Liquidity Management and Corporate Investment During a Financial Crisis*

Murillo Campello
University of Illinois & NBER
campello@illinois.edu

Erasmo Giambona
University of Amsterdam
e.giambona@uva.nl

John R. Graham
Duke University & NBER
john.graham@duke.edu

Campbell R. Harvey
Duke University & NBER
cam.harvey@duke.edu

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Abstract

As external finance became scarce and internal profits plunged, many firms were forced to rely on bank lines of credit during the 2008-9 crisis. Surprisingly, little is known about these credit facilities in general, let alone about their importance during a liquidity crisis. This paper investigates a unique dataset that describes how public and private firms in the U.S. and abroad use lines of credit during early 2009. Our analysis emphasizes the interaction between internal funds, external funds, and real decisions such as corporate investment and employment. Among other things, we find that companies that are "credit constrained" (small, private, non-investment grade, and unprofitable) have larger credit lines (as a proportion of assets) than their large, public, investment-grade, profitable counterparts both before and during the crisis. Constrained firms draw more funds from their credit lines and are more likely to face difficulties in renewing or initiating new lines during the crisis. While the overall quantity of credit lines declined only slightly in the crisis, the terms of those facilities changed significantly: maturities declined, while commitment fees and interest spreads went up for all firms, but particularly more for constrained firms. Our evidence suggests that while being profitable helps businesses establish credit lines, it does not monotonically lead to increases in the use of lines of credit. Instead, we find that lines of credit are used less when firms have more internal funds (cash stocks and cash flows). Looking at real-side decisions, we find that companies seem to save (as opposed to invest) at low levels of lines of credit. This investment dynamic changes at higher levels of liquidity: firms with more cash have their investment plans boosted by greater access to lines of credit and greater drawdowns from existing lines. Our estimates suggest that lines of credit provide the liquidity "edge" firms need to invest during the crisis.

Key words: Financial crisis, investment spending, liquidity management, lines of credit, financial constraints.

JEL classification: G31.

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1 Introduction

In the spring of 2009, world financial markets were in the midst of a credit crisis of historic proportions. While unfortunate, the financial crisis environment creates a unique opportunity for researchers to draw crisp inferences about how firms vary the use of internal and external funds and how funding choices affect real-side decisions such as capital spending.

There is a long literature on the importance of internal funds as a source of financing for corporate investment. According to this literature, profits are likely to become a more relevant funding source when firms face financing constraints (Fazzari et al. (1988)) or when credit is tight in the aggregate economy (Bernanke and Gertler (1989)). In this paper, we study the interaction between different sources of corporate funding and how that interaction affects decisions such as capital investment, technology spending, and employment. We do this using data that is collected in the midst of the 2009 financial crisis. While previous papers have focused on the impact of firms' internal liquidity (namely, cash holdings and cash flows) on their real policy variables, we consider an additional form of liquidity: bank lines of credit.

It is well known that companies make extensive use of committed line of credit facilities provided by banks (see Shockley and Thakor (1997)). Even so, little is known about the determinants of lines of credit. Theory suggests that a bank line of credit can function as an insurance policy against liquidity shortages (Thakor (1995) and Holmstrom and Tirole (1998)). Credit lines work particularly well during times when firms have limited access to the capital markets, and differently from cash, credit lines have very low carry costs. The optionality of immediate access to liquidity that is engendered by credit lines raises a number of questions. Who uses lines of credit when capital markets collapse? How do lines interact with internal liquidity? Are these sources of liquidity substitutes or complements during a liquidity crisis? How is the pricing of these credit facilities set? Do lines of credit affect real-side decisions such as investment and employment? We study these and a number of related questions. We do so by examining the role played by credit lines during the financial crisis of early 2009, a time in which there was both an aggregate credit supply shortage and much variation in credit demand by firms.[1]

Asset liquidity and investment are two choice variables for the firm. In general, simultaneity of these choices makes it difficult to assign causality going from one to the other; in particular, whether liquidity affects investment — which is an important policy question. The current financial crisis offers a way to bypass the challenge posed by simultaneity. Virtually all firms in the economy were affected by a negative shift in the supply of credit that was unrelated to parameters that govern cor-

