,078 observations. In general countries in developing countries have significantly smaller representations.

[Insert Table 1.2 Here]

To study the effect of institutional developments in each country on the use of lines of credit, I consider a measure of banking competition as well as some country governance variables.

Lerner Index is a measure of a firm's market power and it was developed in Lerner (1934). This index as modified by Demirgüç-Kunt and Martínez Pería (2010) is a measure of market power in the banking industry in each country. They define the Lerner Index as the difference between output prices and marginal costs (relative to prices). Higher values of the Lerner index indicate less bank competition. Table 1.2 shows that this measure ranges from -0.09 in Finland (highly competitive banking industry) to 0.78 in Singapore (least competitive banking industry). United Kingdom and United States have reasonable amount of competition in their banking industries, 0.24 and 0.28 respectively.

Furthermore, the seminal work of LaPorta et al. (1998) shows that the level of minority shareholder protection and the rights to the cash flows of securities in general varies significantly among countries. To measure the strength of minority shareholder protection, I use the revised anti-director rights index of Djankov et al. (2008). This is Aggregate index of shareholder rights. The index is formed by summing: (1) vote by mail; (2) shares not deposited; (3) cumulative voting; (4) oppressed minority; (5) pre-emptive rights; and (6) capital to call a meeting. The revised version of the anti-director index relies on the same basic dimensions of corporate law, but defines them in a more precise way. Table 1.2 shows that the highest revised anti-director index is 5 and the lowest is 1.

LaPorta et al. (1998) also provide a creditor rights index which is an index aggregating creditor rights. A score of one is assigned when each of the following rights of secured lenders is defined in laws and regulations: First, there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization. Second, secured creditors are able to seize their collateral after the reorganization petition is approved, i.e. there is no "automatic stay" or "asset freeze." Third, secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as government or workers. Finally, if management does not retain administration of its property pending the resolution of the reorganization. The index ranges from 0 (weak creditor rights) to 4 (strong creditor rights). Djankov, Hart, McLiesh, and Shleifer (2008) estimated this creditor rights

index for more countries, therefore, we use their latest data. Hong Kong, India, New Zealand and United Kingdom have the highest creditor rights where France, Mexico, and Peru have a creditor rights score of zero.

The main financial variables are calculated from Global Compustat Fundamental Annual database and are defined as follows. There are several measures of cash flows that is used in the cash holdings and liquidity management literature. However, according to Sufi (2009) when one studies the characteristics of liquidity management by focusing on lines of credit, the best measure of cash flows is EBITDA over net assets (at-che) where net assets is total assets minus cash and marketable securities. The significance of EBITDA is derived from the fact that this measure is the most common measure of cash flows used by commercial banks (or syndicate of commercial banks) when they outline the covenants of a line of credit. Cash is measured as cash and marketable securities (che). Tangibility is measured as tangible assets (ppent) over net assets. Market-to-Book ratio is defined as total assets (at) plus market value of equity (cshoc*prccd) minus book value of equity (ceq) minus cash (che) divided by net assets. Net worth is defined as total assets minus total liabilities minus cash and marketable securities over net assets.

Following Sufi (2009), I deflate all variables by net assets instead of total assets because firms are more likely to jointly determine cash balances and their use of lines of credit when they set up their liquidity management policies. According to Sufi, using cash in the denominator of variables of interest will lead to a mechanical negative correlation. However, deflating variables with net assets as opposed to total assets leads to more extreme outliers, therefore, in order to minimize the impact of outliers I winsorize all of my continuous variables at the 2nd and 98th percentile.

Summary Statistics

Table 1.3 provides the summary statistics for the main variables of the study. In the full sample about 54% of firms have line of credit. Benefiting from the detailed data on the used and unused portions of

lines of credit obtained from S&P Capital IQ, I formed different measures to study the significance of lines of credit in the liquidity management of the firm. Overall, the unused line of credit represents 4.3% and the used portion of the line of credit represent 3.4% of the total assets of the firms around the world. Therefore, the total line of credit is about 8% of total assets of an average firm. Given the leverage ratio of about 25%, these figures imply that the used portion of line of credit is about 14% of the total debt of an average firm which suggest that line of credit is a popular source of financing in countries present in my sample.

[Insert Table 1.3 Here]

Following Sufi (2009), in order to examine the significance of lines of credit in the liquidity management of firms I construct two measures of line of credit to total liquidity ratios. The first one is the ratio of total line of credit over the summation of total line of credit and cash holdings. The second measure is the unused portion of line of credit divided by summation of unused line of credit and cash holdings. The first measure represents the fraction of the liquidity available to the firm. Whereas, the second measure, as argued by Sufi, takes into account the mechanical endogeneity issues that certain types of firms draw down their lines of credit more than others. These measures show that lines of credit represent a significant portion of the total liquidity of a firm. Total line of credit is about 28% and unused line is about 19% of the total liquidity in an average firm.

Methodology

I use Sufi (2009) model as my baseline regression and to start my analysis I replicate his model in an international setting. Using this baseline model I am able to investigate which firm characteristics influence the choice between cash and lines of credit in my cross country sample. In other words, controlling for firm's country of incorporation, I test whether a firm uses lines of credit in its liquidity management. In the first set of tests, I investigate the effect of firm characteristics on probability of having access to line of credit using the following maximum likelihood estimation:

$$HasLine_{i,t} = \beta_0 + \beta_1 CashFlow_{i,t-1} + \beta_2 Tangibles_{i,t-1} + \beta 3\ Size\ Decile_{i,t-1} + \beta_4 NetWorth_{i,t-1} + \beta_5\ Market\text{-}to\text{-}Book_{i,t-1} + \beta_6\ Sales\ Vol._{i,t-1} + \beta_7 Cash\ Flow\ Vol._{i,t-1} + \varepsilon_{i,t}$$

Where $HasLine_{i,t}$ is an indicator variable which is equal to one if the firm has either used or unused lines of credit at time t. *Cash Flow* is the ratio of EBITDA over net assets where net assets is total assets minus cash and marketable securities. *Tangibles* is measured as property, plant, and equipment over net assets. *Size deciles* are based on the deciles of the total assets. *Net Worth* is cash adjusted and is measured as total assets minus total liabilities, minus cash divided by net assets. *Market-to-book* is also cash adjusted and calculated as total assets plus market value of equity minus book value of equity minus cash divided by net assets. *Cash Flow Vol.* is the median of the standard deviation of cash flows over the past 10 years by country, fiscal year, and 2-digit industry SIC codes. *Sales Vol.* is the median of the standard deviation of sales over net assets ratio over the past 10 years by country, fiscal year, and 2-digit industry SIC codes.

Next, to test the various hypotheses proposed in this study, I extend Sufi's baseline model and include test variables that capture bank competition and governance quality of each country and run different specifications of the following regression:

$$HasLine_{i,t} = \beta_0 + \beta_1 CashFlow_{i,t-1} + \beta_2 Tangibles_{i,t-1} + \beta_3 Size\ Decile_{i,t-1} + \beta_4 NetWorth_{i,t-1} + \beta_5 Market\text{-}to\text{-}Book_{i,t-1} + \beta_6\ Sales\ Vol._{i,t-1} + \beta_7 Cash\ Flow\ Vol._{i,t-1} + \beta_8 Banking\ Competition_i + \beta_9 Shareholder\ Protection_i + \beta_{10} Creditor\ Protection_i + \beta_{11} Rule\ of\ Law_i + \varepsilon_{i,t}$$

In the next set of tests, I implement linear regression OLS by adopting two different measures of line of credit over total liquidity, to study the influence of firm characteristics on the choice between cash and line of credit. In particular I run the following linear regressions with two different measures of line to total liquidity ratios:

$$\textit{Total Line to total liquidity ratio}_{i,t} = \beta_0 + \beta_1\ \textit{CashFlow}_{i,t-1} + \beta_2\ \textit{Tangibles}_{i,t-1} + \beta_3\ \textit{Size Decile}_{i,t-1} + \beta_4\ \textit{NetWorth}_{i,t-1} + \beta_5\ \textit{Market-to-Book}_{i,t-1} + \beta_6\ \textit{Sales Vol.}_{i,t-1} + \beta_7\ \textit{Cash Flow Vol.}_{i,t-1} + \varepsilon_{i,t}$$

$$\textit{Unused Line to total liquidity ratio}_{i,t} = = \beta_0 + \beta_1\ \textit{CashFlow}_{i,t-1} + \beta_2\ \textit{Tangibles}_{i,t-1} + \beta_3\ \textit{Size Decile}_{i,t-1} + \beta_4\ \textit{NetWorth}_{i,t-1} + \beta_5\ \textit{Market-to-Book}_{i,t-1} + \beta_6\ \textit{Sales Vol.}_{i,t-1} + \beta_7\ \textit{Cash Flow Vol.}_{i,t-1} + \varepsilon_{i,t}$$

$$\textit{Total Line to total liquidity ratio}_{i,t} = = \beta_0 + \beta_1\ \textit{CashFlow}_{i,t-1} + \beta_2\ \textit{Tangibles}_{i,t-1} + \beta_3\ \textit{Size Decile}_{i,t-1} + \beta_4\ \textit{NetWorth}_{i,t-1} + \beta_5\ \textit{Market-to-Book}_{i,t-1} + \beta_6\ \textit{Sales Vol.}_{i,t-1} + \beta_7\ \textit{Cash Flow Vol.}_{i,t-1} + \varepsilon_{i,t} + \beta_{11}\ \textit{Banking Competition}_{i} + \beta_9\ \textit{Shareholder Protection}_{i} + \beta_{10}\ \textit{Creditor Protection}_{i} + \beta_{12}\ \textit{Rule of Law}_{i} + \varepsilon_{i,t}$$

$$\textit{Unused Line to total liquidity ratio}_{i,t} = = \beta_0 + \beta_1\ \textit{CashFlow}_{i,t-1} + \beta_2\ \textit{Tangibles}_{i,t-1} + \beta_3\ \textit{Size Decile}_{i,t-1} + \beta_4\ \textit{NetWorth}_{i,t-1} + \beta_5\ \textit{Market-to-Book}_{i,t-1} + \beta_6\ \textit{Sales Vol.}_{i,t-1} + \beta_7\ \textit{Cash Flow Vol.}_{i,t-1} + \varepsilon_{i,t} + \beta_{11}\ \textit{Banking Competition}_{i} + \beta_9\ \textit{Shareholder Protection}_{i} + \beta_{10}\ \textit{Creditor Protection}_{i} + \beta_{12}\ \textit{Rule of Law}_{i} + \varepsilon_{i,t}$$

In all regressions, standard errors are clustered at country and firm levels and all regressions include country, fiscal year, and 1-digit SIC industry indicator variables.

Empirical Results

In Table 1.5, I attempt to reproduce Sufi's results in my cross country sample. Column 1 of Table 1.5 presents the coefficient estimates from the maximum likelihood probit estimation which relates firm characteristics to the likelihood of having a line of credit. Consistent with the results in Sufi (2009), lagged cash flow has a positive and significant influence on the probability of utilization of line of credit. This coefficient suggests that a two standard deviation increase in cash flows (2.11) at the means leads to approximately 22% increase in the probability of utilizing a line of credit. Size is also

positive and significant with a coefficient of 0.039 which suggest that larger firms are more likely to have access to lines of credit. For example a two standard deviation increase in size will increase the probability of having a line of credit by about 24%. The higher the volatility of cash flows, however, the lower the probability of utilization of line of credit. This is in line with the results of Sufi which suggest that lines of credit are viable options only for firms that have and can maintain a high levels of cash flows. Whereas, firms with low cash flows or high volatility in cash flows use cash more often and are less likely to obtain a line of credit. Net worth and Tangibles are also economically and statistically significant. Firms with high net worth and tangibles are less likely to use lines of credit probably due to availability of other sources of financing. Finally, consistent with the evidence in capital structure literature which suggest that high book to market firms are less levered, we see a negative and significant coefficient for the market to book ratio.

[Insert Table 1.5 here]

The results of the linear regression OLS models are also consistent with Sufi's findings in the US sample. Both regressions in models (2) and (3) produce positive and significant coefficients for lagged cash flows. For example in model (2), a one standard deviation increase in cash flows will increase the ratio of total line of credit over summation of total line and cash holdings by 8%. The same positive correlation between lagged cash flow and used line to total liquidity (used line + cash) ratio exists in model (3). Size is also a significant predictor of the utilization of line of credit in the liquidity management of the firm. The results in these two columns also show a negative correlation between cash flow volatility and the ratio of the line to total liquidity. This indicates that firms with highly volatile cash flows tend to rely more on cash holdings in their liquidity management, as opposed to lines of credit. As argued by Sufi, this is due to the fact that these firms may prefer to avoid cash flow based covenants present in almost every line of credit contract. Using the ratios of line of credit over total liquidity isolates the relative attractiveness of lines of credit over cash holdings, while controlling for overall liquidity. Firms with low cash flows may have higher or lower

demand for liquidity, but the important results in here is that they prefer to hold more cash relative to lines of credit.

Country Characteristics and Utilization of Lines of Credit

In this section, I present the empirical results of my investigation of the relationship between country characteristics and the utilization of lines of credit across these countries.

Banking Industry Competition

My first hypothesis focuses on the influence of banking competition and state that the higher the banking competition, firms would utilize the lines of credit more. Therefore, in this section I examine the effect of competition in the banking industry on the use of line of credit by firms in different countries with different levels of banking competition. The argument in bank competition hypothesis is that the higher the competition among the banks in a country, the lower the fees charged by banks for obtaining lines of credit, hence, it will be more affordable for firms to access this service.

[Insert Table 1.6 Here]

Table 1.6 reports the regression results that demonstrates the effect of increased banking competition on the use of lines of credit. High Competition is an indicator variable which equals to one if the Lerner Index of a country is below median in a fiscal year. Lerner Index is a measure of market power in the banking market. All regressions in Table 1.6 show a positive correlation between Bank Competition indicator variable and use of lines of credit by firms across countries. Columns (1), (3), and (5) show the effect of banking competition on the use of lines of credit without including the firm level characteristics. For example, the results in column (1) shows that a two standard deviation increase in High Competition indicator variable (0.998) would increase the probability of accessing the line of credit by about 3% (0.998*0.0261). In columns (2), (4), and (6) I include firm level characteristics to my regression models and the results are still consistent with my hypothesis and the findings of Sufi. For example columns (4) shows that in countries with below median Lerner Index,

the amount of total line of credit as a part of total liquidity increases by about 2%. Column (6) shows that in the same countries, the amount of unused line of credit as a part of total liquidity increases by 1.1%.

The results of Table 1.6 supports the hypothesis that firms in countries with strong and competitive banking industry utilize lines of credit more extensively compare to the firms in countries with less competitive commercial banking systems.

Shareholder Rights

Dittmar et al. (2003) and Kalcheva and Lins (2007) study the influence of country level governance characteristics on liquidity by analyzing the cash holding behavior of the firms in cross country samples. Furthermore, Yun (2009) examines the influence of corporate governance on the use of line of credit and shows that significant changes in corporate governance practices is associated with changes in the utilization of lines of credit relative to cash holdings. Therefore, in this section and next, I test the hypotheses that examines the relationship between country level investor protection rights with the use of line of credit.

[Insert Table 1.7 Here]

My second hypothesis states that firms in countries with strong shareholder protection have higher levels of lines of credit. Table 1.7 presents the regression results that show the effect of shareholder rights on the use of lines of credit. Revised anti-director index is obtained from Djankov, LaPorta, Lopez-de-Silanes, and Shleifer (2008). In the second section, I am investigating whether in countries with strong shareholder protection (i.e. high values of revised anti-director index) firms are more likely to utilize lines of credit. The results of Table 1.7 shows that this relationship is in fact present in my cross country sample. For instance, the results of column (2) shows that a two standard deviation increase in revised anti-director index will increase the probability of utilizing a line of credit by about 44% (2*1.167*0.189) which is both statistically and economically significant.

The same positive correlation between shareholder protection and use of line of credit exists in OLS regressions. for instance, the results of column (4) indicates that a one notch increase in the revised anti-director index increases the ratio of the total line of credit over total liquidity by about 12%. I witness an increase of approximately the same magnitude for the ratio of unused line over total liquidity. The sign and significance of the firm level characteristics are still consistent with the theory.

Overall the results of this section shows that the likelihood and the degree of utilizing the lines of credit is higher in countries with higher values of revised anti-director index, compared to countries with lower levels of shareholder protection.

Creditor Rights

My third hypothesis states that firms in countries with strong creditor protection have higher level of lines of credit. In other words, stronger creditor rights can also be a determining factor in the utilization of lines of credit. In this kind of environment where banks have stronger protection, they are more likely to make loans and provide lines of credit to firms. Therefore, I test the hypothesis that examines whether stronger creditor rights of a country promotes the use of lines of credit. Creditor rights is an index aggregating creditor rights, following La Porta et al. (1998).

[Insert Table 1.8 Here]

Table 1.8 reports the regression results that show the effect of creditor rights on the use of lines of credit. The sign and significance of the coefficient of creditor rights index is in line with the prediction of theory. Results in this table shows a positive and significant relationship between strong creditors rights the utilization of lines of credit. For instance the maximum likelihood probit regression results in column (2) suggest that a two standard deviation increase in creditor rights index at means (2*1.055) will result in a 23% increase in the probability of having a line of credit. Similarly, we see a one notch increase in creditor rights, results in a 15% increase in the ratio of total line of credit over total liquidity in column (4) and 14% increase in the ratio of unused line of credit

over total liquidity in column (3). Again, most of the firm level characteristics have the expected sign and significance as suggested by Sufi.

To sum up, the results of this section suggest that the likelihood and the degree of having access to lines of credit is higher in places with higher values of creditor rights index, compared to countries with lower levels of creditor protection.

Rule of Law

LaPorta et al. (1998) suggest that a strong rule and enforcement of law can compensate for inadequacy of shareholder/creditor protection rights. Therefore, in this section¸ I examine the hypothesis that in countries where the rule of law is strong, firms utilize lines of credit more extensively.

[Insert Table 1.9 Here]

Table 1.9 presents the regression results that show the effect of rule of law on the use of lines of credit. Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of a society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. All the regressions in this table show a positive relationship between the strength of this measure and utilization of lines of credit. For example, the results of the maximum likelihood probit estimation shows that a two standard deviation (2* 0.137) increase in the Rule of Law, results in a 48% increase in the probability of obtaining a line of credit by firms in that country. The linear regression in column (4) also shows that a one unit increase in the Rule of Law measure, increases the ratio of total line of credit to total liquidity by 36%. However, when we focus on the unused portion of lines of credit in column (6), this increase in the utilization of line of credit is smaller in size (approximately 3%).

Overall, the findings of this section imply that the likelihood and the degree of utilization of lines of credit is higher in countries where the rule of law is strong, compared to countries with weaker values for rule of law index.

All Country Variables

Finally, instead of holding everything else constant and studying the influence of each of these country variables in isolation, I include all in the model to provide a better picture of these relationships.

[Insert Table 1.10 Here]

Table 1.10 presents the results of the main regressions with all country variables. Here, we see that the degree of competition in a country's banking industry and the country's rule of law are still positively related to the utilization of lines of credit by firms in my cross country sample. However, the results in this table do not provide a consistent relationship between investor rights and the use of lines of credit. For instance the coefficient of shareholder rights change sign and significance in different models. The inconsistencies in the results of this table might be due to different degrees of correlation between country level variables. For instance creditor rights is highly correlated with revised anti-takeover index (0.48) where its correlation with rule of law is -0.18.

To remedy this situation, I resort to a popular practice in corporate governance studies, and I aggregate different variables to form an index. In this step I aggregate the country level governance variables, by adding the revised anti-director index, Creditor rights index, and rule of law. However, before doing that, I rank the rule of law measure based on its quintiles in order to produce a five scale rank that is comparable with revised anti-director index and creditor rights index. In order to make it consistent with shareholder rights index, I also rescale creditor rights by adding 1 to it which makes it range from 1 to 5. In the next step I add these country level governance variables to construct a country governance index.

[Insert Table 1.11 Here]

When I add this country governance index as well as the banking competition indicator variable to my regressions I get results that are consistent with the previous models. Table 1.11 shows that banking industry competition has a positive and significant influence on the use of lines of credit. At the same time, we also see a positive correlation between country governance index and the utilization of lines of credit. Again, the coefficients for firm level characteristics are still consistent with Sufi's results.

Robustness Tests

To help ensure the validity of my results in the previous section, I perform a number of robustness tests of my main regressions in different samples. One can argue that since US represents almost a quarter of my sample, and has favorable governance systems in place as well as strong and competitive banking industry, the results of the previous section is driven by the US sample. Therefore, to assess whether my results are driven by US firms, I reexamine all three main regressions for non-US firms.

[Insert Table 1.12 Here]

In doing so, I look at the probability of obtaining the line of credit using the maximum likelihood probit estimation for non-US firms and find that the results are still consistent and qualitatively the same as the main regressions. For the sake of brevity, I only report the coefficients for my variable of interest in this table. Both high banking sector competition and high corporate governance index increase the probability of obtaining a line of credit as it shown in column (1) Panel A of Table 1.12. Moreover, I show that these two country level characteristics increase the ratio of total line of credit over total liquidity in column (1) Panel B. However, when it comes to the examining the relationship between the ratio of unused line of credit over total liquidity and firm and country level

characteristics in column (1) Panel C, only banking competition is significant and country governance variable loses its significance.

Next, in column (2) of these Panels, I only include the top seven industrialized nations in the world (G7 countries) and in all panels the coefficient of banking competition is positive and significant. However, the country governance index lowers the probability of obtaining lines of credit or insignificant in other panels. The results of column (3) where I reexamine the model only for developed nations are similar to that of G7 countries in all panels.

In column (4) I examine common law countries in isolation to determine if my results is more driven by the legal origin of the country as opposed to its shareholder/creditor protection. Surprisingly, in my maximum likelihood probit regression, we see that banking competition coefficient becomes negative in these countries and governance variable lose its significance. However, when it comes to testing the relative importance of lines of credit over cash holdings in the liquidity management of the firm, we still see that the bank competition has a positive and significant influence on utilization of lines of credit. Country governance variable is insignificant here.

Next, I separate the period of financial crisis to examine the liquidity management of the firms in response to this liquidity shock. In column (5) I only use the data for 2008 and 2009 to estimate my models. Panel A shows that governance variable is insignificant but the banking competition still have a positive and significant effect on the probability of a firm obtaining a line of credit. However, when it comes to the choice between cash and lines of credit in the liquidity management of the firm, country level governance variable plays a more important role. In Panel B and C of column (5) we see that the coefficient for banking competition is insignificant during the crisis and we have a positive and significant coefficient for governance index. Overall, the results in Table 1.12 supports the finding of the main regressions.

[Insert Table 1.13 Here]

Finally, some studies deflate various measure of lines of credit by net assets instead of dividing them by total liquidity. In the next step, I reexamine my main regressions with some alternative dependent variables. The dependent variable in Models (1) and (4) of Table 1.13 is the ratio of unused portion of line of credit over net assets. Net assets is defined as total assets minus cash and marketable securities. The dependent variable in Models (2) and (5) is the ratio of total of line of credit over net assets. Lastly, the dependent variable in Models (3) and (6) is the ratio of drawn portion of line of credit over net assets. In the first three columns of Table 1.13, I replicate the results of Sufi using these alternative measures of lines of credit and the coefficients of the firm characteristics in all the models are consistent with those of Sufi's. In the remaining columns of Table 1.13, I reproduce the results of these models by including the bank competition and country governance variables and in all three models I have positive and significant coefficients for my variables of interest.

Conclusion

In this essay I employ a novel database of lines of credit that spans several geographic regions, obtained from S&P Capital IQ to study the choice between cash holdings and lines of credit and examine the determinants of this choice in an international setting. As suggested by Sufi (2009), firms are likely to jointly determine the level of cash holdings and the utilization of lines of credit.

This essay extends the findings of Sufi (2009) by examining this choice among 42 countries and study the influence of country level variables on this choice. When one studies this choice in a single country setting such as U.S., all firms face the same challenges, opportunities, regulation, competition, etc. at the country level. However, when we switch from a single country setting to an international setting, we can witness a considerable amount of heterogeneity in country level legal system, competition, regulation, and investor rights. Each of these factors can have a significant influence on the choice of the liquidity of the firms.

Here I find that the level of competition in the banking industry, shareholder rights, creditor rights, and rule of law have significant and positive effect on the likelihood of obtaining and utilization of lines of credit. Even when I include all these country level variables together in my model, I still find significant relationships between banking competition and rule of law on the utilization of lines of credit. Furthermore, in this models I do not get consistent results creditor and shareholder rights. However, when I aggregate all the country level governance variables, I find that both banking competition and country governance index are positively and significantly related to the likelihood of obtaining and also utilizing lines of credit in the liquidity management of the firm. The results of the main tests of the study are still robust using several different subsamples.

REFERENCES

Acharya, V., Almeida, H., Ippolito, F., & Perez, A. (2014). Credit lines as monitored liquidity insurance: Theory and evidence. *Journal of financial economics, 112*(3), 287-319.

Acharya, V. V., Almeida, H., & Campello, M. (2013). Aggregate Risk and the Choice between Cash and Lines of Credit. *The Journal of Finance, 68*(5), 2059-2116.

Almeida, H., Campello, M., & Weisbach, M. S. (2004). The Cash Flow Sensitivity of Cash. *The Journal of Finance, 59*(4), 1777-1804.

Bates, T. W., Kahle, K. M., & Stulz, R. M. (2009). Why Do U.S. Firms Hold So Much More Cash than They Used To? *The Journal of Finance, 64*(5), 1985-2021.

Boot, A., Thakor, A. V., & Udell, G. F. (1987). Competition, risk neutrality and loan commitments. *Journal of Banking & Finance, 11*(3), 449-471

Campello, M., Giambona, E., Graham, J. R., & Harvey, C. R. (2011). Liquidity Management and Corporate Investment During a Financial Crisis. *Review of Financial Studies, 24*(6), 1944-1979.

Campello, M., Giambona, E., Graham, J. R., & Harvey, C. R. (2012). Access to Liquidity and Corporate Investment in Europe during the Financial Crisis. *Review of Finance, 16*(2), 323-346.

Chen, Q., Chen, X., Schipper, K., Xu, Y., & Xue, J. (2012). The Sensitivity of Corporate Cash Holdings to Corporate Governance. *Review of Financial Studies*

Chen, S., Cronqvist, H., Ni, S., & Zhang, F. (2015). Languages and Corporate Cash Holdings: International Evidence. *Working paper*.

Chen, Y., Dou, P. Y., Rhee, S. G., Truong, C., & Veeraraghavan, M. (2015). National culture and corporate cash holdings around the world. *Journal of Banking & Finance, 50*, 1-18.

Demirgüç-Kunt, A. (2004). *Financial structure and economic growth: A cross-country comparison of banks, markets, and development*: MIT press.

Demiroglu, C., & James, C. (2011). The use of bank lines of credit in corporate liquidity management: A review of empirical evidence. *Journal of Banking & Finance, 35*(4), 775-782.

Dittmar, A., & Mahrt-Smith, J. (2007). Corporate governance and the value of cash holdings.

Journal of financial economics, 83(3), 599-634.

Dittmar, A., Mahrt-Smith, J., & Servaes, H. (2003). International Corporate Governance and Corporate Cash Holdings. *Journal of Financial and Quantitative Analysis, 38*(01), 111-133.

Faulkender, M., & Wang, R. (2006). Corporate Financial Policy and the Value of Cash. *The*

Journal of Finance, 61(4), 1957-1990.

Ginglinger, E., & Saddour, K. (2007). Cash Holdings, corporate governance and financial constraints. *Working paper, Université Paris-Dauphine.*

Harford, J., Mansi, S., & Maxwell, W. (2012). Corporate Governance and Firm Cash Holdings in the U.S. In S. Boubaker, B. D. Nguyen & D. K. Nguyen (Eds.), *Corporate Governance* (pp. 107-138): Springer Berlin Heidelberg.

Harford, J., Mansi, S. A., & Maxwell, W. F. (2008). Corporate governance and firm cash holdings in the US. *Journal of financial economics, 87*(3), 535-555

Holmström, B., & Tirole, J. (1998). Private and Public Supply of Liquidity. *Journal of Political Economy, 106*(1), 1-40.

Holmström, B., & Tirole, J. (2000). Liquidity and Risk Management. *Journal of Money, Credit and Banking, 32*(3), 295-319.

Iskandar-Datta, M. E., & Jia, Y. (2012). Cross-country analysis of secular cash trends. *Journal of Banking & Finance, 36*(3), 898-912.

Jiménez, G., Lopez, J. A., & Saurina, J. (2009). Empirical analysis of corporate credit lines.*Review of Financial Studies, 22*(12), 5069-5098.

Kalcheva, I., & Lins, K. V. (2007). International Evidence on Cash Holdings and Expected Managerial Agency Problems. *Review of Financial Studies, 20*(4), 1087-1112.

Kusnadi, Y., & Wei, K. C. J. (2011). The determinants of corporate cash management policies: Evidence from around the world. *Journal of Corporate Finance, 17*(3), 725-740.

La Porta, R., Lopez de Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and Finance. *Journal of Political Economy, 106*(6), 1113-1155. doi: 10.1086/250042

Lins, K. V., Servaes, H., & Tufano, P. (2010). What drives corporate liquidity? An international survey of cash holdings and lines of credit. *Journal of financial economics, 98*(1), 160-176.

Mikkelson, W. H., & Partch, M. M. (2003). Do Persistent Large Cash Reserves Hinder Performance? *The Journal of Financial and Quantitative Analysis, 38*(2), 275-294.

Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of financial economics, 52*(1), 3-46.

Pinkowitz, L., stulz, R., & Williamson, R. (2006). Does the Contribution of Corporate Cash Holdings and Dividends to Firm Value Depend on Governance? A Cross-Country Analysis. *The Journal of Finance, 61*(6), 2725-2751.

Porta, R. L., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (2000). Agency Problems and Dividend Policies around the World. *The Journal of Finance, 55*(1), 1-33.

Shockley, R. L., & Thakor, A. V. (1997). Bank Loan Commitment Contracts: Data, Theory, and Tests. *Journal of Money, Credit and Banking, 29*(4), 517-534

Sufi, A. (2009). Bank Lines of Credit in Corporate Finance: An Empirical Analysis. *Review of Financial Studies, 22*(3), 1057-1088.

Yun, H. (2009). The Choice of Corporate Liquidity and Corporate Governance. *Review of Financial Studies, 22*(4), 1447-1475.

Table 1.1. The Sample

This table provides the distribution of the sample of 16,941non-financial firms. The full sample contains 152,982 firm year observations from 42 Countries between 2002 and 2014. Panel A shows the sample distribution by fiscal year. Panel B presents the sample distribution based on the geographic regions based on S&P Capital IQ classification. Panel C, reports the sample distribution by country of incorporation.

Panel A: By Fiscal Year

Fiscal Year	Freq.	Percent	Cum.
2002	8,319	5.44	5.44
2003	8,882	5.81	11.24
2004	9,446	6.17	17.42
2005	10,037	6.56	23.98
2006	10,632	6.95	30.93
2007	11,273	7.37	38.3
2008	11,798	7.71	46.01
2009	12,254	8.01	54.02
2010	12,873	8.41	62.43
2011	13,961	9.13	71.56
2012	14,483	9.47	81.03
2013	14,568	9.52	90.55
2014	14,456	9.45	100
Total	152,982	100	

Panel B: By Geographic Region

Geographic Locations (Number of Countries)	Freq.	Percent	Cum.
Africa / Middle East (7)	4,984	3.26	3.26
Asia / Pacific (12)	78,964	51.62	54.87
Europe (16)	23,333	15.25	70.13
Latin America and Caribbean (5)	2,730	1.78	71.91
United States and Canada (2)	42,971	28.09	100
Total	152,982	100	

Panel C: By Country			
Country of Incorporation	Freq.	Percent	Cum.
Argentina	276	0.18	0.18
Australia	7,485	4.89	5.07
Austria	324	0.21	5.28
Belgium	494	0.32	5.61
Brazil	1,177	0.77	6.38
Canada	6,079	4	10.35
Chile	450	0.29	10.65
China	14,078	9.2	19.85
Denmark	828	0.54	20.39
Egypt	470	0.31	20.7
Finland	950	0.62	21.32
France	3,147	2.06	23.37
Germany	3,537	2.31	25.69
Greece	1,303	0.85	26.54
Hong Kong	634	0.41	26.95
India	10,223	6.68	33.63
Ireland	346	0.23	33.86
Israel	963	0.63	34.49
Italy	826	0.54	35.03
Japan	25,752	16.83	51.86
Jordan	696	0.45	52.32
Malaysia	5,725	3.74	56.06
Mexico	648	0.42	56.48
Morocco	222	0.15	56.63
Netherlands	731	0.48	57.11
New Zealand	538	0.35	57.46
Nigeria	302	0.2	57.66
Norway	655	0.43	58.08
Peru	179	0.12	58.2
Philippines	635	0.42	58.62
Portugal	194	0.13	58.74
Russia	207	0.14	58.88
Singapore	2,776	1.81	60.69
South Africa	1,347	0.88	61.57
South Korea	7,148	4.67	66.25
Sri Lanka	587	0.38	66.63
Sweden	2,284	1.49	68.12
Switzerland	1,086	0.71	68.83
Thailand	3,389	2.22	71.05
Turkey	984	0.64	71.69
United Kingdom	6,427	4.2	75.89
United States	36,880	24.11	100
Total	152,982	100	

Table 1.2. Means of Country Level Variables across Years

This table reports a description of the sample by country of incorporation. Legal Origin is defined by LLSV(1998). *Revised anti-director index* and *Anti self-dealing index* are obtained from Djankov, LaPorta, Lopez-de-Silanes, and Shleifer (2008). Creditor rights are obtained from Djankov, Hart, McLiesh, and Shleifer (2008). *Rule of Law* is obtained from International Country Risk Guide (ICRG). Lerner Index is a measure of market power in the banking market and is obtained from World Bank database. Higher values of the Lerner index indicate less bank competition.

Country	N	Legal Origin	Revised anti-director index	Creditor rights	Rule of Law (RL)	Lerner Index
Argentina	276	French	2	1	0.44	0.24
Australia	7511	English	4	3	0.93	0.11
Austria	338	German	2.5	3	1.00	0.16
Belgium	477	French	3	2	0.83	0.24
Brazil	1186	French	5	1	0.34	0.19
Canada	6136	English	4	1	0.95	0.27
Chile	450	French	4	2	0.81	0.28
China	15169	German	1	2	0.67	0.35
Denmark	850	Scandinavian	4	3	1.00	0.27
Egypt	479	French	3	2	0.56	0.18
Finland	972	Scandinavian	3.5	1	1.00	-0.09
France	3187	French	3.5	0	0.82	0.18
Germany	3534	German	3.5	3	0.83	0.1
Greece	1259	French	2	1	0.73	0.21
Hong Kong	705	English	5	4	0.82	0.33
India	10289	English	5	4	0.67	0.25
Ireland	357	English	5	1	1.00	0.19
Israel	977	English	4	3	0.83	0.19
Italy	787	French	2	2	0.65	0.25
Japan	25963	German	4.5	2	0.83	0.33
Jordan	710	French	1	1	0.67	0.32
Malaysia	5696	English	5	3	0.65	0.3
Mexico	674	French	3	0	0.37	.
Morocco	222	French	2	1	0.85	0.23
Netherlands	714	French	2.5	3	1.00	0.18
New Zealand	542	English	4	4	0.93	0.16
Nigeria	302	English	4	.	0.34	0.21
Norway	665	Scandinavian	3.5	2	1.00	0.22
Peru	179	French	4	0	0.51	0.32
Philippines	645	French	4	1	0.40	0.2
Portugal	200	French	2.5	1	0.83	0.19
Russia	206	French	4	2	0.58	0.16
Singapore	2686	English	5	3	0.84	0.78

South Africa	1400	English	5	3	0.39	0.18
South Korea	7301	German	4.5	3	0.83	0.32
Sri Lanka	585	English	4	2	0.45	0.2
Sweden	2301	Scandinavian	3.5	1	1.00	0.31
Switzerland	1140	German	3	1	0.83	0.21
Thailand	3393	English	4	2	0.44	0.18
Turkey	984	French	3	2	0.67	0.4
United Kingdom	6479	English	5	4	0.90	0.24
United States	36248	English	3	1	0.83	0.28

Table 1.3. Summary Statistics

This table provides descriptive statistics for key variables in the cross country sample of 16,941non-financial firms and 152,982 observations. The sample contains spans over 42 countries during the period between 2002 and 2014. *Hasline* is an indicator variable that take the value of 1 when a firm has either used or unused line of credit and zero otherwise. *Total line/at* is the ratio of the summation of used and unused line of credit over total assets. *Unused line/at* is the ratio of the undrawn portion of the line of credit over total assets. *Used line/at* is the used portion of the line of credit over total assets. *Total line / (total line + Cash)* is the ratio of the total line of credit over total liquidity defined as summation of total line of credit plus cash. *Unused line / (unused line + cash)* is a measure of available liquidity to the firm and is defined as the unused portion of line of credit over the summation of cash and unused line of credit. *Cash Flows* is the ratio of EBITDA over net assets calculated as total assets minus cash and marketable securities. *Tangibles* is the ratio of tangible assets over net assets. *Size deciles* are calculated based on total assets within each country and fiscal year. *Net Worth* is cash adjusted and calculated as total assets minus total liabilities minus cash divided by net assets. *Market to book* is also cash adjusted and calculated as total assets plus market value of equity minus book value of equity minus cash divided by net assets. *NWC* is net working capital divided by net assets. R&D is the ratio of R&D expense over sales and it is set equal to zero if R&D expense is missing. Cash Flow Vol. is the median of the standard deviation of cash flows over the past 10 years by country, fiscal year, and 2-digit industry SIC codes. Sales Vol. is the median of the standard deviation of sales over net assets ratio over the past 10 years by country, fiscal year, and 2-digit industry SIC codes.