[1] New Commercial and Industrial (C&I) loans extended by commercial banks dropped from $54 billion in February 2007 to about $42 billion in February 2009. At the same time, loans made under commitment as a percentage of total C&I loans increased from 75% in February 2007 to 89% in February 2009 (cf. Federal Reserve's *Survey of Terms of Business Lending*). An increase in loans under commitment during a contraction is often interpreted as evidence of credit rationing — these pre-arranged contracts become firms' only source of external funds (see Berger and Udell (1992)).

porate investment, such as technology, consumer preferences, or the regulatory framework. Instead, the credit shock originated from financial institutions' exposure to liabilities associated with housing mortgage generation and repackaging. Given this exogenous negative shock to external finance, our working hypothesis is that liquid assets and instruments (e.g., cash balances and lines of credit) suddenly become more important for corporate expenditures.

To learn how firms manage liquidity and investment when financial markets fail, in early 2009 we surveyed 800 CFOs from over 30 countries in North America, Europe, and Asia, asking a number of questions related to their holdings of cash, their access to bank lines of credit, their use of available lines (drawdown decisions), the costs associated with the credit lines (e.g., commitment fees), and their pro forma plans about investment, technology, and employment expenditures. Importantly, rather than implementing an *ex-post* approach that collects archival data on observed outcomes, we use firms' *planned* (*ex-ante*) expenditure policies to study the relation between liquidity and real decisions. By doing this, we study decisions that are not contaminated by events that may co-determine *observed* firm policies, but that were not part of managers' information set when they formulated their policies (such as the outcomes of governmental programs put in place to address the crisis). In other words, because we ask managers directly about their plans (at the time they are made), we can get closer to establishing causal links between credit shocks and firms' financial and real decisions.

To fully assess the impact of liquidity management on real corporate policies during the credit crisis we need to understand the determinants of establishing and using lines of credit. We also need to learn more about drawdown policies and the pricing of credit facilities. We note that data on lines of credit are not available from standard data sources. COMPUSTAT, for example, does not have this information, and LPC-Dealscan only has originations (not balances), and even then only for large firms and banks. Not surprisingly, empirical work on this important source of financing is very limited. Accordingly, the first part of our analysis is dedicated to describing the determinants of lines of credit (size of facilities), the use of available lines of credit (drawdowns), the costs of credit lines, and the interaction between lines of credit and other sources of internal liquidity (cash holdings and cash flows) during the crisis.[2]

We document the extent to which companies have outstanding lines of credit, the total amount of those lines in spring 2009 as well as one year prior, the percentage that has been used (drawn down), and the maturity and costs of those facilities (commitment fees, interest spreads, use of collateral). As just indicated, information about firms' use of credit lines is rarely available. Much less is known about drawdowns, maturity, and costs. To our knowledge, ours is the first paper jointly to examine

[2] A couple of contemporaneous survey-based papers look at lines of credit. Campello et al. (2009) also consider the crisis period, but they ignore interactions between lines of credit and firm internal liquidity. Moreover, while we have quantitative data on lines of credit (e.g., facility amounts and costs) for the period before the crisis as well as the crisis period, those authors have mostly qualitative (categorical) data for the crisis period. Lins et al. (2008) do not study the crisis (their survey is conducted over the summer of 2005) and they, too, only have categorical information about total lines of credit, and no information about drawdowns or costs.

all of these items, and we analyze both public and private firms.[3]

In characterizing the role played by lines of credit during the crisis, we first present basic statistics showing that the use of those facilities is widespread in the U.S. economy, though there is some identifiable industry variation. There is also variation when we break down the use of lines of credit by firm characteristics such as size, ownership, credit ratings, financing constraints, and profitability. In the U.S., for example, we find that firms that are private, have below investment-grade ratings, and report difficulties in obtaining external financing establish significantly higher lines-to-asset ratios than their public, investment-grade, unconstrained counterparts. Interestingly, the overall availability of credit lines across those firm-types does not change much during the crisis (there is only a small decline). What is more striking is the rate with which firms draw down funds from their lines of credit during the crisis. Firms that are small, private, junk-rated, financially constrained, and less profitable have drawn, on average, between 42% and 64% of their available lines of credit, while their counterparts (large, public, investment-grade, financially unconstrained) have drawn only between 21% and 33% of the funds available in their facilities.