Variable	N	Mean	Median	S.D.
Hasline	152562	0.537	1.000	0.499
total line/at	152562	0.079	0.007	0.145
unused line / at	152562	0.043	0.000	0.112
used line/at	152562	0.034	0.000	0.074
total line /(total line + Cash)	152370	0.289	0.047	0.352
unused line / (unused line+cash)	152272	0.188	0.000	0.305
Cash Flows	152789	0.029	0.097	1.055
Leverage	155662	0.249	0.215	0.22
Tangibles	152943	0.350	0.317	0.242
size decile	152982	7.373	7.265	3.095
Net Worth	152968	0.368	0.419	0.449
Market to book	149335	2.228	1.211	8.935
NWC	152968	0.005	0.025	0.303
R&D	152982	0.121	0.000	0.951
Cash Flow Vol.	122035	0.107	0.039	0.366
Sales Vol.	136248	0.135	0.118	0.097
High Competition	152982	0.459	0.000	0.498
Revised anti-director index	152982	3.658	4.000	1.168
Creditor rights index	152680	2.042	2.000	1.055
Rule of Law	152982	0.790	0.833	0.137
Country Governance Index	152680	10.799	10.000	2.375

Table 1.4. Correlation Matrix

This table presents the correlation matrix for the sample. Pearson correlation coefficients for all independent variables as well as the country level governance variables are presented.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.Hasline	1.00																
2. total line/(tot line+C)	0.75	1.00															
3. unused / (unused +cash)	0.58	0.79	1.00														
4. Cash Flows	0.10	0.08	0.07	1.00													
5. Tangibles	-0.03	0.01	-0.02	0.01	1.00												
6. Size decile	-0.07	-0.10	-0.09	0.17	0.13	1.00											
7. Net Worth	0.03	0.01	0.04	0.27	0.07	0.07	1.00										
8. Market to Book	-0.06	-0.07	-0.05	-0.15	-0.03	-0.11	-0.20	1.00									
9. NWC	0.10	0.11	0.14	0.25	-0.18	0.07	0.70	-0.17	1.00								
10. R&D	-0.12	-0.10	-0.08	-0.44	-0.03	-0.16	-0.32	0.21	-0.29	1.00							
11. Cash Flow Vol.	-0.11	-0.10	-0.08	-0.20	-0.05	-0.23	-0.23	0.16	-0.23	0.27	1.00						
12. Sales Vol.	0.16	0.13	0.12	0.01	-0.22	-0.23	-0.07	0.01	0.00	0.00	0.05	1.00					
13. Common law	0.33	0.36	0.29	-0.07	-0.01	-0.46	-0.06	0.05	-0.02	0.10	0.14	0.25	1.00				
14. Lerner Index	-0.11	-0.12	-0.06	0.01	0.02	0.08	0.01	0.00	-0.01	-0.02	-0.03	-0.03	-0.05	1.00			
15. Revised Anti Dir	0.06	0.09	-0.02	0.04	-0.01	0.21	0.05	-0.06	0.08	-0.04	-0.04	-0.03	0.21	-0.04	1.00		
16. creditor rights	-0.02	0.00	-0.22	0.06	0.06	0.13	0.10	-0.07	0.04	-0.09	-0.08	-0.01	0.08	-0.09	0.48	1.00	
17. Rule of Law	0.04	0.07	0.24	-0.05	-0.10	-0.16	-0.06	-0.01	-0.02	0.07	0.08	-0.01	0.04	0.07	0.11	-0.18	1.00

Table 1.5. Bank Lines of Credit and Firm Characteristics

This table presents the regression results that closely follows the regressions presented in Sufi (2009). These regressions relate the liquidity provided by lines of credit to various lagged firm characteristics. Model (1) presents the estimated marginal effects of lagged firm characteristics on the probability of having a line of credit from maximum likelihood probit estimation. Columns 2 and 3 present the estimated coefficients of the OLS regressions that relate two different measures of lines of credit to total liquidity to various lagged firm characteristics. All regressions include Country, year, and 1-digit SIC code indicator variables. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Probit (hasline)	(2) OLS totalline/(totalline+cash)	(3) OLS unusedline/(unusedline+cash)
Cash Flow $_{t-1}$	0.104***	0.0420***	0.0355***
	(0.0142)	(0.00743)	(0.00587)
Tangibles $_{t-1}$	-0.0449***	0.0375***	0.0196**
	(0.0163)	(0.0111)	(0.00937)
Size Decile $_{t-1}$	0.0396***	0.0161***	0.0194***
	(0.00172)	(0.00105)	(0.000863)
Net worth $_{t-1}$	-0.0343***	-0.0213***	0.0245***
	(0.0119)	(0.00718)	(0.00543)
Market to Book $_{t-1}$	-0.00229*	-0.00245**	-0.00172**
	(0.00120)	(0.00117)	(0.000704)
Sales vol. $_{t-1}$	0.250***	0.0586*	0.0130
	(0.0426)	(0.0307)	(0.0234)
Cash Flow vol. $_{t-1}$	-0.398***	-0.156***	-0.120***
	(0.0655)	(0.0332)	(0.0259)
Constant		-0.0200	-0.146***
		(0.0309)	(0.0185)
Observations	103,141	103,084	103,039
R-squared	0.1992	0.239	0.328

Table 1.6. Bank Competition and Use of Lines of Credit

This table presents the regression results that show the effect of increased banking competition on the use of lines of credit. High Competition is an indicator variable which equals to one if the Lerner Index of a country is below median in a fiscal year. Lerner Index is a measure of market power in the banking market. It compares output pricing and marginal costs (that is, markup). An increase in the Lerner index indicates a deterioration of the competitive conduct of financial intermediaries. Lerner Index estimations follow the methodology described in Demirgüç-Kunt and Martínez Pería (2010) and is obtained from the World Bank Database. All regressions include Country, year, and 1-digit SIC code indicator variables. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Probit	Probit	OLS	OLS	OLS	OLS
VARIABLES	hasline	hasline	total/(total+cash)	total/(total+cash)	unused/(unused+cash)	unused/(unused+cash)
High Competition	0.0261***	0.00940**	0.0222***	0.0183***	0.0166***	0.0110***
	(0.00369)	(0.00445)	(0.00211)	(0.00242)	(0.00176)	(0.00198)
Cash Flow $_{t-1}$		0.105***		0.0422***		0.0356***
		(0.0142)		(0.00742)		(0.00586)
Tangibles $_{t-1}$		-0.0447***		0.0380***		0.0199**
		(0.0163)		(0.0111)		(0.00937)
Size Decile $_{t-1}$		0.0396***		0.0162***		0.0194***
		(0.00172)		(0.00104)		(0.000863)
Net worth $_{t-1}$		-0.0344***		-0.0215***		0.0243***
		(0.0119)		(0.00717)		(0.00542)
Market to Book $_{t-1}$		-0.00228*		-0.00243**		-0.00171**
		(0.00120)		(0.00117)		(0.000704)
Sales vol. $_{t-1}$		0.251***		0.0600*		0.0138
		(0.0426)		(0.0309)		(0.0235)
Cash Flow vol. $_{t-1}$		-0.398***		-0.156***		-0.120***
		(0.0655)		(0.0330)		(0.0258)
Constant			-0.00602	-0.0410	-0.0564***	-0.153***
			(0.0241)	(0.0310)	(0.0124)	(0.0186)
Observations	152,522	103,141	152,330	103,084	152,232	103,039
R-squared	0.1411	0.1992	0.190	0.239	0.253	0.328

Table 1.7. Shareholder Rights and Use of Lines of Credit

This table presents the regression results that show the effect of shareholder rights on the use of lines of credit. *Revised anti-director index* is obtained from Djankov, LaPorta, Lopez-de-Silanes, and Shleifer (2008). This is Aggregate index of shareholder rights. The index is formed by summing: (1) vote by mail; (2) shares not deposited; (3) cumulative voting; (4) oppressed minority; (5) pre-emptive rights; and (6) capital to call a meeting. All regressions include Country, year, and 1-digit SIC code indicator variables. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Probit hasline	(2) Probit hasline	(3) OLS total/(total+cash)	(4) OLS total/(total+cash)	(5) OLS unused/(unused+cash)	(6) OLS unused/(unused+cash)
Revised Anti director Index	0.155***	0.189***	0.0864***	0.116***	0.0981***	0.125***
	(0.0300)	(0.0592)	(0.0183)	(0.0286)	(0.0163)	(0.0246)
Cash Flow $_{t-1}$		0.104***		0.0420***		0.0355***
		(0.0142)		(0.00743)		(0.00587)
Tangibles $_{t-1}$		-0.0449***		0.0375***		0.0196**
		(0.0163)		(0.0111)		(0.00937)
Size Decile $_{t-1}$		0.0396***		0.0161***		0.0194***
		(0.00172)		(0.00105)		(0.000863)
Net worth $_{t-1}$		-0.0343***		-0.0213***		0.0245***
		(0.0119)		(0.00718)		(0.00543)
Market to Book $_{t-1}$		-0.00229*		-0.00245**		-0.00172**
		(0.00120)		(0.00117)		(0.000704)
Sales vol. $_{t-1}$		0.250***		0.0586*		0.0130
		(0.0426)		(0.0307)		(0.0234)
Cash Flow vol. $_{t-1}$		-0.398***		-0.156***		-0.120***
		(0.0655)		(0.0332)		(0.0259)
Constant			-0.170***	-0.252***	-0.246***	-0.396***
			(0.0511)	(0.0726)	(0.0370)	(0.0551)
Observations	152,522	103,141	152,330	103,084	152,232	103,039
R-squared	0.1408	0.1992	0.189	0.239	0.253	0.328

Table 1.8. Creditor Rights and Use of Lines of Credit

This table presents the regression results that show the effect of creditor rights on the use of lines of credit. *Creditor rights* is an index aggregating creditor rights, following La Porta et al. (1998). A score of one is assigned when each of the following rights of secured lenders is defined in laws and regulations: First, there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization. Second, secured creditors are able to seize their collateral after the reorganization petition is approved, i.e. there is no "automatic stay" or "asset freeze." Third, secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as government or workers. Finally, if management does not retain administration of its property pending the resolution of the reorganization. The index ranges from 0 (weak creditor rights) to 4 (strong creditor rights). All regressions include Country, year, and 1-digit SIC code indicator variables. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Probit	Probit	OLS	OLS	OLS	OLS
VARIABLES	hasline	hasline	total/(total+cash)	total/(total+cash)	unused/(unused+cash)	unused/(unused+cash)
Creditor Rights	0.0987***	0.109***	0.133***	0.152***	0.123***	0.147***
	(0.0252)	(0.0302)	(0.0163)	(0.0179)	(0.0140)	(0.0159)
Cash Flow $_{t-1}$		0.105***		0.0420***		0.0355***
		(0.0142)		(0.00742)		(0.00586)
Tangibles $_{t-1}$		-0.0441***		0.0378***		0.0195**
		(0.0164)		(0.0111)		(0.00939)
Size Decile $_{t-1}$		0.0396***		0.0162***		0.0194***
		(0.00172)		(0.00105)		(0.000865)
Net worth $_{t-1}$		-0.0339***		-0.0210***		0.0245***
		(0.0119)		(0.00718)		(0.00543)
Market to Book $_{t-1}$		-0.00228*		-0.00245**		-0.00172**
		(0.00120)		(0.00117)		(0.000705)
Sales vol. $_{t-1}$		0.247***		0.0561*		0.0128
		(0.0427)		(0.0306)		(0.0235)
Cash Flow vol. $_{t-1}$		-0.398***		-0.156***		-0.120***
		(0.0655)		(0.0332)		(0.0259)
Constant			-0.131***	-0.192***	-0.173***	-0.293***
			(0.0346)	(0.0420)	(0.0206)	(0.0272)
Observations	152,220	102,970	152,029	102,913	151,933	102,870
R-squared	0.1411	0.1994	0.189	0.239	0.252	0.327

Table 1.9. Rule of Law and Use of Lines of Credit

This table presents the regression results that show the effect of rule of law on the use of lines of credit. *Rule of Law* captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5. the data is obtained from the World Bank Database and is based on the methodology in Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi (2010). All regressions include Country, year, and 1-digit SIC code indicator variables. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Probit hasline	(2) Probit hasline	(3) OLS total/(total+cash)	(4) OLS total/(total+cash)	(5) OLS unused/(unused+cash)	(6) OLS unused/(unused+cash)
Rule of Law	0.673***	1.762***	0.112***	0.366***	0.0134	0.0291
	(0.0491)	(0.0904)	(0.0236)	(0.0391)	(0.0165)	(0.0250)
Cash Flow $_{t-1}$		0.104***		0.0419***		0.0355***
		(0.0142)		(0.00743)		(0.00587)
Tangibles $_{t-1}$		-0.0520***		0.0362***		0.0195**
		(0.0164)		(0.0111)		(0.00937)
Size Decile $_{t-1}$		0.0400***		0.0162***		0.0194***
		(0.00172)		(0.00105)		(0.000863)
Net worth $_{t-1}$		-0.0329***		-0.0208***		0.0245***
		(0.0119)		(0.00717)		(0.00543)
Market to Book $_{t-1}$		-0.00230**		-0.00245**		-0.00172**
		(0.00117)		(0.00117)		(0.000704)
Sales vol. $_{t-1}$		0.239***		0.0568*		0.0129
		(0.0426)		(0.0306)		(0.0234)
Cash Flow vol. $_{t-1}$		-0.399***		-0.156***		-0.120***
		(0.0653)		(0.0332)		(0.0259)
Constant			-0.0419	-0.164***	-0.0553***	-0.157***
			(0.0259)	(0.0349)	(0.0138)	(0.0211)
Observations	152,522	103,141	152,330	103,084	152,232	103,039
R-squared	0.1423	0.2046	0.189	0.239	0.253	0.328

Table 1.10. All Country Level Variables and Use of Line of Credit

This table reports the results of the main regressions using all country level variables together. All regressions include Country, year, and 1-digit SIC code indicator variables. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Probit hasline	(2) OLS total/(total+cash)	(3) OLS unused/(unused+cash)
High Competition	0.0189***	0.0207***	0.0113***
	(0.00440)	(0.00241)	(0.00196)
Revised Anti-director Index	-0.172***	0.0360	0.116***
	(0.0621)	(0.0296)	(0.0251)
Creditor Rights	-0.0288	-0.0646**	-0.0848***
	(0.0580)	(0.0284)	(0.0253)
Rule of Law	1.789***	0.401***	0.0471*
	(0.0905)	(0.0389)	(0.0245)
Cash Flow $_{t-1}$	0.104***	0.0421***	0.0356***
	(0.0143)	(0.00742)	(0.00586)
Tangibles $_{t-1}$	-0.0507***	0.0370***	0.0197**
	(0.0164)	(0.0111)	(0.00939)
Size Decile $_{t-1}$	0.0400***	0.0162***	0.0194***
	(0.00173)	(0.00105)	(0.000864)
Net worth $_{t-1}$	-0.0326***	-0.0208***	0.0244***
	(0.0119)	(0.00716)	(0.00542)
Market to Book $_{t-1}$	-0.00229**	-0.00243**	-0.00171**
	(0.00117)	(0.00116)	(0.000704)
Sales vol. $_{t-1}$	0.237***	0.0557*	0.0134
	(0.0428)	(0.0305)	(0.0236)
Cash Flow vol. $_{t-1}$	-0.397***	-0.156***	-0.120***
	(0.0652)	(0.0330)	(0.0258)
Constant		-0.224***	-0.321***
		(0.0562)	(0.0370)
Observations	102,970	102,913	102,870
R-squared	0.205	0.240	0.328

Table 1.11. Bank Competition, Governance, and Use of Lines of Credit

This table reports the results of the main regressions using all bank competition and governance variables. *Country Governance* is an index aggregating *Creditor Rights*, *Revised Anti-takeover index*, and a quintile rank of *Rule of Law* variable and it ranges between 3 and 15. All regressions include Country, year, and 1-digit SIC code indicator variables. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	(1) Probit (hasline)	(2) OLS totalline/(totalline+cash)	(3) OLS unusedline/(unusedline+cash)
High Competition	0.0126***	0.0189***	0.0110***
	(0.00443)	(0.00241)	(0.00197)
Country Governance	0.0386***	0.00853***	-0.000823
	(0.00477)	(0.00273)	(0.00263)
Cash Flow $_{t-1}$	0.105***	0.0422***	0.0356***
	(0.0142)	(0.00742)	(0.00586)
Tangibles $_{t-1}$	-0.0457***	0.0380***	0.0198**
	(0.0164)	(0.0111)	(0.00939)
Size Decile $_{t-1}$	0.0395***	0.0162***	0.0194***
	(0.00172)	(0.00105)	(0.000864)
Net worth $_{t-1}$	-0.0338***	-0.0212***	0.0243***
	(0.0119)	(0.00717)	(0.00542)
Market to Book $_{t-1}$	-0.00230*	-0.00244**	-0.00171**
	(0.00120)	(0.00117)	(0.000705)
Sales vol. $_{t-1}$	0.246***	0.0572*	0.0137
	(0.0428)	(0.0307)	(0.0236)
Cash Flow vol. $_{t-1}$	-0.398***	-0.156***	-0.120***
	(0.0656)	(0.0330)	(0.0258)
Constant		-0.110***	-0.148***
		(0.0359)	(0.0255)
Observations	102,970	102,913	102,870
R-squared	0.2002	0.240	0.328

Table 1.12. Robustness Tests

The dependent variable in this table is an indicator variable, Hasline, which is equal to one if firm has line of credit and zero otherwise. Model (1) excludes the US firms from the sample. Model (2) is estimated only for top 7 industrialized nations. Model (3) estimated only for developed countries as defined by United Nations. Model (4) focuses on the Legal Origin of the country and is estimated for countries with common law legal origin. Finally, Model (5) is estimated over the period of financial crisis, 2008 and 2009. All regressions include Country, year, and 1-digit SIC code indicator variables. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Exclude US	G7 Countries	Developed	Legal Origin	crisis
Panel A: Probit Regression, Dependent Variable Hasline					
High Competition	0.0126***	0.0413***	0.0377***	-0.0102*	0.0165**
	(0.00443)	(0.00574)	(0.00498)	(0.00616)	(0.00767)
Country Governance Index	0.0386***	-0.0109**	-0.0109**	0.000572	-0.00892
	(0.00477)	(0.00542)	(0.00530)	(0.00450)	(0.00544)
Observations	102,970	58,486	69,686	55,911	18,671
R squared	0.2002	0.2531	0.2429	0.1761	0.1969
Panel B: OLS Regression, Dependent Variable Total Line/(totalLine+cash)					
High Competition	0.0189***	0.0219***	0.0226***	0.0243***	0.000145
	(0.00241)	(0.00285)	(0.00258)	(0.00449)	(0.0143)
Country Governance Index	0.00853***	-0.00106	-0.00109	0.00102	0.0232***
	(0.00273)	(0.00302)	(0.00299)	(0.00306)	(0.00632)
Observations	102,913	58,457	69,644	55,865	17,607
R-squared	0.240	0.297	0.273	0.156	0.229
Panel C: OLS Regression, Dependent Variable unsued Line/(unusedLine+cash)					
High Competition	0.0110***	0.0158***	0.0158***	0.00743**	-0.00246
	(0.00197)	(0.00267)	(0.00239)	(0.00319)	(0.0120)
Country Governance Index	-0.000823	-0.00119	-0.00134	-2.76e-05	0.0184***
	(0.00263)	(0.00299)	(0.00297)	(0.00299)	(0.00496)
Observations	102,870	58,432	69,609	55,824	17,603
R-squared	0.328	0.295	0.274	0.317	0.333

Table 1.13. Alternative Dependent Variables and Use of Lines of Credit

The dependent variable in Models (1) and (4) is unused line/NA which is ratio of unused portion of line of credit over net assets. net assets is defined as total assets minus cash and marketable securities. The dependent variable in Models (2) and (5) is total line/NA which is ratio of total of line of credit over net assets. The dependent variable in Models (3) and (6) is used line/NA which is ratio of drawn portion of line of credit over net assets. All regressions include Country, year, and 1-digit SIC code indicator variables. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	unused line/NA	total line/ NA	usedline/ NA	unused line/ NA	total line/ NA	usedline/ NA
High Competition				0.00311***	0.00829***	0.00486***
				(0.000820)	(0.00110)	(0.000603)
Country Governance Index				0.00181**	0.00608***	0.00413***
				(0.000752)	(0.00110)	(0.000697)
Cash Flow $_{t-1}$	0.0152***	0.0241***	0.00782***	0.0152***	0.0242***	0.00787***
	(0.00209)	(0.00350)	(0.00143)	(0.00209)	(0.00350)	(0.00143)
Tangibles $_{t-1}$	-0.0191***	-0.0249***	-0.00519*	-0.0191***	-0.0250***	-0.00531*
	(0.00280)	(0.00466)	(0.00279)	(0.00280)	(0.00467)	(0.00278)
Size Decile $_{t-1}$	0.00228***	0.00114***	-0.000893***	0.00228***	0.00113***	-0.000902***
	(0.000282)	(0.000417)	(0.000218)	(0.000282)	(0.000417)	(0.000217)
Net worth $_{t-1}$	0.00426**	-0.0217***	-0.0233***	0.00423**	-0.0216***	-0.0232***
	(0.00182)	(0.00324)	(0.00175)	(0.00182)	(0.00324)	(0.00174)
Market to Book $_{t-1}$	-0.000174**	-0.000451	-0.000277	-0.000173**	-0.000448	-0.000276
	(7.39e-05)	(0.000312)	(0.000236)	(7.38e-05)	(0.000312)	(0.000235)
Sales vol. $_{t-1}$	0.0337***	0.0544***	0.0201**	0.0337***	0.0528***	0.0183**
	(0.00995)	(0.0169)	(0.00934)	(0.00999)	(0.0167)	(0.00914)
Cash Flow vol. $_{t-1}$	-0.0226***	-0.0456***	-0.0226***	-0.0225***	-0.0453***	-0.0224***
	(0.00513)	(0.00987)	(0.00480)	(0.00510)	(0.00980)	(0.00476)
Constant	-0.0191***	0.00765	0.0226***	-0.0347***	-0.0422***	-0.0104
	(0.00466)	(0.00762)	(0.00506)	(0.00692)	(0.0106)	(0.00684)
Observations	103,138	103,138	103,138	102,967	102,967	102,967
R-squared	0.178	0.145	0.114	0.178	0.145	0.114

Appendix 1.1. Variable Descriptions

The following are the various control variables that will be used in testing our hypotheses in first essay.