After characterizing the corporate use of lines of credit before and during the crisis, we study how those facilities interact with internal liquidity (cash holdings and cash flows). We first look at correlations between liquidity variables for which we have information both prior to and during the crisis: the ratio of cash to total assets and the ratio of credit line facilities to total assets. We find, perhaps surprisingly, low contemporaneous correlation between lines of credit and cash holdings: they are only marginally negatively related during the crisis, and insignificantly related before the crisis. We note, however, that the correlation coefficient between cash holdings and credit lines is five times larger (more negative) during the crisis. Less surprisingly, we find that cash holdings and lines of credit are correlated over time: firms with more cash holdings and lines of credit prior to the crisis tend to have more cash and lines of credit during the crisis.[4] Finally, we find that drawdown ratios are highly positively correlated with the ratio of credit lines-to-assets, and highly negatively correlated with cash holdings.

The next step of our characterization of interactions between lines of credit and internal sources of funds is done via regression analysis. The regression framework allows us to control for variables capturing (potentially confounding) information on firm heterogeneity; variables such as firm size, ownership type, credit ratings quality, degree of credit constraints, and long-term growth prospects. Multivariate regressions also allow us to conveniently represent higher-level interactions between internal and external sources of liquidity.

We first regress lines of credit on cash flow (in addition to various controls). This regression shows

[3] Sufi (2009), Lockhart (2009), and Yun (2009) also look at drawdowns, however, their samples are limited to public U.S. corporations. Moreover, these papers do not have information of the pricing of credit lines. Finally, their data do not encompass a credit crisis.

[4] The strong intertemporal correlation in liquidity variables allows us to use IV methods in tests involving investment.

a positive relation between credit lines and cash flows, a result that is consistent with Sufi's (2009) finding that more profitable firms have more access to these facilities. We then include cash holdings in the model and find this variable to be negatively related with credit lines. Recall, previous results from univariate correlation tests pointed to a marginally significant relation between cash and lines of credit use in the crisis, but our multivariate tests identify a significant negative relation after other factors — firm characteristics such as size and growth opportunities — are partialled out.

The more interesting results obtain when we also allow for the interaction between cash holdings and cash flows. This richer specification highlights how internal liquidity sources *jointly* determine the use of lines of credit in the crisis. The interaction term is negative and significant. Our results suggest that in a hypothetical situation in which a firm had no cash, a one-interquartile range (IQR) change in cash flows is associated with an increase of 4% in the firm's ratio of credit lines-to-total assets (note that the sample average ratio is about 24%). That is, in the absence of internal savings, positive cash flow innovations increase the firm's access to credit lines. However, this relation between internal liquidity and credit lines is *mitigated* as firms have more savings. At the ninth decile of cash holdings, a one-IQR change in cash flow increases the size of lines by only 2% (statistically indistinguishable from zero). In other words, cash flow does not monotonically lead to increases in the size of established credit lines. Instead, lines of credit (i.e., access to external liquidity) become less important when firms have more internal funds.

Another way to characterize the above interaction is to look at the impact of a one-IQR change in cash holdings at the average level of cash flow. This comparison is interesting since it allows us to focus directly on the interplay of two financial policy variables during the crisis. We find that this change in cash is associated with a *decline* in the firm's credit lines by nearly 4% of total assets. That is, taking into account that lines of credit are generally made available to more profitable firms, we find that firms with relatively high internal liquidity shy away from the use credit lines in the crisis. This is a surprising finding because firms with higher savings and profits are likely to have an easier time obtaining a line of credit when they want to (we later present evidence that this is indeed the case).[5]

We also use regressions to study drawdowns. We find that firms with higher cash flows draw fewer funds from their outstanding lines of credit, and the same obtains for firms with more cash on hand. In other words, conditional on having a line of credit available, cash flows and cash holdings both lead to smaller drawdowns. These latter results are interesting because they confirm our inferences about the substitution between internal and external liquidity during the crisis, and at same time they are less subject to a reverse-causality story: smaller drawdowns cannot cause the firm to have

[5] On the flip side, one can also see these estimations as suggesting that, regardless of their profitability, firms will save cash in the crisis if they lack access to lines of credit. The next set of results uses line drawdowns to tackle this concern with direction of causality.

more cash in hand.

Our findings suggest that firms may choose not to use lines of credit when they have enough internal funds, implying a cost wedge between these two sources of liquidity. It is therefore important that we understand how lines of credit are priced both during the crisis as well as before it, and how firm attributes (including cash flows and cash holdings) determine the price structure of a credit line. To investigate this issue, in a subsequent survey (conducted in the second quarter of 2009) we gather detailed data about the pricing of credit line facilities (both during that quarter as well as in the beginning of 2008). In the U.S., we document that commitment fees have increased by 14 basis points on average (i.e., nearly doubled) during the crisis, markups over prime rate (LIBOR) have increased by 46 (41) basis points, and the average credit line maturity has declined by 2.6 months (down from 30 months prior to the crisis). There is, moreover, pronounced cross-sectional variation in these numbers. Financially constrained firms, for example, register increases in interest markups that exceed, on average, 100 basis points since the crisis, at the same time that the maturity of their lines declined by nearly six months. We also examine the role of cash flows and cash holdings in determining the structure of the commitment fees in regression models based on Shockley and Thakor (1997). We find that firms with more internal liquidity are less likely to pay a commitment fee (extensive margin), and that, conditional on paying a fee, they pay lower fees (intensive margin).

Finally, we turn our attention to the interplay between corporate liquidity and real-side policies. We consider liquidity coming from internal sources (cash holdings and cash flows) and "options" on external funds (lines of credit). We examine a number of real corporate policies: capital investment spending, technology spending, and employment growth. Surprisingly, researchers have not explored the connections between lines of credit and real expenditures.[6]

In this final analysis, we regress our real-side variables on cash holdings, lines of credits, and an interaction term between those two sources of liquidity. These regressions contain a number of controls, including proxies for firm size, ownership type, credit ratings, financial constraint status, growth prospects, and industry dummies. Because we have information on cash and credit lines prior to the crisis, we can use that information as instruments in our estimations. These instrumental-variables regressions help alleviate concerns about endogeneity biases.

One might have two sorts of priors concerning the relation between a firm's internal liquidity and real spending during a financial crisis. One is that firms with more internal liquidity will be able to spend more than those with less liquidity. The other is that cash savings and real spending will "compete" for funds during the crisis (due to the shortage of external financing). We find evidence for both types of relations, where the dynamics of these relations are modulated by the firm's credit lines.

At the average level of cash holdings, an increase in lines of credit does not significantly alter

[6] Sufi's (2009) study, for example, looks at the interactions between lines of credit and cash flow, but does not explore the real-side implications of lines of credit.

investment plans, and a similar effect applies for an increase in cash at the average level of credit lines. This internal–external liquidity dynamics change, however, at higher levels of cash holdings. We find that firms with more cash boost their investment plans as their access to lines of credit increases. For example, a one-IQR increase in lines of credit at the ninth decile of cash leads the firm to increase investment by 3% over the next year. The same estimations suggest that, for firms with no (or little) access to lines of credit, investment and cash accounts seem to "compete" for funds: firms that save the most are also planning the largest investment cuts. However, as lines of credit increase, this relation is *reversed* — lines of credit seem to "free up" internal funds for investment. At the ninth decile of lines of credit, a one-IQR increase in cash leads investment to grow by 3% (in contrast, for a firm with no lines of credit, investment falls by 5%).[7] Considering the large, widespread spending cuts during the crisis, our estimates suggest that pre-committed lines of credit may provide the "edge" firms might use to fund investment during the financial crisis.