Variable	Description	Data Source
Hasline	An indicator variable that take the value of 1 when a firm has either used or unused line of credit and zero otherwise	Capital IQ
Total line/at	The ratio of the summation of used and unused line of credit over total assets	Capital IQ and Compustat Global
Unused line/at	The ratio of the undrawn portion of the line of credit over total assets	Capital IQ and Compustat Global
Used line/at	The used portion of the line of credit over total assets	Capital IQ and Compustat Global
Total line / (total line + Cash)	The ratio of the total line of credit over total liquidity defined as summation of total line of credit plus cash	Capital IQ and Compustat Global
Unused line / (unused line + cash)	The unused portion of line of credit over the summation of cash and unused line of credit	Capital IQ and Compustat Global
unused line/NA	Ratio of unused portion of line of credit over net assets. Net assets is defined as total assets minus cash and marketable securities.	Capital IQ and Compustat Global
total line/NA	Ratio of total of line of credit over net assets.	Capital IQ and Compustat Global
used line/NA	ratio of drawn portion of line of credit over net assets	Capital IQ and Compustat Global
Cash Flows	The ratio of EBITDA over net assets calculated as total assets minus cash and marketable securities.	Compustat Global
Tangibles	The ratio of tangible assets over net assets.	Compustat Global
Size deciles	This variable is calculated based on total assets within each country and fiscal year	Compustat Global
Net Worth	Cash adjusted and calculated as total assets minus total liabilities minus cash divided by net assets.	Compustat Global
Market to book	Cash adjusted and calculated as total assets plus market value of equity minus book value of equity minus cash divided by net assets	Compustat Global
Cash Flow Vol.	The median of the standard deviation of cash flows over the past 10 years by country, fiscal year, and 2-digit industry SIC codes	Compustat Global
Sales Vol.	The median of the standard deviation of sales over net assets ratio over the past 10 years by country, fiscal year, and 2-digit industry SIC codes.	Compustat Global
High Competition	An indicator variable which equals to one if the Lerner Index of a country is below median in a Fiscal year. Lerner Index is a measure of market power in the banking market.	World Bank Database
Revised anti-director index	This is Aggregate index of shareholder rights. The index is formed by summing: (1) vote by mail; (2) shares not deposited; (3) cumulative voting; (4) oppressed minority; (5) pre-emptive rights; and (6) capital to call a meeting.	Djankov, LaPorta, Lopez-de-Silanes, and Shleifer (2008)
Creditor rights	An index aggregating creditor rights, following La Porta et al. (1998). A score of one is assigned when each of the following rights of secured lenders is defined in laws and regulations	Djankov, Hart, McLiesh, and Shleifer (2008)
Rule of Law	Captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Bank Database
Country Governance	An index aggregating Creditor Rights, Revised Anti-takeover index, and a quintile rank of Rule of Law variable and it ranges between 3 and 15.	

CHAPTER II

THE SUBSTITUTABILITY OF CASH AND LINES OF CREDIT: A SHAREHOLDER PERSPECTIVE

Introduction and Motivation

That firms need cash for liquidity purposes is undisputed. Also undisputed is the potential for agency problems, especially when "excessive" cash balances are held. Jensen (1986) Free Cash Flow (FCF) hypothesis advocates that shareholders limit managers' access to free cash flow to reduce the agency problems related to the way they spend it. The idea behind this hypothesis is to provide enough cash for managers to take on positive NPV projects, while not providing extra cash that allows them to fund projects for the purposes of empire building or self-interest. In other words, agency theory advocates that without strict monitoring and control threats, it is difficult to convince self-interested managers to payout the excess cash to shareholders.

Several papers investigated the agency problems associated with the excessive cash holdings of firms, both in U.S. and international markets (Jensen and Meckling (1976), Jensen (1986), Denis and Sibilikov (2010), Dittmar and Mahrt-Smith (2007)). Given that cash reserves are easily accessible by managers and much of their use is discretionary, it is not surprising that the recent growth in cash holdings has generated significant attention from researchers, the financial press, and large investors. With respect to agency problems and cash holdings, existing research documents significant cross sectional differences in the level and value of cash holdings of firms with different levels of corporate governance effectiveness.

With the significant potential for agency problems that comes with the excessive level of cash holdings among the firms as an internal source of liquidity, it only makes sense to look more broadly into the liquidity management of the firms and investigate the effect of external sources of liquidity, especially lines of credit. Lines of credit are pre-committed loans to firms that allow them to withdraw funds from a bank account, with pre-negotiated terms. Figure 1 shows the average level of cash holdings, undrawn portion, and the drawn portion of the line of credit for an average U.S. firm between 2002 and 2014. Like cash holdings, the undrawn portion of the lines of credit has increased significantly over this period from about $100 million for an average firm to about $300 million. More importantly, one should notice that the level of undrawn lines of credit is about half of the level of cash holdings, especially in recent years. Overall, this figure shows the significant amount and increased popularity of lines of credit in the liquidity management of the US firms.

[Insert Figure 1 Here]

Opler, Pinkowitz, Stulz, and Williamson (1999) and Bates, Kahle, and Stulz (2009) study the determinants of cash holdings and state that the main reason for U.S. firms to hold excessive amounts of cash is the precautionary motive. In other words, firms hold cash to make sure they are able to invest in positive NPV projects when there is a negative shock to their cash flows.

Lines of credit provide precisely the same benefit without the potential for agency problems. These intruments provide firms with liquidity only when valuable investment projects arise, which helps overcome the free cash flow agency problem associated with the cash holdings. According to theory, lines of credit should resolve the same capital market frictions that forces firms to hoard cash as a precautionary motive (Harford (1999), Holmstrom and Triole (1998)). However, the extant literature on cash holdings do not provide a good answer on why firms may use cash instead of lines of credit in their liquidity management.

Although there is some evidence that points to the existence of the agency problem due to cash holdings in a firm, there is not yet a consensus about this issue. For example Bates et al. (2009) find no consistent evidence that the agency problems contribute to the increase in cash holdings in recent years. Harford, Mansi, and Maxwell (2008) show that U.S. firms with weaker governance hold lower levels of cash holdings. These results are obviously in stark contrast to those of Dittmar, Mahrt-Smith, and Servaes (2003), Pinkowitz, Stulz, and Williamson (2006), and Dittmar and Mahrt-Smith (2007). The main drawback of all these papers is that they focus on cash holdings as the only source of liquidity for the firm. However, as Sufi (2009) suggests, introducing lines of credit to the analysis of liquidity management provides a better picture on how firms decide about their liquidity management.

Assuming that managers make value maximizing decisions that benefit shareholders, they should choose a combination of cash and lines of credit that maximize shareholder value. At the same time, agency theory argues that managers and shareholders may have a different view on the costs and benefits of each source of liquidity. As I mentioned above, it is a well-known fact that U.S. firms hold too much cash. Consequently, when valuing a firm, shareholders assign a value on these cash holdings based on their assessment of the probable uses of the funds. Faulkender and Wang (2006), Pinkowtiz et al. (2006), and Dittmar and Mahrt-Smith (2006) estimate the value shareholders assign to cash holdings and they find that cash is more valuable if a firm is constrained, poorly governed, or located in a poor investor protection environment.

Therefore, the natural question would be: since lines of credit is a major source of liquidity for firms, what value investors assign to each additional dollar of lines of credit? Controlling for the existence of lines of credit, what value investors place on the cash holdings of the firm? In this study, I attempt to answer these questions and estimate the value that investors assign to these two different sources of liquidity for the firm.

While the effect of lines of credit have been studied in the finance literature, most of these studies have dealt with the level of lines of credit of corporations and mostly use either small samples or survey methodology (Sufi (2009), Lins, Servaes, Tufano (2010), Acharya, Almeida, Ippolito, and Prez (2014), Campello, Giambona, Graham, and Harvey (2011), etc.). These studies investigate why firms have lines of credit and investigate the determinants of the choice between cash holdings and lines of credit. However, the focus of our study is to find the value investors assign to each of these sources and see if the existence of lines of credit mitigate the agency problem caused by holding excess cash. In other words, if there is a potential for agency problems in a firm, we expect to see that shareholders assign a higher value to lines of credit compared to cash holdings.

In a similar paper, Flannery and Lockhart (2009) also examine the marginal value of lines of credit, focusing mostly on the effect of transaction costs on the choice between cash and lines of credit. Using the methodology of Faulkender and Wang (2006), they find that the value of additional dollar of cash is less for unconstrained firms which is driven by unconstrained firms with access to lines of credit. Shareholders of unconstrained firms without access to lines of credit, value marginal changes in cash holdings the same way the shareholders of constrained firms do. They also find that access to lines of credit is like cash for unconstrained firms, therefore, shareholders value the changes in the amount of lines of credit, the same as the changes in cash holdings. In contrast, the goal of our study is to investigate, in the presence of agency problems, how the value of cash holdings and lines of credit varies with the quality of the corporate governance of the firms. Additionally, unlike extant studies that were constrained by

limited data on lines of credit and sample size, this study taps into lines of credit use information for a much more extensive sample of firms recently made available from S&P Capital IQ (CIQ).

Literature Review

In this section, first I present some evidence pertaining to the importance of cash holdings and its trend over the past few decades plus the perception of shareholders about the value of cash holdings. Next, I refer to some of the studies that investigate the liquidity of the firms by including the lines of credit in their analyses.

Cash Holdings and Value of Cash

In their seminal paper, Opler et al. (1999) study the determinants of corporate cash holdings and the optimal level of cash. In their tests of trade-off and pecking order theories of cash holdings they find that the trade-off theory cannot be dismissed as irrelevant and it makes important predictions. Therefore, they show that the determinants of the optimal level of cash holdings are empirically relevant. However, as it was pointed out by popular media and shareholder activists, there are some firms that hold dramatically more cash than what is suggested by the trade-off model.

Opler et al. (1999) suggest that these firms hold cash to ensure they will be able to take advantage of growth opportunities when their cash flows are low. They call this a precautionary motive for cash holdings. According to their results, firms with stronger growth opportunities, riskier cash flows, and restricted access to external sources of capital, hold more cash. They show that firms with large amount of excess cash, acquired it through the accumulation of internal funds and spending in new projects and acquisitions is only slightly higher for these firms.

Bates et al. (2009) examine how the cash holdings of the U.S. firms have changed since 1980s and whether this evolution can be explained by changes in the known determinants of cash holdings. They show that the increase in the cash holdings of the U.S. firms is concentrated

among the firms that do not pay dividends, firms in more recent IPO cohorts, and firms in industries with the most increase in industry volatility of cash flows. They show that the main reasons for the increase in the cash holdings are that inventories have fallen, cash flow risk for firms have increased, capital expenditures have fallen, and R&D expenditures have increased. According to the authors, precautionary motive would be a plausible explanation for this significant increase in the cash holdings.

Opler et al. (1999) state that firms that do well, accumulate more cash than one would expect with the static tradeoff theory where managers maximize shareholder wealth. However, the results of Almeida, Camplello, and Weisback (2004) suggest the opposite. They contrast financially constrained firms with their unconstrained counterparts in their cash holding behavior. According to authors, since market imperfections affect the investments of the constrained firms most, they actively manage their liquidity to maximize shareholder value. Therefore they offer a new measure of financial constraint, cash flow sensitivity of cash which shows the proportion of the cash flows saved by firms. They develop a model that suggests the propensity to save from cash inflows is positive for constrained firms, but it is indistinguishable from zero for unconstrained firms. Their results show that the set of constraint firms show positive and significant sensitivities of cash, while unconstrained firms show insignificant values.

Managers that maximize shareholder wealth, should choose the level of cash holdings such that the marginal benefit of cash equals the marginal cost of it. This is the tradeoff view of cash holdings as suggested by Opler et al. (1999). However, as advocated by the shareholder activists' disapproval of cash hoarding of the firms, managers and shareholders might view the costs and benefits of cash holdings differently. This difference in the views between managers and shareholders can be seen in the way shareholders value cash holdings.

Several papers (Faulkender and Wang (2006), Pinkowitz, Stulz, and Williamson (2006),

Pinkowitz and Williamson (2005), Dittmar and Mahrt-Smith (2007), etc.) attempt to quantify the value that investors assign to cash holdings of the firm. All these papers use the methodology of Fama and French (1998) to find the marginal value of each dollar of cash. Faulkender and Wang (2006) is one of the first studies that attempts to examine the cross sectional differences in the value of the cash holdings of the firms from the point of view of shareholders. In doing so, they argue the marginal value of each dollar of cash should vary conditional on how firms are planning to use that cash. Therefore, investors place a lower value on each additional dollar of cash if it is going to be used to pay down debt, and place a higher value on it if it is to be used for growth opportunities and payments to shareholders. In a more general finding, they show that this difference in the marginal value of cash is even more noticeable between financially constrained, especially those with growth opportunities, and unconstrained firms.

Pinkowitz and Williamson (2005) use similar methodology to study the cross sectional differences in the marginal value of cash, but with the focus on the investment opportunity set of the firms. Based on their results, shareholders of firms with better growth options and more volatile growth opportunities have a higher marginal value of cash compared to firms with fewer and more stable growth opportunities.

Apart from the transactions and precautionary motives, agency theory considerations may play a significant role in the choice and valuation of cash holdings. From an agency theory perspective (e.g., Jensen 1986), managers have a great preference for cash because it keeps the firm away from financial distress, and increases their discretion over its use. As mentioned in Opler et al. (1999), firms with greater managerial preference for risk reduction and discretion, hold more cash than would be required to maximize shareholder value. Further, Jensen (1986) demonstrates that firm with high levels of cash holdings are more likely to acquire other firms and their acquisitions are more likely to destroy shareholder value.

From a valuation perspective, Dittmar and Mahrt-Smith (2007) examine how corporate governance affects shareholder value by comparing the value and uses of cash among poorly and well governed firms. They focus on cash holdings mainly because it is easily accessible by managers with little scrutiny and much of its use is discretionary. Using the methodology of Faulkender and Wang (2006) they find that the marginal value of cash for a poorly governed firms is almost one half of those of well governed firms.

A few studies investigate the effect of agency problems in cash holdings in an international setting. Dittmar et al. (2003) argues that agency problem is a determining factor in cash holdings. In their sample of 45 countries, they find that firms in the countries with weak investor protection have twice as much cash as the firms in countries with good investor protection. Similar results can be found in Pinkowtiz et al. (2006) and Kalcheva and Lins (2007). Pinkowtiz et al. (2006) state that in poor investor protection countries a marginal dollar of cash holdings is valued significantly less than a marginal value of dollar in a good investor protection country. They also show that shareholders in poor investor protection countries would value dividends more than their counterparts in countries with good investor protection. In a similar paper, Kalcheva and Lins (2007) find that shareholders in countries with poor investor protection, and controlling for the cash holdings, firms have lower value and when managers pay dividends, the value is higher. However, in countries with strong shareholder protection, they find that the cash holdings are unrelated to the value of the firm which is consistent with the general empirical results for both U.S. and international markets.

At the same time there are other papers that find no evidence for the agency problems of cash holdings. For example, Opler et al. (1999) and Bates et al. (2009) find no consistent evidence that the agency problems are the motive for the increase in the level of cash holdings of U.S. firms and state the precautionary motive as the main cause for the increased cash holdings.

As noted earlier, cash is not the only source of liquidity and firms can also use lines of credit

for their liquidity. In the next section we discuss the literature with respect to lines of credit.

Lines of Credit

Lines of credit is one of the major sources of liquidity for U.S. Firms. According to the Survey of Terms of Business Lending released by Federal Reserve conducted in May 2015, 91.5% of all commercial and business loans in U.S. made by domestic banks are made under some sort of commitment (i.e. Lines of credit). Lines of credit is a credit agreement between a firm and a bank, which gives the firm the option to borrow up to a certain amount, over a certain period of time, for a fee, when there is a need for liquidity. Lines of credit are also called revolving credit agreements because they can be renewed at maturity upon request and financial health of the firm. According to the banking literature, the main difference between Lines of credit and conventional loans is that option embedded in lines of credit that allows the firm to withdraw funds from a pre-committed debt capacity (Boot, Thakor, and Udell (1987), Shokley and Thakor (1997), Holmtrom and Tirole (1998), Harford (1999), and Acharya et al. (2014)). As suggested by Boot et al. (1987) one of the major functions of lines of credit is that they can be used as a hedge against future interest rate hikes. Further, Holmtrom and Tirole (1998) argues that lines of credit could be a good and beneficial source of financing especially for firms which suffer from agency problems. Holmtrom and Tirole (1998) model suggest that given the costs and benefits, lines of credit are more efficient liquidity buffers than cash holdings.

Overall, the theoretical literature on the lines of credit suggests that the main reason for using lines of credit is to overcome capital market frictions by making sure that funds are available when a positive NPV project presents itself to the firm. Therefore, one can argue that at least theoretically, lines of credit should resolve the same capital market frictions that force firms to hoard cash as a precautionary motive. This means studying the liquidity management of a firm by only focusing on cash holdings, without considering other sources of liquidity such as lines of credit, would provide an incomplete picture about the liquidity of the firm.

Sufi (2006) is one of the more recent papers that study the effect of using lines of credit in the capital structure of the firms, which stirred the discussion about the impact of these instruments on the liquidity of the firm. According to Sufi, the extant literature on cash holdings do not provide a good answer on why firms may use cash instead of lines of credit in their liquidity management and he attempts to bridge this gap. Benefiting from the newly available loan data of LPC Dealscan and a hand collected detailed sample of firms' used and unused lines of credit, he examines the determinants of the choice between cash holdings and lines of credit and finds that lines of credit are viable source of liquidity, but only for firms that have and can maintain high cash flows. Whereas, firms with low cash flows use cash more often and are less likely to obtain a lines of credit.

Sufi also reports that, in the presence of financial distress, a firm uses lines of credit more than cash, only if it maintains a high level of cash flow. According to Shokely and Thakor (1997), almost all lines of credit have a "Material Adverse Change" clause as part of their structure, which gives the bank the right to alter the terms of the contract in the event of a violation of the clause. These restrictive covenants attached to the lines of credit make them weak substitutes for cash. Sufi uses decline in cash flows as a proxy for covenant violation, and shows that in his sample, a firm that violates a covenant loses access to 15 to 30% of its lines of credit capacity. This would translate to the fact that some firms might not have access to their lines of credit precisely when they need them. Therefore, according to Sufi (2009), access to lines of credit can be used as a new measure of financial constraints, and his results are in line with those of Almeida et al. (2004) that firms without access to lines of credit save more cash out of cash flows. As suggested by different models of liquidity (Shokley and Thakor (1997), and Holmstrom and Tirole (1998)) the main difference between lines of credit and corporate bonds is that lines of credit allow a firm to have access to a pre-committed debt capacity. However, the conditional nature of the lines of credit versus the unconditional availability of cash leads to the question of

whether cash holdings and lines of credit are used to fulfil different precautionary roles and hedge against different risks.

Lins et al. (2010) investigate whether and why firms from around the world use lines of credit versus cash for their corporate liquidity and they find that firms have higher amounts of lines of credit when CFOs have high future external funding needs or believe their equity is undervalued. Certainty of funding for acquisitions purposes is also an important factor in using lines of credit. In contrast, they state that the only prominent reason for holding non-operational (excess) cash is that it acts as a buffer against future cash flow shortfalls. Excess cash seems to hedge against the possibility that frictions prevent firms from funding its current operations in potential bad time. In other words, they find that lines of credit are mostly held for growth options while excess cash is held as a general purpose insurance. In line with the findings of Sufi (2009), less than half of CFOs in their survey believe that excess cash and lines of credit are substitutes. Those who consider them substitutes are the CFOs of more profitable firms, with fewer potential agency problems.

Acharya et al. (2014) propose and test a model of corporate liquidity management that is consistent with weak substitutability of lines of credit and cash, and use lines of credit not only for precautionary motives, but also for financing future growth options. In this model, they look at lines of credit as a form of monitored insurance. The idea behind their model is to explain liquidity seeking behavior of firms, especially in the presence of exogenous pressures. They argue that this monitored liquidity insurance controls the liquidity seeking behavior by firms through bank monitoring and credit line revocation. Acharya et al. (2014) find that bank monitoring and resulting revocations help control liquidity seeking behavior of firms insured by lines of credit. Similar to the results of Sufi (2009), they find that bank monitoring is more costly for firms that have greater arrival of growth opportunities in low cash flow states of nature and such firms prefer to use cash as their main source of liquidity. The cost of lines of credit are

therefore greater for firms with high liquidity risk which in turn is more likely to use cash instead of lines of credit.

Besides the factors such as the size, cash flows, payout policy, and credit ratings that are specific to each firm, macroeconomic factors can also have impacts on the use of lines of credit by firms. Acharya et al. (2013) examine whether a firm's exposure to aggregate risk – its beta- is a fundamental determinant of liquidity choice between cash and lines of credit. According to the authors, in the presence of liquidity premium, firms hold less cash and prefer lines of credit. However, the ability of banks to meet corporate liquidity needs depends on the extent to which firms are subject to correlated liquidity shocks. They also find that the relationship between beta and lines of credit only holds for constrained firms and these high beta firms pay significantly higher fees on their undrawn balances and also have higher spreads when drawing on their lines of credit. In further tests, they control for GDP and flight to quality effects, and find that an increase in VIX reduces lines of credit initiations and raises firm's cash reserves.

Similarly, Campello et al. (2011) conduct a survey study and use a macroeconomic event, the financial crisis, as a natural experiment to study the interaction of cash and lines of credit and their impact on managers' decisions such as capital investments, technology spending, and employment. In other words, they study how the behavior of the firm changes in times of limited credit and they find that during the financial crisis, small, private, non-investment grade and unprofitable firms had significantly higher lines of credit to Assets ratios and univariate tests show a negative correlation between lines of credit and cash. Unlike the survey of Lins et al. (2010) where most of CFOs do not look at cash and lines of credit as substitutes, they show firms with higher cash flows and more cash savings have fewer drawdowns in their lines during the crisis. This finding is consistent with a substitution effect between cash holdings and lines of credit during the time of crisis. The results of the survey also suggest that firms with higher cash holdings and strong cash flows, drew fewer funds from their lines of credit. Firms also choose not

to use lines of credit when they have enough internal funds, implying a cost wedge between these two sources of funds which suggests that firms with high internal liquidity, place a lower value for lines of credit. Finally, Campello et al. (2011) suggest that lines of credit ease the impact of financial crisis on investments and other real decisions such as technology and employment. Overall, the survey evidence on the use of lines of credit provide contradicting results which means the weak substitutability of cash and lines of credit is yet to become a stylized fact in the literature.

Another aspect of the financial management that can influence the use of lines of credit is corporate governance. Management and shareholders may have conflicting preferences between cash and lines of credit, therefore, the mix of these sources of liquidity is likely to be influenced by potential agency problems. For example, Yun (2009) investigates the impact of corporate governance on management's choice between cash and lines of credit by focusing on the passage of antitakeover laws in state of Delaware. The author shows that the state level changes in anti-takeover protection is linked to changes in the use of lines of credit relative to cash for firms incorporated in those states. Also the preference for cash relative to lines of credit is stronger for firms without large or institutional shareholders. According to Yun (2009), exogenous removal of takeover treats leads to a shift from lines of credit to cash for poorly governed firms, which is another reason that we should consider both lines of credit and cash when studying governance structure.

Transaction costs also affect the choice of liquidity for the firms. Flannery and Lockhart (2009) examine the characteristics of the lines of credit and changes in cash and find that the transactions costs are important for liquidity management and they show that transaction costs will consequently affect shareholder value. They extend the sample of Sufi (2009) available in Amir Sufi's website and find that firms without lines of credit hold twice as much cash as the firms with access to lines of credit. They find that Faulkender and Wang (2006) results that the

value of additional dollar of cash is less for unconstrained firms is driven by unconstrained firms with access to lines of credit. On the other hand, for financially constrained firms, shareholders value both unused lines of credit and marginal value of cash positively, which suggests that these firms need both cash and lines of credit and they are not substitutes for these firms.

This essay contributes to the corporate finance literature in many ways. First, it offers new empirical support on the liquidity management of the firms by including one of the major sources of funds for US firms, lines of credit. Second, we test the substitutability of cash and lines of credit from a shareholder perspective and evaluate how different is the valuation of these two sources of liquidity. Third, we provide further evidence on the existence of agency problems, specifically the Free Cash Flow problem.

Hypothesis Development

Lines of credit are instruments which are designed to provide liquidity on demand. Federal Reserve's Survey of Terms of Business Lending shows that more than 90 percent of the loans made by U.S. domestic banks are under some sort of a commitment. Furthermore, theory suggest that when it comes to providing liquidity, lines of credit are more efficient than cash holdings (Holmström and Tirole (1998)).

Overall, the theoretical literature on the lines of credit suggests that the main reason for using lines of credit is to overcome capital market frictions by making sure that funds are available when needed (Harford (1999); Holmström and Tirole (1998)). Therefore, one can argue that at least theoretically, lines of credit should resolve the same capital market frictions that force firms to hoard cash as a precautionary motive and firms should be indifferent between using one or the other.

Besides explaining the determinants of the use of lines of credit by U.S. firms, Sufi (2009) also tests the substitutability of the cash holdings and the lines of credit and finds that lines of credit are viable liquidity options, but only for firms with high and stable cash flows. On the other

hand, firms with low and sporadic cash flows prefer to use cash instead of lines of credit. According to Sufi, these firms are more likely to violate cash flow covenants of the lines of credit which consequently restricts their access to the funds, precisely when they need them. One of the major findings of Sufi (2009) is that lines of credit are weak substitutes for cash holding for constrained firms.

Given the unconditional availability of cash and conditional nature of lines of credit (at least for distressed firms), Lins et al. (2010) state that less than half of CFOs in their global survey, believe that excess cash and lines of credit are substitutes. Those who consider them substitutes are firms that are more profitable, with fewer potential agency problems. However the weak substitutability of lines of credit and cash is yet to become a stylized fact in the line of credit literature. Campello et al. (2011) study the substitutability of cash and lines of credit during the financial crisis period when liquidity was scarce. Unlike Sufi (2009) they find that firms that are small, private, low-rated, and unprofitable, have higher levels of lines of credit and draw more on their lines. The CEOs in this survey state that the decision to use cash or lines of credit is made jointly which is different from the finding of Lins et al. (2010) where less than half of CFOs look at these two sources as substitutes.

Obviously, from the theoretical and empirical stand points, there are some opponents and proponents for the substitutability of lines of credit and cash holdings in the liquidity management literature. It looks like that the results of the previous papers are sensitive to the size of the sample and the period of the study. Therefore, I propose to settle the issue of the substitutability of lines of credit and cash, by implementing a *market based* approach. According to finance theory, the goal of the managers of the firm is to maximize the shareholder value, hence, all the decisions made in the firm should pursue this goal. Consequently, a decision about the source of liquidity (internal versus external) should also lead to shareholder maximization. If lines of credit and cash holdings are perfect substitutes to provide liquidity for the firm, then shareholders should also

value them equally. In other words, although managers might not look at lines of credit and cash holdings as perfect substitutes, I can still test the substitutability of cash and lines of credit by looking at the issue from the shareholders' point of view. As the ultimate beneficiary of the actions of managers, shareholders might have different perceptions about the liquidity management of the firm. Therefore, by looking at the valuations of lines of credit and Cash holdings, I want to see if and why lines of credit resonate more with investors.

H_1: marginal value of a dollar of lines of credit equals the marginal value of a dollar of cash

Furthermore, one can also look at the difference in the pricing of lines of credit among the constrained and unconstrained firms. One of the most significant results of Sufi (2009) is the difference in the substitutability of cash and lines of credit among the constrained and unconstrained firms. Due to existence of material adverse change (MAC) clauses attached to lines of credit, if a firm has a negative shock to its cash flows, the restrictive covenants of the lines of credit may be invoked which lets the bank to withhold funds from the firm. Therefore, firms might not have access to credit at the times they most need them. Hence, according to Sufi (2009) lines of credit are not good substitutes for cash in a constrained firm setting. An issue that Sufi do not mention in his paper is the stringency of these MACs. If MACs prevent firms from using lines of credit during "normal" business cycle downturns or any negative shock, then Sufi's reasoning may be right. However, if MACs only applies to one-off events (tail risk type event) there is a question as to whether it makes sense (from a shareholders perspective) to build up cash for such a low probability risk event. That is, while managers want excessive cash as an insurance against all even the most severe downturn, it may not be in the interest of shareholders. Faulkender and Wang (2006) look at the value that shareholders place on the cash holdings of constraint and unconstraint firms and find that cash is more valued for the constrained firms. Since the violation of a MACs is most likely to happen to a financially constrained firm, I follow the methodology of Fama and French (1998) and test the value investors place on these two sources of liquidity, and I expect that in a constrained firm, shareholders place a lower value on lines of credit compared to

cash holdings.

H_2: marginal value of a dollar of lines of credit is less valuable for financially constrained firms

Moreover, as suggested by several papers that focus on finding the value of cash holdings, both in domestic and international markets, shareholders place a higher value on cash holdings in environments with good and strong corporate governance. On the other hand, if the firm has poor corporate governance in place, shareholders place a low value on the cash holdings of the firm. This would suggest the existence of a free cash flow agency problem in this group of firms. Lines of credit entail commitments to provide firms with liquidity only when valuable investment opportunities arise, which help overcome the agency problems that are associated with holding cash. Yun (2009) examines the effect of agency problems on the choice between cash and lines of credit by studying an external shock to corporate governance of U.S. firms (i.e. state level changes in anti-takeover protection laws). He finds state-level changes in anti-takeover protection are associated with changes in the use of lines of credit relative to cash for firms incorporated in those states. For example, firms incorporated in Delaware reduced their level of unused lines of credit relative to cash by 19% after Delaware allowed the use of the poison pill in conjunction with staggered board.

To put it differently, if there exists some Free Cash Flow (FCF) agency problems as suggested by Jensen (1986), then one should expect to see that the shareholders of a firm with poor corporate governance place a higher value on the lines of credit compared to cash holdings. At the same time, one should also expect to see firms with good corporate governance will have lower levels of cash holdings compared to lines of credit.

H_3: marginal value of a dollar of lines of credit is more valuable for firms with poor corporate governance relative to those with strong corporate governance

Sufi (2009) shows that credit line use is contingent on maintaining the cash flows and financial health of the firm. On the other hand, the survey paper by Campello et al. (2011) which study the

liquidity management of firms during the financial crisis suggest that lines of credit eased the impact of financial crisis on corporate spending. Since during financial crisis most firms experience negative cash flow shocks, these results contradict each other. Therefore, we propose to examine the relative valuation of cash and lines of credit during and before/after financial crisis to test the substitutability of these sources of liquidity. Therefore, if we see a higher value of lines of credit relative to cash during the financial crisis we should be able to support the substitutability of cash and lines of credit.

H_4: the value of lines of credit is higher during the financial crisis compared to before/after the crisis

Another survey paper by Lins et al. (2010) finds that firms with high future external funding needs or believe their equity is undervalued have higher levels of lines of credit. CFOs in their survey state that certainty of funding for acquisitions purposes is an important factor in using credit line. In other words, lines of credit hedges against the possibility that frictions prevent firms from funding valuable investment opportunities in good times ahead. Therefore, we propose to compare and contrast the relative valuation of cash and lines of credit with respect to growth options. In this case, we expect to see higher valuation for lines of credit relative to cash among the firms that are classified as high growth option firms.

H_5: shareholders of high growth option firms place higher value on lines of credit relative to cash compared to those of low growth option firms.

Data and Sample

My sample consists of all the publicly traded firms incorporated in U.S for which the required data items are available. Data on lines of credit is obtained from S&P Capital IQ which provides information on drawn and the undrawn portions of lines of credit and its availability for the majority of the firms starts from 2002 and ends in 2014. For consistency with previous liquidity

management studies, I merge the line of credit data with the financial statement data obtained from S&P Compustat annual database. Following the literature, and due to their especial liquidity needs and regulatory environments, I eliminate all financial (SIC code between 6000 and 6999) and utility (SIC code between 4900 and 4999) firms.

Main Control Variables

Market value of the firm is calculated at fiscal year-end as the sum of the market value of equity plus the book value of short term debt and the book value of long term debt. Earnings are earnings before interest and taxes minus taxes. Cash is cash and marketable securities and dividends are common dividends paid. Net assets are defined as total assets minus cash and marketable securities. R&D is research and development expenses and when missing, I set it equal to zero. Following Pinkowitz, Stulz, and Williamson (2016), I eliminate all the small firms in my sample which have assets of less than $5 million. All the variables of interest in determinants of cash and valuation of liquidity models are winsorised in each fiscal year at the 1% tail using the full sample. My final sample constitutes 4,551 firms, representing 42,881 firm year observations. Appendix 2 provide the list, description and source of the data for the variables of interest in this study.

[Insert Table 2.1 Here]

Table 2.1 shows the descriptive statistics of the variables used in the determinants of cash model. About two third (68%) of the firm-year observations in the whole sample have some level of line of credit. Cash holdings represent about 20% of the total assets of the firm where unused line of credit represents about 10% of the value of total assets, which implies that an average firm in my sample procure about one third of its liquidity through lines of credit. The ratio of the used portion to total assets is about 4% which represents approximately 18% of the total leverage of an average firm. This shows that lines of credit are a major source of liquidity for firms.

In addition to providing descriptive statistics for the whole sample, Table 2.1 also provides some comparison between characteristics of firms with and without lines of credit. When we divide my

sample into firms with and without access to lines of credit, one can see that firms without lines of credit hold three times as much cash (0.37) as the firms with lines of credit (0.13). Firms without access to lines of credit have a market to book ratio of 2.7 and R&D expenditure of 1.75 which are substantially larger than those of firms with line of credit. This implies that firms with more growth opportunities are less likely to have access to lines of credit. Firms which have access to lines of credit are typically larger firm, and about 33% of firms with lines of credit have bond rating compared to 9.6% of firms without lines of credit. Firms with access to lines of credit also have significantly lower cash flow volatility at the firm level (firm sigma) of 0.09 compared to 0.33 for firms without lines of credit. One thing to notice here is that the ratio of unused line of credit to assets (0.126) is almost equal the ratio of cash holdings to total assets (0.133) for firm with access to lines of credit which shows that the level of utilization of lines of credit by these firms is non-trivial. The descriptive statistics of my sample is very similar to those of previous studies, especially to that of Acharya et al. (2014) in which they also used the line of credit data from S&P Capital IQ.

[Insert Table 2.2 Here]

Table 2.2 presents the second set of summary statistics of the variables used for the liquidity valuation model. Here one can see that the ratio of the market value of the firm over total assets is 1.68 for the whole sample. As expected, this value is higher for firms without lines of credit (2.168) since these are smaller firms with more growth opportunities. The median firm in the whole sample earns about 9 cents per each dollar in assets. The change in the cash holdings between this period and next period dC_{t+1} is about 3 percent in the whole sample which shows that firms tend to increase their cash holdings over the period of my sample. This increase is more pronounced among the firms without line of credit (4.6%). We can also see an increase in the unused line of credit between year *t* and *t+1* in the whole sample (9%). The changes in the earnings, research and development expense, interest expense, and dividend payments fairly

small and there is no discernable trend over time as suggested by small values of dX_t and dX_{t+1} of these variables.

[Insert Table 2.3 Here]

Before presenting the results of my analysis, I address the concern for multicollinearity. Table 2.3 presents the correlation coefficients of the variables used in the liquidity valuation models. This table shows that the correlation coefficients among the main independent variables of Pinkowitz et al. (2006) model are relatively low. There are few potentially concerning coefficients between level variables and their changes, however, since the focus of this research is to find and compare the value of cash and lines of credit, my concern is to examine whether the cash and lines of credit variables have strong correlations with other variables in the model. It is clear from the last 6 rows of the table that all of the correlations between cash and lines of credit variables with the main variables of the model are less than 0.25, therefore, I believe that my lines of credit and cash holdings variables allow me to correctly quantify and compare the market values of cash and lines of credit.

Constraint, Governance, and Growth variables

To find the constrained firms in my sample I use various measures of financial distress which are extensively used in the literature. Several variables such as payout ratio, credit rating, firm size, commercial paper rating, and KZ index, have been used as the measures of financial constraint in firms. However, recent literature provides us with two indices that encompass and incorporate the effects of most of these measure, Whited and Wu (2006) index (WW), and Hadlock and Pierce (2010) index (SA). *WW* index is consistent with firm characteristics associated with external finance constraints and it incorporates the effects of cash flows, dividends, long term debt, total assets, and industry and firm sales growth. On the other hand, SA index only incorporates the effect of size and age of the firm. A firm is considered constrained when it falls in the upper 30% of these indices, and is unconstrained if it falls in the lower 30% of the indices. Also, since most of dividend payers are mature and unconstrained firms, I also use an indicator variable, Dividend

Dummy, which is equal to one if a firm pays dividend and zero otherwise. Finally, I aggregate all three measures of constraint and form a constraint index that incorporates all three variables.

To test the hypothesis that questions the effect of corporate governance on the value of lines of credit as opposed to cash, I use two widely used measures of the degree of managerial entrenchment that is a result of takeover protection, G index and E index. G index is based on the findings of Gompers, Ishii, and Metrick (2003) which show that corporate governance has a positive and significant influence on the firm value. They establish that the more anti-takeover provisions a firm has, the poorer is the quality of the corporate governance in that firm. G Index ranges between zero and 24, and I assume a firm has good corporate governance if its G index is less than 12 (i.e. has fewer anti-takeover provisions). The next measure I use is the Entrenchment Index (E index) developed by Bebchuk, Cohen, and Farrell (2008) which shows that only 6 of the 24 measures that is used in G index have the highest influence on the firm value. Therefore, their index ranges between zero to 6 and I assume a firm has good governance if its E index is less than 3.

In my third hypothesis I investigate the effect of growth opportunities on how investors value lines of credit, therefore, I implement several measures of growth opportunities. The first measure of the growth opportunities that I use is the market to book ratio of the firm and I assume a firm has high growth opportunities if the market to book ratio of the firm is above the median market to book ratio of the whole sample in each year. The second measure of the growth opportunities is the sales growth of the firm from the previous year and if it is above the median of sales growth for the whole sample in each year, the firm is considered a high growth firm. My third measure of growth opportunities is research and development expense of a firm and if the ratio of R&D over total assets is above the sample median in a year, the firm is assumed to be a high growth firm. Fourth, I proxy growth opportunities by the amount of capital expenditures a firm has and if the ratio of capital expenditures over total assets is above the median in a fiscal year, that firm is assumed to be a high growth firm. Finally, I aggregate all these measure of

growth into a growth index in which, a firm is considered a high growth firm, if it has at least two of these characteristics. (i.e. high MB, high RD, high sales growth, and high CAPEX).

Methodology

In order to quantify the value that shareholders place on a dollar of cash or line of credit, one should also account for other variables that may affect the market value of the firm. Therefore, I use the cash valuation methodology of Pinkowitz, et al. (2006) which is based on Fama and French (1998) model. This methodology relates the market value of a firm to the levels, lead, and lag differences of several firm characteristics. In order to find the value of cash holdings, they divide the assets of the firm into cash and non-cash (net assets). However, since I am examining the behavior of shareholders and the value they assign to cash holdings and unused line of credit, I further refine their model by dividing liquidity into cash and unused line of credit. This change allows me to find and compare the value that shareholders assign to cash holdings and lines of credit.

As Pinkowtiz et al. (2006) explain, using the market value of the firm as dependent variable, might lead to heteroscedasticity problems, hence, they normalize all variables by dividing them by total assets of the firm. They also mention, although Fama and French (1998) model is ad hoc and does not have a functional form that is driven from a theoretical model, it can help us in our goal which is to study the cross sectional variation in the market value of the firm. The basic model used in Pinkowitz et al. (2006) is the following:

$$V_{i,t} = \alpha + \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dA_{i,t} + \beta_5 dA_{i,t+1} + \beta_6 RD_{i,t} +$$

$$\beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} +$$

$$\beta_{14} dD_{i,t+1} + \beta_{15} dV_{i,t+1} + \varepsilon_{i,t} \qquad (1)$$

Where X_t is the level of variable X in year t divided by the level of total book value of assets in year t. dX_t is the change in the level of X from year t-1 to year t, $X_t - X_{t-1}$, divided by the level of the total book value of assets in year t. dX_{t+1} is the change in the level of variable X from year t to year $t+1$, $X_{t+1} - X_t$, divided by the book value of assets at year t. A is the book value of assets; V is

the market value of the firm calculated at fiscal year-end as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt. *E* is the earnings before interest and taxes minus tax; *RD* is research and development expense; *I* is the interest expense; and *D* is common dividends paid. When R&D is missing, it is set to be zero.