Naturally, one concern is whether uncontrolled firm heterogeneity could be the source of confounding explanations for our results. A firm's investment prospects during the crisis, for example, could both drive managers' investment plans and influence their firms' access to lines of credit and savings policies. It is difficult to articulate a story in which uncontrolled investment prospects would explain the effects just described, but differentiating firms by investment opportunities is beneficial for at least two reasons. First, it helps account for a variable that explains the cross-sectional distribution of investment plans. Second, this differentiation takes the tests performed thus far to their next logical step.

The results above suggest that firms trade off saving cash and spending funds with capital investment. Presumably, it is more costly for a firm to cancel its investment plans when investments opportunities are greater. Accordingly, the choice between saving and investing is likely to "tilt" at different levels of access to credit lines, depending on the firm's investment prospects. For firms with high opportunity costs of investment, it will be rational to switch from cash savings into investment at lower levels of lines of credit. In the context of our econometric model, this would be equivalent to having a stronger interaction effect between cash holdings and lines of credit for firms with higher investment growth opportunities. This is what we observe in the data when we estimate our investment regressions separately over subsamples of firms with low and high investment opportunities. In particular, we find that the effect of cash holdings on investment switch from negative to positive when line of credits are at around 26% of total assets for firms with high investment prospects. In contrast, for firms with low prospects, the switch occurs only when lines of credit reach 62% of total assets.

The remainder of the paper is organized as follows. The next section provides a review of the

[7] Since one could argue that the size of pre-committed credit facilities may passively proxy for investment opportunities during the crisis, we conduct similar tests using actual drawdown activity from existing lines. We obtain stronger results when we do so. For additional robustness, in subsequent tests we explicitly model investment opportunities.

literature and the priors motivating our analysis. We describe our survey data in Section 3. Section 4 shows how the firm manages different sources of internal liquidity (cash holding and cash flows) as well as "options" on external liquidity (lines of credit). Section 5 examines the interplay between liquidity management and real-side policies such as investment and employment. Section 6 concludes.

2 Cash and Lines of Credit as Sources of Liquidity

In this section, we provide a brief review of the theory motivating our analysis of corporate liquidity; namely, the management of cash balances and lines of credit. We also discuss the empirical literature that is associated with the theories we discuss.

2.1 Theory

A central theme motivating a firm's demand for liquid assets is that those assets provide insurance against states in which the firm does not have sufficient funds to pay for its contractual obligations (pay financiers, employees, suppliers) or invest in positive NPV projects. The insurance idea is behind theories dealing with the motivations for cash savings (e.g., Kim et al. (1998), Almeida et al. (2004), and Acharya et al. (2007)) and theories explaining the optimality of credit lines (Boot et al. (1987), Holmstrom and Tirole (1998), and Thakor (1995)).

Theories looking at the role of cash in providing for liquidity insurance have largely discussed its role in transferring funds across time (Almeida et al. (2004)) or across states of the world (Acharya et al. (2007)). In these models, the company tries to maximize value derived from the investment process under a financing friction that arises exogenously. Under a number of scenarios, holding the most liquid asset (cash) insures the firm against external financial constraints in virtually all states.

Models in the credit line literature propose a similar motivation: firms obtain committed credit lines as insurance against states in which spot-market financing would lead to inefficient outcomes (such as termination of valuable projects). In essence, lines of credit work as "options on liquidity" that can be strategically exercised.[8] Boot et al. (1987) are among the first to formalize this idea. They consider an asymmetric information set up where the firm suffers a liquidity shock. Since credit will be expensive in bad states of the world it makes sense for the firm to seek an insurance policy in the form of a credit line. The facility works like a put option for the borrower, if the spot-market interest rates are high, the borrower can use the line and borrow at the pre-arranged low rate. To compensate for the loss, the bank charges an ex-ante commitment fee.[9]

[8] However, there is debate about whether banks can later renege on their commitments. In the real world, virtually all credit lines have a covenant that gives the bank the right to revoke the credit facility (the "materially adverse conditions" or MAC clause). Thakor (2005) provides a theory explaining why banks would avoid evoking these clauses too often and Roberts and Sufi (2008) show empirically that banks do not invoke that clause, preferring instead other renegotiated alternatives that still allow for the credit facility to be used.

[9] Many other insurance-like characterizations can be found in the literature. Maksimovic (1990) provides a rationale

The most natural scenario under which firms will exercise (*en masse*) the liquidity option embedded in their credit lines occurs when there is an aggregate credit contraction.[10] This situation is modeled in Thakor (2005), who proposes a theory in which firms use their credit lines to secure liquidity during contractions, relying more on their own cash flows during favorable economic conditions. Thakor's theory points to concerns about overlending in good times since covenants are less likely to bind and firms may engage in inefficient investment. Based on the idea the credit lines provide for committed lending in the private sector, Holmstrom and Tirole (1998) also discuss aggregate implications for the insurance-like feature of those credit facilities.

Surprisingly, despite the similarities among the literatures on cash holdings and lines of credit, there is no unifying theory considering these two sources of funding.[11] Both sets of theories, however, emphasize the importance of liquidity under contingencies in which the organized markets may fail. From a theoretical standpoint, one should examine the relative importance of these two views on corporate liquidity management at times when firms face a negative shift in the supply of external financing. To our knowledge, our paper is the first to do this empirically.

2.2 Empirical Evidence

A large empirical literature on cash holdings has emerged in recent years. A partial list of papers includes Kim et al. (1998), Opler et al. (1999), Pinkowitz and Williamson (2001), Mikkelson and Partch (2003), Almeida et al. (2004), Faulkender and Wang (2006), and Haushalter et al. (2007). Bates et al. (2009) provide an useful review of this literature.

In contrast to the literature on cash holdings, the literature on lines of credit is scant. Ham and Melnik (1987) is one of the few papers to examine demand for lines of credit, looking at usage (drawdowns). Studying a sample of 90 non-financial corporations, they find that drawdowns are positively related to total sales and negatively related to interest rate costs (risk premium plus commitment fee). Looking at Spanish firms, Jimenez et al. (2007) find a negative relation between cash flows and drawdowns. Agarwal et al. (2004) use a proprietary dataset of loan commitments extended by a single bank to small, privately firms in the five U.S. markets. They find that firms with higher profits establish fewer credit lines, but they have inconclusive results for drawdowns. Agarwal et al. (2006) find empirically that borrowers with higher expectations of future credit quality deterioration originate credit lines to preserve financial flexibility. Melnik and Plaut (1986) and Shockley and Thakor (1997) provide empirical support on the use of lines of credit as a means of liquidity

based on product market competition, where a credit line allows the firm to expand when an investment opportunity arises, and this commitment threatens industry rivals. Berkovitch and Greenbaum (1991) propose a model in which lines of credit provide insurance against variations in required investment.

[10] Evidence in Ivashina and Scharfstein (2008) suggests that firms began to draw heavily on their existing lines of credit during the crisis (to such an extent that these activities began to "crowd out" the supply of new loans in the economy).

[11] However, Boot et al. (1987) argue that a firm might be better off with a credit line than with cash. The reason is that cash reduces inefficiencies equally across all states, while the credit line is effective when interest rates are high.

insurance and show how prices are determined from a contract design viewpoint.[12]

Starting with Sufi (2009), a number of papers have focused on the covenants attached to credit lines and their implications for firm liquidity management. Using a sample of 300 public firms, Sufi finds that credit line access and usage is influenced by firm profitability. Sufi finds that high cash flow increases the chance that the firm has a line of credit and boosts the relative importance of lines of credit for total liquidity (credit lines plus cash). Sufi also examines whether the firm has violated covenants, and finds that low cash flow is a strong predictor of violations. Nini et al. (2007) document the existence of explicit restrictions on capital expenditures associated with credit lines. In general, poor performance triggers covenant violations, which in turn trigger larger renegotiation processes that eventually change the terms of the original loan (see also Chava and Roberts (2007)).