As mentioned above, an intuitive way to estimate the relation between market value and liquid assets in Fama and French's model is simply to split the change in assets into its cash, line of credit, and non-liquid components. Therefore, we are going to test our first hypothesis by running the following regression:

$$V_{i,t} = \alpha + \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} + \beta_5 dNA_{i,t+1} +$$

$$\beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t}$$

$$+\beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dV_{i,t+1} + \beta_{16} C_{i,t} + \beta_{17} LOC_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where, *NA* is net assets which is defined as total assets minus cash, *C* is cash and marketable securities, and *LOC* is the unused portion of the line of credit. Variables *C* and *LOC* are the variables of interest which represent the liquid assets of a firm. In this model the coefficient on cash holdings, β_{16}, and the coefficient of unused line of credit, β_{17}, measures the sensitivity of firm value to a marginal dollar of cash holdings and unused line of credit. Since the effect of a change in cash holdings and unused line of credit on future cash flows is captured by variables in the Fama-French (1998) model that captures expectations, the coefficient on cash holdings and LOC are estimates of the market value of a dollar of cash and unused line of credit. With this modification, I can test the null hypothesis (hypothesis 1) that cash holdings and lines of credit are perfect substitutes and expect that changes in cash holdings and unused portions of the lines of credit contribute the same amount to the firm value.

According to Pinkowitz et al. (2006), there are potential cross correlation problems in the residuals for individual firms in their valuation model and indicate that some of the problems can be rectified by implementing Fama and MacBeth (1973) regression. In all the regressions we follow Fama and MacBeth regressions which involves estimating annual cross sectional

regressions and using the series of coefficients to make inferences. The coefficients of the regressions are the averages of the series of coefficients and the standard errors are estimated using the time series of coefficients. Also, the adjusted R-squared values are the average of the adjusted R-squared values of the 12 cross-sectional regression. According to Pinkowitz and Williamson (2005), this method should reduce the effect of any survivorship bias and/or serial correlation.

One of the major concerns about the substitutability of cash holdings and LOC, is that due to existence of restrictive covenants attached to most of these revolving credit agreements, constrained firms might not be able to access them when they have a negative shock in their cash flows. Therefore, one can examine the substitutability hypothesis using subsamples of constrained and unconstrained firms (hypothesis 2) and test whether shareholders of these firms value LOC and cash differently. In other words, this model allows me to compare the value of cash and unused line of credit between constrained and unconstrained firms.

Furthermore, as suggested by the literature, since management have total discretion over the cash holdings of the firm, cash holdings create a potential for free cash flow agency problem, especially in firms with poor corporate governance. On the other hand, since lines of credit provide liquidity on demand (i.e. when a positive NPV projects is presented to firm) they should reduce the agency problems attributed to cash holdings. One way to test this hypothesis is to compare the value of cash holdings and LOC between firms with strong corporate governance and firms with poor corporate governance (hypothesis 3).

Next, we can also test the substitutability of cash and lines of credit by investigating the value shareholders place on lines of credit versus cash during the financial crisis (hypothesis 4). Firms are more likely to violate covenants during the financial crisis, and if Sufi's argument about weak substitutability of cash and line of credit is right, then we should witness lower values for lines of credit during the financial crisis.

Finally, the difference in the value of cash holdings and lines of credit can be examined between samples of high growth firms as opposed to a sample of low growth firms (hypothesis 5). Lins et al. (2010) suggest that firms with high future external funding needs utilize lines of credit more often than other firms. Therefore, I test the substitutability of these two sources of liquidity by investigating the value shareholders place on them in high and low growth firms (hypothesis 5).

Empirical Results

Lines of Credit as a Determinant of Cash Holdings

Sufi (2009) and Yun (2009) suggest that since a firm's decision on how much cash to hold is jointly determined with the level and access to alternatives of cash (i.e. lines of credit), which suggest that cash holding by itself is not an accurate measure of liquidity for a firm. Therefore, in the first step in my analysis of the substitutability of cash and lines of credit in liquidity management of a firm, I examine whether lines of credit have any influence on the level of cash holdings of firms. Opler et al. (1999) introduce a model to estimate the optimal level of cash holdings and find evidence in support of tradeoff theory of cash holdings. They also state that "firms may choose to insure themselves against losses by holding liquid assets besides cash, and by having lines of credit available." This statement implies that lines of credit are one of the main substitutes for cash in the liquidity management of the firm. Consequently, they should be considered as one of the determinant of cash holdings the same way we consider net working capital as a measure of liquid asset substitutes in models of optimal cash holding.

[Insert Table 2.4 Here]

Therefore, in order to show the substitutability of lines of credit to cash and comparing the magnitude of its substitutability with other substitutes such as net working capital, I replicate the models of Opler et al. (1999) and Bates et al. (2009). In this replication and extension of Opler et al. (1999) model, I add the ratio of unused line of credit to total assets as viable and relatively cheap source of liquidity and the results are presented in Panel A of Table 2.4 for the whole

sample. As it was expected from theories of lines of credit (Boot et al. (1987); Shockley and Thakor (1997); Acharya et al. (2014)) the coefficient of the credit line variable is negative and significant in all the specifications of the optimal cash regressions. This implies that when firms have access to lines of credit they tend to hold less cash. For example, when I add lines of credit to the OLS model of Bates et al. (2009), one can see that a one dollar increase in unused line of credit will reduce the cash holdings by 37 cents. In other words, cash holdings of an average firm decrease significantly with utilization of lines of credit and it is consistent with the theory in the lines of credit literature. When we implement panel or Fama and MacBeth Regressions, the results remained qualitatively the same, and since the results of these regressions are similar, I will focus on the Fama and MacBeth regressions to be consistent with previous studies.

One of the concerns about these results is the selection bias that results from including both firms with and without lines of credit in sample. Therefore, in order to find a more refined estimate for the substitutability of lines of credit and cash holdings, I estimate these regressions only for firms with lines of credit. Panel B of Table 2.4 presents the results for these tests and we can see that the results with respect to substitutability are qualitatively the same. However, we see that the magnitude of substitution is smaller for the sample of firms with lines of credit. For example in the case of the Fama and MacBeth regression we see that for every dollar of lines of credit cash is reduced only 20 cents as opposed to 40 cents in the full sample. Thus the weak substitutability argument of Sufi (2009) and Acharya et al. (2014) appears to hold when evaluated over the full sample and the restricted sample of firms with a line of credit.

Market Value of Cash vs Lines of Credit

Before examining my hypotheses, I replicate the Pinkowitz et al. (2006) main results for my sample. Column (1) of Table 2.5 shows the estimation results of the model without lines of credit which makes it possible for me to compare my estimated coefficients with those in other liquidity

valuation studies that implemented this model. Most of the estimated coefficients in my sample have the expected signs and are close to those of Pinkowtiz et al. (2006). However there are also estimated coefficients that are different which might be driven by different sample composition and period. For instance the coefficient for earnings variables is negative in my sample and it changes sign in most of my regressions. Interestingly, earnings also produce mixed signs in Pinkowitz and Williamson (2005). In my model I used one year difference as opposed to two year difference that Pinkowitz and Williamson (2005) use. This method provides more observations and at the same time produce more noise. However, I should emphasize that the rest of the variable estimations are consistent with the estimations of Pinkowitz et al. (2006).

[Insert Table 2.5 Here]

In my first hypothesis I look at the substitutability of lines of credit and cash in the whole sample. Theory suggests that the lines of credit resolve the same capital market frictions that force firms to hold cash, therefore, they are perfect substitutes for cash holdings and consequently shareholders should value them the same. Model (2) of Table 2.5 examines this hypothesis by including the ratio of unused line of credit to the base model. The results of this test show the shareholders do not value these sources of liquidity equally. This column shows that the market value of a dollar of cash is 1.844 compared to the market value of a dollar of lines of credit is only 0.323. Evidently, shareholders do not see these two sources of liquidity as perfect substitutes as suggested by theory. These results are more in line with the findings of Sufi (2009) which suggests that a strong substitutability of cash and lines of credit is only true for unconstrained firms with steady and strong cash flows. Otherwise, the substitutability is weak because of the likelihood of covenant violations.

Valuation of Liquidity and Financial Constraint

In my second hypothesis, I further test the influence of financial constraint and estimate the value of cash and lines of credit between constrained and unconstrained firms. Table 2.6 reports the

results of these tests. For brevity and ease of presentation, I only present the coefficient estimates of cash and lines of credit which are the focus of this study.

The Pinkowitz et al. (2006) model allows me to examine how the value of a dollar of cash and line of credit of a firm differs between constrained and unconstrained firms. I use four different measures of financial constraint to classify firms into constrained and unconstrained samples. First, a firm is classified as constrained if its SA Index obtained from Hadlock and Pierce (2010) or its WW index obtained from Whited and Wu (2006) are in the top 30% of these indices. Second, since most of dividend payers are mature and unconstrained firms, I also use an indicator variable, Dividend Payer, which is equal to one if a firm pays dividend and zero otherwise. Finally, I aggregate all these financial constraint indices to form my own index. Based on this aggregate measure a firm is constrained if a firm is classified as constrained by SA and WW index and does not pay dividend. This strict measure of constraint identifies the most financially constrained firms in my sample.

[Insert Table 2.6 Here]

Based on this hypothesis and findings of Sufi (2009), one should expect to see a higher value for lines of credit among the unconstrained firms. However, reported results in Table 2.6 do not support this prediction. The main finding of this table is that both sources of liquidity, namely cash and lines of credit are valued higher among the constrained firms. Based on the findings of Faulkender and Wang (2006) and Denis and Sibilikov (2009) and several other studies, it is normal to see that cash holdings are more valuable for financially constrained firms. However, assuming that the findings of Sufi (2009) are true for the whole universe of US firms, along with the higher likelihood of covenant violation among constrained firms, one should not see a higher value of lines of credit in this group. In all constrained samples it is evident that shareholders place a higher value on lines of credit of constrained firms than unconstrained firms with a p-value of difference less than 0.05 in all cases. For instance each dollar of line of credit is valued

0.35 among SA constrained firms and is not significant among the unconstrained firms. The same pattern can be seen in the rest of the classifications. Even among the firms that are classified based on a strict measure of constrained, my aggregate constrained index, one can see that the value of lines of credit as well as cash holdings are higher among constrained firms.

One explanation for this phenomenon is that the shareholders of constrained firms value liquidity regardless of its source. Furthermore, Sufi finds that in case of a covenant violation the availability of the lines of credit drops by losing access to 15 to 25% of the contract size. Therefore, since even after violating a covenant, these firms still have access to about 75 to 85% of the contract size, shareholders of constrained firms still place a higher value on them as opposed to shareholders of unconstrained firms.

Valuation of Liquidity and Corporate Governance

In my second hypothesis, I evaluate the effect of corporate governance on the valuation of cash holdings versus lines of credit. The idea is that in firms with poor corporate governance where there is a possibility for misuse of cash holdings, investors place a higher value on lines of credit compared to the firms with good corporate governance. Table 2.7 presents the Fama and MacBeth regression estimations of the model between good governance and poor governance firms as well as the p-values of the difference between coefficients of two samples.

[Insert Table 2.7 Here]

In order to examine the effect of corporate governance on how investors perceive the value of cash holdings and lines of credit I implement two of the most widely used measures of corporate governance. In the first three columns of Table 2.7 I use the G Index developed by Gopers, Ishii, and Metrick (2003) which shows that corporate governance has a positive and significant influence on the firm value. The second measure I use is the Entrenchment Index (E index) developed by Bebchuk, Cohen, and Farrell (2008) which closely related to G Index but shows that only 6 of the 24 measures that is used in G index, have the highest influence on the firm

value. The data for these two indices is gathered and reported about every two years (1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006) by the Investor Responsibility Research Center (IRRC) available at RiskMetrics. A common practice using these indices is to replace the values of the index in the missing years with the ones of the previous available observation. For example the value of the index in 2005 is the same as the value in 2004.

In panel A I make the above assumption for the rest of the period which means that I replace the value of the index in years after the 2006 with the one in 2006. As expected by the agency theory and consistent with the findings of Pinkowitz et al. (2006) and Dittmar and Mahrt-Smith (2007), cash is valued more by investors of the firms with good corporate governance using both G Index and E Index. However, the p-value of difference is significant only when I use the E Index. Here, we can see the coefficient for cash holdings is 2.010 in a good governance firm as opposed to 1.773 in a poor governance firm. As for the coefficient of interest in this study, I show that the estimate of lines of credit is not significant among good governance firms, however, it is positive and significant (0.444) among the poorly governed firms. Along with the difference in the coefficients of cash holdings, these coefficients show that investors in poorly governed firms prefer more lines of credit to cash holdings. The findings in this table shows the other side of the coin of the findings of Yun (2009) in which he finds that state-level changes in anti-takeover protection are associated with changes in the use of LOC relative to cash for firms incorporated in those states. My results imply that shareholders are aware of this behavior and when governance is weak, they discount the cash holdings and put a premium on the value of lines of credit. In other words, Yun (2009) documents the behavior of the agents and I present the behavior of the principals. These findings are consistent with the expectations of my governance hypothesis.

To some, replacing the value of these indices in years after the 2006 with the one in 2006 might sound like a very strong assumption, therefore in Panel B of Table 2.7, I re-estimate my model by dropping all the observations after fiscal year 2008. Panel B of Table 2.7 shows that the results of this specification are qualitatively the same as the one for the whole sample and we can infer the

same conclusions using the shorter sample period. Panel B also shows that investors place a higher value on cash in case of good governance firms and at the same time place a higher value on lines of credit in case of poorly governed firms.

Valuation of Liquidity and Growth Opportunities

Another hypothesis of my studies focuses on the influence of growth opportunities in utilization of liens of credit. Lins et al. (2010) in their survey of 204 CFOs around the world show that lines of credit hedge against the possibility that frictions prevent firms from funding valuable investment opportunities in good times ahead. In other words, lines of credit are mostly held for growth options while excess cash is held as a general purpose insurance. Given the findings of Lins et al. (2010), one should expect to see a higher value of lines of credit among firms with greater growth opportunities. Table 2.8 represents the results of the liquidity valuation model between high growth and low growth firms using several measures of growth.

[Insert Table 2.8 Here]

Table 2.8 presents mixed results for this hypothesis especially when I use market to book, sales growth, and research and development expense as my measures of growth opportunities. For instance, lines of credit are valued higher in low growth firms when my growth measures are market to book and sales growth, while, they are valued higher among high growth firms when I use research and development expense as my measure of growth opportunities. However, in none of these models, the p-values of difference is significant. On the other hand, when I use capital expenditures over assets as my measure of growth opportunities, the estimates of the model shows that shareholders place a higher value to lines of credit for high growth firms and also, the p-value of difference among the low and high growth samples is significant at 5% level.

Finally, to settle the mixed results of the various measures of growth opportunities presented in this section, I aggregate all these measure of growth into one growth index, in which a firm is considered a high growth firm, if it has at least two of above mentioned characteristics. (i.e. high MB, high RD, high sales growth, and high CAPEX). The results of this test is presented in

Columns (13), (14), and (15) of Table 2.8 and they suggest that shareholders of high growth firms place higher values for both cash holdings and lines of credit as opposed to shareholder of low growth firms. The coefficient for a dollar of cash among high growth firms is 2.252 and it is only 0.372 among low growth firms. This suggest that shareholders of low growth firms with fewer positive NPV projects prefer the firm to disgorge cash instead of holding it. More importantly, one can see a higher value for lines of credit among high growth firms (0.429) which is consistent with my hypothesis. The p-value of difference of the coefficients among these two samples are also significant at 5% level.

Valuation of Liquidity and Financial Crisis

Finally, my last hypothesis looks at the valuation of liquidity in periods of crisis compared to normal times. Sufi (2009) shows that credit line use is contingent on maintaining the cash flows and financial health of the firm. On the other hand, the survey paper by Campello et al. (2011) which study the liquidity management of firms during the financial crisis suggest that lines of credit eased the impact of financial crisis on corporate spending. Therefore, in this section I am trying to examine and compare the findings of these two papers and test whether shareholders place higher (lower) values on lines of credit during the period of financial crisis.

[Insert Table 2.9 Here]

Table 2.9 represent the results of my valuation model for the whole sample in two different periods of financial crisis and before/after financial crisis. The coefficient estimates of this table imply that shareholders place a higher value on lines of credit in periods of before and after the financial crisis, when there is less likelihood of negative cash flow shocks. This finding is consistent with Sufi (2009) argument about the importance of cash flows in utilization of lines of credit. However, the p-value of difference between the two samples is not significant. The results of this test is almost the same when we compare crisis period with before crisis period only.

Conclusion

Most of the studies in this area focus on the valuation of cash holdings as the sole source of liquidity, however, since the choice to hold cash is jointly determined with the utilization of other sources of liquidity, I attempt to evaluate the importance of another major source of liquidity, lines of credit. Therefore, in this essay I examine the difference in valuations of these two sources of liquidity by shareholders of the firm. The results of this essay supports the weak substitutability of cash holdings and lines of credit. My base model shows that shareholders place a positive and significant value on lines of credit, but they still place a higher value on cash holdings. This might be due to contingent nature of the lines of credit contracts, as suggested by Sufi (2006).

Next, I refined my findings by estimating the values of cash and lines of credit among different subsamples. For instance, I find that both cash and lines of credit are valued significantly higher among the constrained firms as opposed to unconstrained firms. This suggest that, although there might be a likelihood that constrained firms violate a covenant which limits the amount they can access to, shareholders of constrained firms still place a higher value on it. In other words, shareholders of constrained firms appreciate any source of liquidity that they can utilize.

In another subsample test, I show that shareholders of poorly governed firms place a higher value on lines of credit as opposed to cash. This is in line with the predictions of agency theory, which suggest that managers of poorly governed firms are more likely to misuse cash. The value of cash coefficients are also higher for good governance firms as it is shown in Pinkowitz et al. (2006) and Dittmar and Mahrt-Smith (2007). The values of the coefficients of cash holdings and lines of credit between good and poor governance firms together provides more support on how investors perceive the use of cash by entrenched managers and how they value more controlled sources of liquidity and the bank monitoring that comes with the utilization of lines of credit.

In terms of growth opportunities the results are mixed. However, when I use an aggregate measure of growth opportunities, I show that high growth firms place a higher value on both cash holdings and lines of credit. This suggest that the shareholders of high growth firms appreciate

any type of liquidity, both monitored and unmonitored. At the same time shareholders of low growth firms prefer that the firm disgorge the extra cash and do not want to pay for a contract that they might not need. Finally I show that shareholders place a lower value on lines of credit during the crisis as opposed to normal times. This is consistent with the findings of Sufi (2009) which suggest that the strength and consistency of cash flow (which are likely to experience disruptions during crisis) are crucial on the decision to utilize cash flows.

REFERENCES

Acharya, V., Almeida, H., Ippolito, F., & Perez, A. (2014). Credit lines as monitored liquidity insurance: Theory and evidence. *Journal of financial economics, 112*(3), 287-319. doi: http://dx.doi.org/10.1016/j.jfineco.2014.02.001

Almeida, H., Campello, M., & Weisbach, M. S. (2004). The Cash Flow Sensitivity of Cash. *The Journal of Finance, 59*(4), 1777-1804. doi: 10.1111/j.1540-6261.2004.00679.x

Bates, T. W., Kahle, K. M., & Stulz, R. M. (2009). Why Do U.S. Firms Hold So Much More Cash than They Used To? *The Journal of Finance, 64*(5), 1985-2021. doi: 10.1111/j.1540-6261.2009.01492.x

Campello, M., Giambona, E., Graham, J. R., & Harvey, C. R. (2011). Liquidity Management and Corporate Investment During a Financial Crisis. *Review of Financial Studies, 24*(6), 1944-1979. doi: 10.1093/rfs/hhq131

Denis, D. J., & Sibilkov, V. (2010). Financial Constraints, Investment, and the Value of Cash Holdings. *Review of Financial Studies, 23*(1), 247-269. doi: 10.1093/rfs/hhp031

Diamond, D. W. (1984). Financial Intermediation and Delegated Monitoring. *The Review of Economic Studies, 51*(3), 393-414. doi: 10.2307/2297430

Dittmar, A., & Mahrt-Smith, J. (2007). Corporate governance and the value of cash holdings.
Journal of financial economics, 83(3), 599-634. doi: http://dx.doi.org/10.1016/j.jfineco.2005.12.006

Dittmar, A., Mahrt-Smith, J., & Servaes, H. (2003). International Corporate Governance and Corporate Cash Holdings. *Journal of Financial and Quantitative Analysis, 38*(01), 111-133. doi: doi:10.2307/4126766

Fama, E. F., & MacBeth, J. D. (1973). Risk, Return, and Equilibrium: Empirical Tests. *Journal of Political Economy, 81*(3), 607-636. doi: 10.2307/1831028

Faulkender, M., & Wang, R. (2006). Corporate Financial Policy and the Value of Cash. *The Journal of Finance, 61*(4), 1957-1990. doi: 10.1111/j.1540-6261.2006.00894.x

Flannery, M. J., & Lockhart, G. B. (2009). Credit Lines and the Substitutability of Cash and Debt. *SSRN Working Papers*.