Other papers focus on the feedback effects between macroeconomic aggregates (such as the stance of monetary policy) and lines of credit. Morgan (1998) gathers credit line data from bank surveys and finds that loans based on existing credit lines increase after a policy tightening, but that origination of new term loans slows. Saidenberg and Strahan (1999) find that firms drew upon their bank lines when access to the commercial paper market was limited in 1998. Ivashina and Scharfstein (2008) find that many of the drawdowns observed in the current credit crisis were undertaken by low credit quality firms concerned about their access to funding. Their inferences find support in Campello et al. (2009).

Papers considering aggregate credit conditions and corporate liquidity point to an interesting (yet unexplored) line of research in corporate finance: the effect of macroeconomic conditions on firms' liquidity management choices, namely the use of cash and lines of credit, and their ultimate impact on real corporate decisions. Our study uses the current financial crisis to shed some light on this dynamic.

The paper that is closest to ours is Sufi (2009). However, the two papers differ in a number of important aspects. First, Sufi looks at the interaction between cash and lines of credits in "normal times," when external financing is generally not a binding constraint. The limitation of this approach is that cash and credit lines might not be particularly important for firms during those times, let alone the interaction between them. In his conclusion, Sufi suggests examining credit lines during a financial crisis, which is what we do. Another limitation is that Sufi's data are restricted to public firms — firms that are larger and likely to have access to alternative forms of liquidity management (such as off-balance sheet derivatives). Third, we substantiate our findings by looking at the pricing of credit line, while Sufi's data do not contain price information. Fourth, our paper is not limited to U.S. data. We focus our exposition on U.S. data to allow for comparisons with the literature, but we corroborate our inferences with unique evidence from Europe and Asia. Finally, a crucial difference is that our paper looks at firms' real economic outcomes. From a policy perspective, firms' choices

[12] Shockley and Thakor (1997) study the determinants of prices charged for credit lines (i.e., rates and fees). Firms that are smaller, have lower Q, and are poorly-rated are more likely to be charged high usage fees.

between liquidity instruments (cash and lines of credit) are only relevant to the extent that firms' real-side decisions are affected (or even distorted). While we build on Sufi's recent work, we push research in lines of credit into a number of important new directions.

3 Data

We survey 794 CFOs from 31 countries in North America, Europe, and Asia during a severe contraction in the supply of credit in the economy: the 2008-9 financial crisis. Our premise is that a test of theories dealing with firm's choice of liquidity tools such as cash holding and lines of credit should have more power when access to liquidity becomes particularly important (during a credit squeeze). We ask CFOs questions related to their holdings of cash, their access to bank credit lines, their use of available lines (drawdown decisions), the cost of those credit facilities, and their pro forma plans about investment, technology, and employment expenditures. As we have discussed, rather than using an approach that collects archival data on firm observed outcomes, we study firms' *planned* policies to learn about the relation between liquidity and real decisions. Because we ask decision-makers directly about their plans right at the crisis — rather than looking at ex-post outcomes potentially contaminated by factors outside of the decision-maker information set — we get closer to establishing causal relations between credit shocks and corporate decision-making.

In what follows we detail the data gathering process. Before doing so, however, it is important that we also discuss the limitations of our data. The first thing to notice is that we only have a cross-section of firms. It is thus impossible for us to control for unobserved time-invariant firm heterogeneity. Ideally, we would like to use firm-fixed effects and discuss results from "within estimators" (e.g., OLS-FE). While this is not available to us, we have a number of variables that are measured in changes and other variables for which we have current and lagged values. For example, we ask managers about their cash-to-asset positions today, as well as of one year prior (before the crisis). We have the same information about lines of credit. These are the main ingredients for our liquidity analysis and we can both: (1) look at *changes* in cash holdings and lines of credit from the time before the crisis to the crisis period, and (2) use lagged values for these variables as *instruments* in IV regressions (which we do in Section 5). Unfortunately, we do not have "before crisis" data for an important element of line of credit management, which is drawdowns.