Gompers, P., Ishii, J., & Metrick, A. (2003). Corporate Governance and Equity Prices. *The Quarterly Journal of Economics, 118*(1), 107-156. doi: 10.1162/00335530360535162

Hadlock, C. J., & Pierce, J. R. (2010). New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index. *Review of Financial Studies, 23*(5), 1909-1940. doi: 10.1093/rfs/hhq009

Harford, J. (1999). Corporate Cash Reserves and Acquisitions. *The Journal of Finance, 54*(6), 1969-1997. doi: 10.2307/797985

Harford, J., Mansi, S. A., & Maxwell, W. F. (2008). Corporate governance and

firm cash holdings in the US. *Journal of financial economics*, *87*(3), 535-555. doi: http://dx.doi.org/10.1016/j.jfineco.2007.04.002
Holmström, B., & Tirole, J. (1998). Private and Public Supply of Liquidity. *Journal of Political Economy, 106*(1), 1-40. doi: 10.1086/250001
Jensen, M. C. (1986). Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *The American Economic Review*, *76*(2), 323-329. doi: 10.2307/1818789
Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics, 3*(4), 305-360. doi: http://dx.doi.org/10.1016/0304-405X(76)90026-X
Lins, K. V., Servaes, H., & Tufano, P. (2010). What drives corporate liquidity? An international survey of cash holdings and lines of credit. *Journal of financial economics*, *98*(1), 160-176.
Marchica, M.-T., & Mura, R. (2010). Financial Flexibility, Investment Ability, and Firm Value: Evidence from Firms with Spare Debt Capacity. *Financial Management, 39*(4), 1339-1365. doi: 10.1111/j.1755-053X.2010.01115.x
Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of financial economics, 52*(1), 3-46. doi: http://dx.doi.org/10.1016/S0304-405X(99)00003-3
Pinkowitz, L., stulz, R., & Williamson, R. (2006). Does the Contribution of Corporate Cash Holdings and Dividends to Firm Value Depend on Governance? A Cross-Country Analysis. *The Journal of Finance, 61*(6), 2725-2751. doi: 10.2307/4123443
Pinkowitz, L., & Williamson, R. (2005). What is a Dollar Worth? The Market Value of Cash Holdings.
Riddick, L. A., & Whited, T. M. (2009). The Corporate Propensity to Save. *The Journal of Finance, 64*(4), 1729-1766. doi: 10.1111/j.1540-6261.2009.01478.x
Sannikov, Y. (2007). Agency Problems, Screening and Increasing Credit Lines. *Working paper*. Shockley, R. L., & Thakor, A. V. (1997). Bank Loan Commitment Contracts: Data, Theory, and
Tests. *Journal of Money, Credit and Banking, 29*(4), 517-534. doi: 10.2307/2953711 Sufi, A. (2009). Bank Lines of Credit in Corporate Finance: An Empirical Analysis. *Review of Financial Studies, 22*(3), 1057-1088. doi: 10.1093/revfin/hhm007
Yun, H. (2009). The Choice of Corporate Liquidity and Corporate Governance. *Review of Financial Studies, 22*(4), 1447-1475. doi: 10.1093/rfs/hhn041

Figure 2.1: Average Level of Liquidity

The graph below shows the level of cash holdings, undrawn and drawn portions of lines of credit for an average US firms between 2002 and 2014.

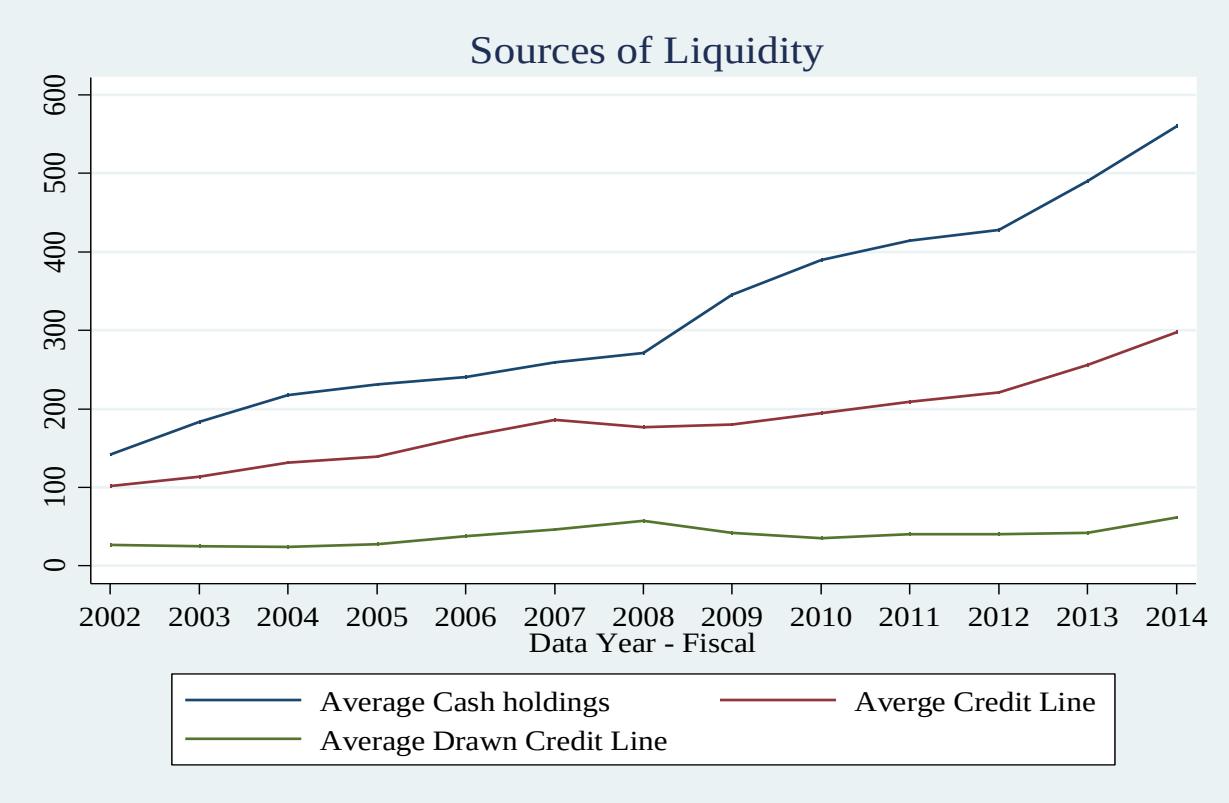

Table 2.1. Summary Statistics of the Determinants of Cash Model

This table presents the descriptive statistics for my sample of U.S. public firms from 2002-2014. The data for line of credit is obtained from S&P Capital IQ and the firm balance sheet data is obtained from Compustat. *Hasline* is an indicator variable which is equal to one if a firm has used or unused line of credit. *Cash* is cash and marketable securities deflated by total assets. *Unused line* is the undrawn portion of the line of credit divided by total assets. *Used line* is the drawn portion of line of credit divided by assets. *Size* is the natural logarithm of total assets. *Market to Book* is total assets plus market value of equity minus book value of equity divided by total assets. *RD/Sale* is the ratio of research and development expense over total sales. *Cash flow* is the ratio of EBITDA over assets. *NWC* is net working capital divided by total assets. *CAPEX* is capital expenditures over total assets. *Leverage* is total debt over assets. *Dividend Dummy* is an indicator variable which is equal to one if the firm pays dividend and zero otherwise. Acquisitions is acquisition expense over total assets. *Firm Sigma* is the standard deviation of cash flows of the firm over the last 10 years. *Industry Sigma* is the median of the standard deviations of the cash flows of the firm over the past ten years. *Rating* is an indicator variable if a firm has a credit rating. Real variables are adjusted by 2007 CPI and all ratios are winsorized at 1% tail.

	Whole sample		Has line of credit		No line of credit	
variable	Mean	Median	Mean	Median	Mean	Median
Hasline	0.680	1				
Cash	0.207	0.116	0.133	0.080	0.366	0.319
Unused line	0.090	0.061	0.126	0.101	0.000	0.000
Used line	0.041	0.000	0.057	0.005	0.000	0.000
Size	5.712	5.707	6.212	6.272	4.650	4.346
Market to Book	2.107	1.548	1.837	1.456	2.705	1.902
RD/SALE	0.626	0.000	0.097	0.000	1.750	0.069
Cash Flow	0.033	0.098	0.097	0.116	-0.104	0.010
NWC	0.233	0.211	0.195	0.180	0.314	0.332
CAPEX	0.051	0.029	0.055	0.033	0.042	0.021
Leverage	0.238	0.173	0.261	0.214	0.190	0.037
Dividend Dummy	0.297	0.000	0.370	0.000	0.143	0.000
Acquisition	0.023	0.000	0.026	0.000	0.016	0.000
Firm Sigma	0.168	0.051	0.093	0.041	0.338	0.101
Industry Sigma	0.080	0.065	0.070	0.060	0.100	0.082
Rating	0.256	0.000	0.331	0.000	0.096	0.000
Obs.	37374		25410		11964	

Table 2.2. Summary Statistics of the Value Model Variables

This table presents the summary statistics used in the cash and line of credit valuation models. This methodology follows Fama and French (1998) valuation model. X_t is the level of variable X in fiscal year t divided by total assets in the same year. dX_t is the change in the level of X from fiscal year *t-1* to fiscal year t deflated by total assets in fiscal year *t ((Xt-1 – Xt)/At). dXt+1* is the change in the level of variable *X* from fiscal year *t* to fiscal year *t+1*. *A* is the book value of assets. *V* is the market value of the firm which is the sum of the market value of equity total debt. *E* is the earnings before interest and taxes minus tax. *NA* is total assets minus cash and marketable securities. *RD* is the research and development expense and is set to zero if missing. *I* is the interest expense. *D* is the total common dividends paid. The sample include 4,551 distinct firms and 42881 firm-year observations from 2002 to 2014.

	Whole sample		Has line of credit		No line of credit	
variable	Mean	Median	Mean	variable	Mean	Median
V_t	1.681	1.169	1.452	1.101	2.168	1.440
dV_{t+1}	0.287	0.051	0.238	0.058	0.395	0.022
E_t	0.015	0.086	0.077	0.100	-0.116	0.011
dE_t	0.006	0.007	0.006	0.007	0.004	0.005
dE_{t+1}	0.006	0.005	0.003	0.005	0.013	0.006
dNA_t	0.017	0.014	0.026	0.019	-0.002	0.005
dNA_{t+1}	0.068	0.013	0.066	0.016	0.072	0.006
RD_t	0.059	0.000	0.029	0.000	0.122	0.045
dRD_t	0.002	0.000	0.001	0.000	0.004	0.000
dRD_{t+1}	-0.001	0.000	-0.001	0.000	-0.001	0.000
I_t	0.023	0.012	0.021	0.013	0.027	0.006
dI_t	0.000	0.000	0.000	0.000	0.001	0.000
dI_{t+1}	0.001	0.000	0.001	0.000	0.003	0.000
D_t	0.010	0.000	0.011	0.000	0.008	0.000
dD_t	0.001	0.000	0.001	0.000	0.001	0.000
dD_{t+1}	0.000	0.000	0.000	0.000	0.001	0.000
L_t	0.294	0.236	0.260	0.219	0.367	0.319
dL_t	0.016	0.011	0.027	0.017	-0.010	0.000
dL_{t+1}	0.040	0.006	0.026	0.007	0.071	0.005
C_t	0.207	0.116	0.133	0.080	0.366	0.319
dC_t	-0.002	0.002	0.005	0.002	-0.018	0.002
dC_{t+1}	0.029	0.001	0.021	0.002	0.046	-0.002
LOC_t	0.090	0.061	0.126	0.101	0.000	0.000
$dLOC_t$	0.013	0.000	0.021	0.001	-0.007	0.000
$dLOC_{t+1}$	0.010	0.000	0.006	-0.001	0.020	0.000

Table 2.3. Correlation Matrix

This table presents the correlation coefficients between firm level variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. V	1.00																					
2. dV1	-0.11	1.00																				
3. E	-0.28	-0.05	1.00																			
4. dE	0.01	0.05	0.20	1.00																		
5. dE1	-0.01	0.05	-0.21	-0.08	1.00																	
6. dNA	0.12	0.03	0.15	0.06	-0.10	1.00																
7. dNA1	0.17	0.27	0.06	0.05	0.12	0.19	1.00															
8. RD	0.32	0.15	-0.66	0.00	0.06	-0.08	-0.02	1.00														
9. dRD	0.09	0.03	0.01	-0.38	-0.12	0.16	0.05	0.08	1.00													
10. dRD1	0.13	0.16	0.07	-0.07	-0.35	0.11	0.15	-0.10	0.18	1.00												
11. I	0.08	0.00	-0.23	0.05	0.05	-0.15	-0.06	0.08	-0.07	-0.04	1.00											
12. dI	0.05	0.00	-0.11	-0.01	0.01	0.17	0.01	0.05	0.03	-0.02	0.32	1.00										
13. dI1	0.05	0.04	-0.13	-0.06	0.02	0.14	0.21	0.06	0.04	-0.01	-0.16	0.05	1.00									
14. D	0.08	0.00	0.18	0.00	0.00	0.00	0.03	-0.11	-0.01	-0.01	-0.06	0.00	0.01	1.00								
15. dD	0.02	0.01	0.04	0.02	0.01	0.01	0.03	-0.02	-0.01	0.00	-0.01	0.01	0.00	0.51	1.00							
16. dD1	0.00	0.02	0.02	0.02	0.01	0.02	0.01	-0.01	0.00	0.00	-0.02	-0.01	0.01	-0.38	-0.41	1.00						
17. C	0.38	0.07	-0.42	-0.01	-0.04	-0.08	0.07	0.55	0.05	0.10	-0.13	-0.01	0.00	-0.04	0.00	0.01	1.00					
18. dC	0.06	-0.01	0.18	-0.03	-0.16	0.05	0.08	-0.17	0.11	0.22	-0.05	0.03	-0.03	-0.06	-0.04	0.06	0.07	1.00				
19. dC1	0.10	0.52	-0.10	0.03	-0.03	0.08	0.12	0.20	0.06	0.21	0.02	0.00	0.04	-0.03	0.00	-0.01	0.01	-0.08	1.00			
20. LOC	-0.12	-0.02	0.25	-0.01	0.00	-0.02	0.06	-0.22	0.00	-0.01	-0.06	-0.04	-0.02	0.09	0.02	0.00	-0.33	0.01	-0.03	1.00		
21. dLOC	0.00	0.04	0.08	0.03	0.01	0.07	0.10	-0.04	0.01	0.01	-0.01	-0.02	-0.01	0.01	0.01	0.01	-0.08	0.01	0.02	0.47	1.00	
22. dLOC1	0.00	0.09	0.04	0.03	0.06	0.08	0.16	-0.03	0.01	0.02	-0.01	0.00	0.03	0.02	0.02	0.01	-0.03	0.02	0.04	-0.28	-0.21	1.00

Table 2.4. Determinants of Cash Holdings Model

This table present the results of the regressions for the determinants of cash holdings. The dependent variable is the ratio of cash and marketable securities over total assets. Real variables are deflated using the CPI into 2007 dollars. *Cash* is cash and marketable securities. *Size* is defined as the natural logarithm of net assets. *Unused line* is the undrawn portion of the line of credit divided by total assets. *Market to Book* ratio is measured the sum of the market value of equity plus total liabilities divided by total assets. Cash flow is defined as the ratio of EBITDA over assets. *NWC* is net working capital divided by total assets. *CAPEX* is capital expenditures over total assets. *Leverage* is total debt over assets. *Dividend Dummy* is an indicator variable which is equal to one if the firm pays dividend and zero otherwise. Acquisitions is acquisition expense over total assets. *Firm Sigma* is the standard deviation of cash flows of the firm over the last 10 years. *Industry Sigma* is the median of the standard deviations of the cash flows of the firm over the past ten years. Industries are defined by 2-digit SIC codes. *Rating* is an indicator variable if a firm has a credit rating. Real variables are adjusted by 2007 CPI and all ratios are winsorized at 1% tail. N is the number of non-missing observations in the sample for each variable. All the standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel B: Determinants of cash for the whole sample						
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	OLS	Panel Model	Panel Model	FM Model	FM Model
Unused Line/at		-0.373***		-0.105***		-0.399***
		(0.0156)		(0.00960)		(0.0153)
Market to Book	0.0279***	0.0267***	0.0112***	0.0114***	0.0300***	0.0287***
	(0.00115)	(0.00115)	(0.000977)	(0.000989)	(0.00164)	(0.00150)
Size	0.00166	0.000743	-0.0132***	-0.0141***	0.00161**	0.000481
	(0.00104)	(0.00101)	(0.00248)	(0.00252)	(0.000581)	(0.000619)
Cash Flows	-0.193***	-0.167***	-0.0526***	-0.0492***	-0.169***	-0.141***
	(0.00906)	(0.00925)	(0.00799)	(0.00809)	(0.0107)	(0.0109)
NWC/at	0.463***	0.461***	0.449***	0.449***	0.426***	0.427***
	(0.00992)	(0.00980)	(0.0102)	(0.0106)	(0.00936)	(0.00900)
CAPEX/at	-0.116***	-0.0898***	-0.190***	-0.178***	-0.135***	-0.107***
	(0.0218)	(0.0218)	(0.0185)	(0.0187)	(0.0225)	(0.0215)
Leverage	-0.0378***	-0.0376***	0.0405***	0.0356***	-0.0487***	-0.0477***
	(0.00810)	(0.00792)	(0.00724)	(0.00752)	(0.00419)	(0.00383)
Industry Sigma	0.477***	0.400***	0.162***	0.159***	0.603***	0.495***
	(0.0404)	(0.0382)	(0.0446)	(0.0444)	(0.0790)	(0.0668)
RD/Sale	0.00471***	0.00459***	0.00172***	0.00171***	0.00791***	0.00779***
	(0.000418)	(0.000420)	(0.000365)	(0.000369)	(0.00157)	(0.00155)
Dividend Dum.	-0.0316***	-0.0213***	0.00665**	0.00707***	-0.0405***	-0.0286***
	(0.00395)	(0.00376)	(0.00278)	(0.00264)	(0.00207)	(0.00223)
Acquisition	-0.220***	-0.211***	-0.146***	-0.150***	-0.218***	-0.205***
	(0.0123)	(0.0121)	(0.00868)	(0.00887)	(0.0191)	(0.0155)
Constant	0.0313***	0.0631***	0.140***	0.153***	0.0266***	0.0736***
	(0.00997)	(0.0102)	(0.0145)	(0.0148)	(0.00708)	(0.00726)
Observations	34,759	33,202	34,759	33,202	34,759	33,202
R-squared	0.635	0.664	0.446	0.453	0.615	0.649
Year FE	Yes	Yes	Yes	Yes	No	No
Firm FE	Yes	Yes	Yes	Yes	No	No
Number of groups					13	13
Number of gvkey			4,273	4,050		

Table 2.4. Determinants of Cash Holdings Model (Cont.)

This table present the results of the regressions for the determinants of cash holdings. The dependent variable is the ratio of cash and marketable securities over total assets. Real variables are deflated using the CPI into 2007 dollars. *Cash* is cash and marketable securities. *Size* is defined as the natural logarithm of net assets. *Unused line* is the undrawn portion of the line of credit divided by total assets. *Market to Book* ratio is measured the sum of the market value of equity plus total liabilities divided by total assets. Cash flow is defined as the ratio of EBITDA over assets. *NWC* is net working capital divided by total assets. *CAPEX* is capital expenditures over total assets. *Leverage* is total debt over assets. *Dividend Dummy* is an indicator variable which is equal to one if the firm pays dividend and zero otherwise. Acquisitions is acquisition expense over total assets. *Firm Sigma* is the standard deviation of cash flows of the firm over the last 10 years. *Industry Sigma* is the median of the standard deviations of the cash flows of the firm over the past ten years. Industries are defined by 2-digit SIC codes. *Rating* is an indicator variable if a firm has a credit rating. Real variables are adjusted by 2007 CPI and all ratios are winsorized at 1% tail. N is the number of non-missing observations in the sample for each variable. All the standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel B: Determinants of cash for firms with lines of credit

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	OLS	Panel Model	Panel Model	FM Model	FM Model
Unused Line/at		-0.180***		-0.0701***		-0.193***
		(0.0141)		(0.00902)		(0.0133)
Market to Book	0.0333***	0.0336***	0.0128***	0.0129***	0.0349***	0.0353***
	(0.00158)	(0.00159)	(0.00125)	(0.00125)	(0.00147)	(0.00148)
Size	0.00350***	0.00190**	-0.00406	-0.00591**	0.00338***	0.00164***
	(0.000930)	(0.000917)	(0.00252)	(0.00252)	(0.000327)	(0.000326)
Cash Flows	-0.161***	-0.149***	-0.0322***	-0.0293***	-0.147***	-0.132***
	(0.0136)	(0.0138)	(0.0112)	(0.0112)	(0.0134)	(0.0133)
NWC/at	0.316***	0.320***	0.374***	0.374***	0.282***	0.287***
	(0.0111)	(0.0111)	(0.0127)	(0.0127)	(0.00713)	(0.00707)
CAPEX/at	-0.0685***	-0.0613***	-0.161***	-0.159***	-0.0840***	-0.0748***
	(0.0213)	(0.0213)	(0.0165)	(0.0165)	(0.0203)	(0.0186)
Leverage	-0.0598***	-0.0626***	0.0306***	0.0243***	-0.0702***	-0.0736***
	(0.00771)	(0.00762)	(0.00756)	(0.00767)	(0.00338)	(0.00339)
Industry Sigma	0.232***	0.204***	0.153***	0.152***	0.299***	0.266***
	(0.0365)	(0.0355)	(0.0439)	(0.0431)	(0.0501)	(0.0472)
RD/Sale	0.00859***	0.00859***	0.00249***	0.00240***	0.0177***	0.0182***
	(0.00111)	(0.00114)	(0.000813)	(0.000798)	(0.00409)	(0.00418)
Dividend Dum.	-0.0204***	-0.0156***	0.00157	0.00242	-0.0280***	-0.0228***
	(0.00348)	(0.00342)	(0.00246)	(0.00244)	(0.00121)	(0.00131)
Acquisition	-0.174***	-0.173***	-0.112***	-0.114***	-0.171***	-0.170***
	(0.0113)	(0.0111)	(0.00808)	(0.00809)	(0.0127)	(0.0121)
Constant	0.0230**	0.0545***	0.0491***	0.0702***	0.0230***	0.0558***
	(0.00942)	(0.00939)	(0.0160)	(0.0161)	(0.00592)	(0.00596)
Observations	23,919	23,919	23,919	23,919	23,919	23,919
R-squared	0.463	0.478	0.355	0.359	0.437	0.455
Year FE	Yes	Yes	Yes	Yes	No	No
Firm FE	Yes	Yes	Yes	Yes	No	No
Number of groups					13	13
Number of gvkey			3,243	3,243		

Table 2.5. Value of Cash and Lines of Credit Base Models

This table reports the results of Fama and MacBeth (1973) regressions. The dependent variable is the market value of the firm. Each regression includes 12 cross sectional regressions. X_t is the level of variable X in fiscal year t divided by total assets in the same year. dX_t is the change in the level of X from fiscal year *t-1* to fiscal year t deflated by total assets in fiscal year *t ((Xt-1 – Xt)/At). dXt+1* is the change in the level of variable *X* from fiscal year *t* to fiscal year *t+1*. *A* is the book value of assets. *V* is the market value of the firm which is the sum of the market value of equity total debt. *E* is earnings before extraordinary items plus, interest, deferred tax credit, and investment tax credit. *NA* is total assets minus cash and marketable securities. *RD* is the research and development expense and is set to zero if missing. *I* is the interest expense. *D* is the total common dividends paid The sample include 4,551 distinct firms and 42881 firm-year observations from 2002 to 2014. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
VARIABLES	Full Sample	Full Sample
C	1.818***	1.844***
	(0.181)	(0.178)
LOC		0.323***
		(0.0890)
E	-0.660***	-0.670***
	(0.177)	(0.183)
dE	0.686***	0.701***
	(0.145)	(0.152)
dE1	0.248	0.286*
	(0.153)	(0.156)
dNA	0.933***	0.943***
	(0.0708)	(0.0692)
dNA1	0.799***	0.799***
	(0.0716)	(0.0776)
RD	2.015***	1.990***
	(0.198)	(0.202)
dRD	2.831***	2.637***
	(0.553)	(0.576)
dRD1	4.213***	4.194***
	(0.460)	(0.465)
I	5.714***	5.690***
	(0.466)	(0.466)
dI	-3.132***	-3.086***
	(0.768)	(0.720)
dI1	0.647	0.497
	(0.574)	(0.551)
D	10.67***	10.38***
	(0.540)	(0.561)
dD	-2.341*	-1.873
	(1.098)	(1.185)

dD1	5.648***	5.835***
	(0.912)	(0.878)
dV1	-0.218***	-0.215***
	(0.0597)	(0.0595)
Constant	0.896***	0.867***
	(0.0470)	(0.0460)
Observations	28,797	27,834
R-squared	0.339	0.337
Number of groups	12	12

Table 2.6. Value of Lines of Credit and Financial Constrain

This table reports the results of Fama and MacBeth (1973) regressions. The dependent variable is the market value of the firm. Each regression includes 12 cross sectional regressions. Regressions are estimated for each subsample of constraint and unconstraint firms independently, allowing coefficients on control variables to vary across subsamples. Xt is the level of variable X in fiscal year t divided by total assets in the same year. dXt is the change in the level of X from fiscal year t-1 to fiscal year t deflated by total assets in fiscal year t ((Xt-1 – Xt)/At). dXt+1 is the change in the level of variable X from fiscal year t to fiscal year t+1. SA Index is Hadlock and Pierce (2010) size and age index. WW Index is Whited and Wu (2006) financial constraint index. *Dividend Payer* is an indicator variable equal to one if the firm pays dividend and zero otherwise. *Constrained Index* is an indicator variable which is equal to one if a firm is considered constrained by SA and WW index and does not pay dividend. *A* is the book value of assets. *V* is the market value of the firm which is the sum of the market value of equity total debt. *E* is the earnings before interest and taxes minus tax. *NA* is total assets minus cash and marketable securities. *RD* is the research and development expense and is set to zero if missing. *I* is the interest expense. *D* is the total common dividends paid The sample include 4,551 distinct firms and 42881 firm-year observations from 2002 to 2014. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	SA Index			WW Index			Dividend Payer			Constraint Index		
VARIABLES	Unconst.	Const.	P-Value	Unconst.	Const.	P-Value	Unconst.	Const.	P-Value	Unconst.	Const.	P-Value
C	1.744***	1.790***		1.984***	1.665***		1.259***	1.871***		0.930***	1.880***	
	(0.126)	(0.204)	(0.848)	(0.194)	(0.184)	(0.176)	(0.124)	(0.190)	(p<0.01)	(0.0663)	(0.186)	(p<0.01)
LOC	0.0784	0.351**		0.0874	0.293**		-0.0543	0.479***		-0.146	0.409***	
	(0.0789)	(0.114)	(0.0112)	(0.110)	(0.0985)	(0.0288)	(0.0914)	(0.105)	(p<0.01)	(0.106)	(0.103)	(p<0.01)
Constant	0.323***	0.930***		0.290***	0.946***		0.279***	0.923***		0.261***	0.879***	
	(0.0299)	(0.0564)	(p<0.01)	(0.0314)	(0.0508)	(p<0.01)	(0.0388)	(0.0498)	(p<0.01)	(0.0249)	(0.0483)	(p<0.01)
Observations	11,717	16,117	27,834	10,131	17,386	27,517	8,846	18,988	27,834	5,832	22,002	27,834
R-squared	0.490	0.348	0.385	0.501	0.346	0.382	0.518	0.345	0.377	0.590	0.339	0.361
Number of groups	12	12	12	12	12	12	12	12	12	12	12	12

Table 2.7. Value of Lines of Credit and Corporate Governance

This table reports the results of Fama and MacBeth (1973) regressions. The dependent variable is the market value of the firm. Each regression includes 12 cross sectional regressions. Regressions are estimated for each subsample of good governance and poor governance firms independently, allowing coefficients on control variables to vary across subsamples. Xt is the level of variable X in fiscal year t divided by total assets in the same year. dXt is the change in the level of X from fiscal year t-1 to fiscal year t deflated by total assets in fiscal year t ((Xt-1 – Xt)/At). dXt+1 is the change in the level of variable X from fiscal year t to fiscal year t+1. *G Index* is obtained from Gompers, Ishii, and Metrick (2003). *E Index* is obtained from Bebchuck, Cohen, and Farrell (2008). *A* is the book value of assets. *V* is the market value of the firm which is the sum of the market value of equity total debt. *E* is the earnings before interest and taxes minus tax. *NA* is total assets minus cash and marketable securities. *RD* is the research and development expense and is set to zero if missing. *I* is the interest expense. *D* is the total common dividends paid. The sample include 4,551 distinct firms and 42881 firm-year observations from 2002 to 2014. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Governance Index Whole period

	(1)	(2)	(3)	(4)	(5)	(6)
	G Index			E Index		
VARIABLES	Good Gov.	Poor Gov.	P-Value of Diff.	Good Gov.	Poor Gov.	P-Value of Diff.
C	1.850***	1.783***		2.010***	1.773***	
	(0.191)	(0.197)	(0.117)	(0.190)	(0.198)	(0.0676)
LOC	-0.0453	0.408***		0.0529	0.444***	
	(0.141)	(0.111)	(0.105)	(0.178)	(0.108)	(0.0519)
Constant	0.772***	0.876***		0.680***	0.870***	
	(0.0694)	(0.0460)	(p<0.01)	(0.0697)	(0.0445)	(p<0.01)
Observations	5,342	22,025	27,834	3,459	22,642	27,834
R-squared	0.375	0.351	0.354	0.433	0.349	0.351
Number of groups	12	12	12	12	12	12

Panel B: Governance Index before 2008

	(7)	(8)	(9)	(10)	(11)	(12)
	G Index			E Index		
	Good Gov.	Poor Gov.	P-Value of Diff.	Good Gov.	Poor Gov.	P-Value of Diff.
C	1.850***	1.551***		2.010***	1.535***	
	(0.191)	(0.287)	(0.118)	(0.190)	(0.287)	(0.0620)
LOC	-0.0453	0.362*		0.0529	0.425*	
	(0.141)	(0.181)	(0.105)	(0.178)	(0.176)	(0.0445)
Constant	0.772***	0.969***		0.680***	0.959***	
	(0.0694)	(0.0510)	(p<0.01)	(0.0697)	(0.0497)	(p<0.01)
Observations	5,342	10,247	16,056	3,459	10,864	16,056
R-squared	0.375	0.369	0.374	0.433	0.365	0.368
Number of groups	7	7	7	7	7	7

Table 2.8. Value of Lines of Credit and Growth Opportunities

This table reports the results of Fama and MacBeth (1973) regressions. The dependent variable is the market value of the firm. Each regression includes 12 cross sectional regressions. Regressions are estimated for each subsample of high growth and low growth firms independently, allowing coefficients on control variables to vary across subsamples. Xt is the level of variable X in fiscal year t divided by total assets in the same year. dXt is the change in the level of X from fiscal year t-1 to fiscal year t deflated by total assets in fiscal year t ((Xt-1 – Xt)/At). dXt+1 is the change in the level of variable X from fiscal year t to fiscal year t+1. Firms are considered high growth if they have above median Market to Book, Sales growth over the past year, and research and development expense, and capital expenditures. *Growth Index* is an indicator variable which is equal to one if a firm is considered high growth by at least two of these measures. *A* is the book value of assets. *V* is the market value of the firm which is the sum of the market value of equity total debt. *E* is the earnings before interest and taxes minus tax. *NA* is total assets minus cash and marketable securities. *RD* is the research and development expense and is set to zero if missing. *I* is the interest expense. *D* is the total common dividends paid. The sample include 4,551 distinct firms and 42881 firm-year observations from 2002 to 2014. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Market to Book			Sales			R&D		
Variables	High Growth	Low Growth	P-Value of Diff.	High Growth	Low Growth	P-Value of Diff.	High Growth	Low Growth	P-Value of Diff.
C	1.807***	0.219***		2.692***	0.854***		1.718***	1.996***	
	(0.134)	(0.0328)	(p<0.01)	(0.248)	(0.112)	(p<0.01)	(0.178)	(0.186)	(0.0266)
LOC	0.149	0.0555**		0.352**	0.418***		0.404***	0.278*	
	(0.0934)	(0.0227)	(0.335)	(0.124)	(0.0855)	(0.580)	(0.108)	(0.137)	(0.469)
Constant	1.639***	0.701***		0.820***	0.821***		0.925***	0.830***	
	(0.0924)	(0.0300)	(p<0.01)	(0.0472)	(0.0488)	(0.972)	(0.0450)	(0.0499)	(p<0.01)
Obs.	13,127	13,502	26,629	13,704	13,555	27,259	13,442	14,392	27,834
R-squared	0.314	0.195	0.538	0.314	0.396	0.364	0.361	0.254	0.357
Number of groups	12	12	12	12	12	12	12	12	12

Table 2.8. Value of Lines of Credit and Growth Opportunities (cont.)

This table reports the results of Fama and MacBeth (1973) regressions. The dependent variable is the market value of the firm. Each regression includes 12 cross sectional regressions. Regressions are estimated for each subsample of high growth and low growth firms independently, allowing coefficients on control variables to vary across subsamples. Xt is the level of variable X in fiscal year t divided by total assets in the same year. dXt is the change in the level of X from fiscal year t-1 to fiscal year t deflated by total assets in fiscal year t ((Xt-1 – Xt)/At). dXt+1 is the change in the level of variable X from fiscal year t to fiscal year t+1. Firms are considered high growth if they have above median Market to Book, Sales growth over the past year, and research and development expense, and capital expenditures. *Growth Index* is an indicator variable which is equal to one if a firm is considered high growth by at least two of these measures. *A* is the book value of assets. *V* is the market value of the firm which is the sum of the market value of equity total debt. *E* is the earnings before interest and taxes minus tax. *NA* is total assets minus cash and marketable securities. *RD* is the research and development expense and is set to zero if missing. *I* is the interest expense. *D* is the total common dividends paid. The sample include 4,551 distinct firms and 42881 firm-year observations from 2002 to 2014. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(10)	(11)	(12)	(13)	(14)	(15)
	CAPEX			Growth Index		
Variables	High Growth	Low Growth	P-Value of Diff.	High Growth	Low Growth	P-Value of Diff.
C	2.624***	1.540***		2.252***	0.372***	
	(0.271)	(0.141)	(p<0.01)	(0.198)	(0.0395)	(p<0.01)
LOC	0.547***	0.0371		0.429***	0.0483	
	(0.136)	(0.0624)	(p<0.01)	(0.123)	(0.0463)	(0.0215)
Constant	0.832***	0.856***		1.065***	0.704***	
	(0.0590)	(0.0487)	(0.700)	(0.0593)	(0.0543)	(p<0.01)
Obs.	14,268	13,566	27,834	18,943	8,891	27,834
R-squared	0.332	0.384	0.362	0.318	0.269	0.394
Number of groups	12	12	12	12	12	12

Table 2.9. Value of Lines of Credit and Financial Crisis

This table reports the results of Fama and MacBeth (1973) regressions. The dependent variable is the market value of the firm. Each regression includes 12 cross sectional regressions. Regressions are estimated for each subsample of crisis period and no crisis periods independently, allowing coefficients on control variables to vary across subsamples. Xt is the level of variable X in fiscal year t divided by total assets in the same year. dXt is the change in the level of X from fiscal year t-1 to fiscal year t deflated by total assets in fiscal year t ((Xt-1 – Xt)/At). dXt+1 is the change in the level of variable X from fiscal year t to fiscal year t+1. Crisis is an indicator variable if fiscal year is 2008 or 2009. *A* is the book value of assets. *V* is the market value of the firm which is the sum of the market value of equity total debt. *E* is the earnings before interest and taxes minus tax. *NA* is total assets minus cash and marketable securities. *RD* is the research and development expense and is set to zero if missing. *I* is the interest expense. *D* is the total common dividends paid. The sample include 4,551 distinct firms and 42881 firm-year observations from 2002 to 2014. Standard errors are shown in parentheses below coefficients. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Crisis	No Crisis	P-Value of Diff.	Crisis	before Crisis	P-Value of Diff.
C	1.347***	2.101***		1.347***	1.945***	
	(0.161)	(0.128)	(p<0.01)	(0.161)	(0.159)	(p<0.01)
LOC	0.163	0.368***		0.163	0.231	
	(0.153)	(0.140)	(0.204)	(0.153)	(0.163)	(0.714)
Constant	0.778***	0.935***		0.778***	1.045***	
	(0.0486)	(0.0379)	(p<0.01)	(0.0486)	(0.0465)	(p<0.01)
Observations	4,530	23,304	27,834	4,530	13,807	18,337
R-squared	0.295	0.306	0.312	0.295	0.320	0.328

Appendix 2.1. Variable Descriptions

The following are the various control variables that will be used in testing our hypotheses in second essay.

Variable	Description	Data Source
Hasline	An indicator variable that take the value of 1 when a firm has either used or unused line of credit and zero otherwise	Capital IQ
Unused line	undrawn portion of the line of credit divided by total assets	Capital IQ and Compustat
Used line	the drawn portion of line of credit divided by assets	Capital IQ and Compustat
Cash	Cash and marketable securities deflated by total assets.	Compustat
Size	the natural logarithm of total assets	Compustat
Market to Book	total assets plus market value of equity minus book value of equity divided by total assets	Compustat
RD/Sale	the ratio of research and development expense over total sales	Compustat
Cash flow	the ratio of EBITDA over assets	Compustat
NWC	net working capital divided by total assets	Compustat
CAPEX	capital expenditures over total assets	Compustat
Leverage	total debt over assets	Compustat
Dividend Dummy	an indicator variable which is equal to one if the firm pays dividend and zero otherwise	Compustat
Acquisitions	acquisition expense over total assets	Compustat
Firm Sigma	the standard deviation of cash flows of the firm over the last 10 years	Compustat
Industry Sigma	the median of the standard deviations of the cash flows of the firm over the past ten years	Compustat
Rating	An indicator variable if a firm has a credit rating.	Compustat
V	the market value of the firm which is the sum of the market value of equity total debt over assets	Compustat
E	the earnings before interest and taxes minus tax over assets	Compustat
NA	total assets minus cash and marketable securities over assets	Compustat
RD	the research and development expense over assets and is set to zero if missing	Compustat
I	the interest expense over assets	Compustat
D	The total common dividends paid over assets.	Compustat
SA Index	size and age index and a firm is considered financially constrained if SA Index is on the top three deciles of the index	Hadlock and Pierce (2010)
WW Index	financial constraint index and a firm is considered financially constrained if WW Index is on the top three deciles of the index	Whited and Wu (2006)
Dividend Payer	An indicator variable equal to one if the firm pays dividend and zero otherwise.	Compustat

Constrained Index	a firm is constrained if a firm is classified as constrained by SA and WW index and does not pay dividend	
G Index	Aggregation of 24 anti-takeover characteristics which ranges from 0 to 24	Gompers, Ishii, and Metrick (2003)
E Index	Aggregation of 6 anti-takeover characteristics which ranges from 0 to 24	Bebchuck, Cohen, and Farrell (2008)
Growth Index	a firm is considered a high growth firm, if it has at least two out of four growth criterial are met. Growth criteria are when a firm scores above median on the following measures: MtB ratio, Sales growth, RD expenditure, and Capex.	Compustat
Crisis	an indicator variable if fiscal year is 2008 or 2009	

VITA

Mohsen Mollagholamali

Candidate for the Degree of

Doctor of Philosophy

Thesis: TWO ESSAYS ON THE SUBSTITUTABILITY OF CASH HOLDINGS AND LINES OF CREDIT

Major Field: Business Administration, Finance

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Finance at Oklahoma State University, Stillwater, Oklahoma in July, 2016.

Completed the requirements for the Master of Science in Quantitative Financial Economics at Oklahoma State University, Stillwater, Oklahoma in 2011.

Completed the requirements for the Master of Business Administration at Multimedia University, Cyberjaya, Malaysia in 2008

Completed the requirements for the Bachelor of Arts in Journalism at University of Applied Science and Technology, Tehran, Iran in 2001.