In addition, due to the limitations on survey length, we do not have as many covariates as one would like to include in standard regressions. We do have information, however, on firm size, ownership, credit rating, financial constraints, profitability, growth prospects, cash holdings, outstanding lines of credit, line of credit drawdown, and industry. We make full use of this information in our tests. Because respondents to the survey remain anonymous, we are unable directly link our sample to other databases (but we conduct comparisons below).

Finally, it is important to highlight the types of caveats that apply to all empirical studies that are based on surveys. For instance, while we consulted with experts and refined our survey questions, it is still possible that some of the questions were misunderstood or otherwise produce noisy measures of the desired variable of interest. In addition, when interpreting field studies one needs to consider that market participants do not necessarily have to understand the reason they do what they do in order to make (close to) optimal decisions. Readers should bear these limitations in mind.

3.1 The Survey Data Gathering Process

To gather the data used in this study, we survey CFOs who are subscribers of the *CFO* magazine and other executives that have been involved in previous surveys conducted by Duke University. We invited CFOs to take part in the survey via E-mail on February 16, 2009. A reminder E-mail was sent one week later. The survey closed on February 26, 2009.

We refer to the executives surveyed for this study as "CFOs" because this is their prevailing job title. However, we note that some of the executives have the title of Treasurer, Assistant Treasurer, V.P. Finance, or a related title. *CFO* magazine sent out 10,500 E-mail invitations to U.S. firms. About 7% of these invitations did not reach the recipients (bounce backs). The additional invitations issued by Duke University helped offset the bounce backs from the *CFO* magazine invitations.

We know annual sales and industry focus of the firms covered by the 10,500 E-mail invitations sent out by *CFO* magazine. These include bounce backs and invitations to financial institutions though financial firms are excluded from our main analysis. We combine the data in our final sample with the E-mail invitations of CFO magazine to estimate response rates. Table 1 shows that response rates range from about 3% to almost 7% across different sales and industry categories.

Table 1 About Here

3.2 Sample Descriptive Statistics

Table 2 reports basic descriptive statistics to characterize the U.S. sample during the financial crisis. The tables describe variables reflecting real-side policies, liquidity management, and a broad set of firm characteristics.[13]

Our real-side policy variables include forward-looking capital investment spending, technology spending, and employment growth, which are measured by asking the CFOs in our survey their planned percentage changes in these policies over the next 12 months. As expected, we find that firms are planning substantial cuts in their expenditures. On average, firms plan to cut investments by about 15% in the U.S. This is about 3 times as much the cut planned for technology spending

[13] To streamline the presentation, we sometimes omit summary tables related to Europe and Asia. However, we conduct all of our main tests on European and Asian data and report the results.

and employment. By comparison, in Europe and Asia the planned cuts in investment are 11% and 13%, respectively.

Table 2 also shows evidence of the widespread use of lines of credit by U.S. firms. Indeed, lines of credit are a critical source of liquidity for our sample of firms. On average, lines of credit represent about 24% of total assets, compared to about 12% for cash holdings and 9% for cash flows. The averages reported in Table 2 seem to imply that lines of credit have not noticeably changed during the financial crisis, but further data breakdowns reported below give context to these aggregate numbers. In Europe (Asia) lines of credit represent 27% (33%) of total assets, while cash holdings represent 14% (23%) of assets.

Table 2 describes additional characteristics of the surveyed firms. We note that only 20% of firms in our U.S. sample are publicly listed (the rates are lower in the European and Asian samples). This is a unique feature of our data relative to other corporate finance studies, which usually rely only on public firm data. About 20% of our firms have revenues higher than $1 billion and have an investment-grade rating for their public debt.

TABLE 2 ABOUT HERE

Table 3 shows that there is significant cross-industry variation in the proportion of firms with a line of credit. In the U.S., this proportion ranges from 52% of healthcare firms with a line of credit to 92% for transportation. The table also points to a broad substitution effect between lines of credit and cash savings across industries. For instance, 16% of healthcare firms' assets are composed by cash, compared to only 4% for firms in the transportation industry. We return to these issues in the firm-level tests in Section 4.

TABLE 3 ABOUT HERE

3.3 Comparison with Standard Datasets

Table 4 compares our U.S. survey sample with the standard COMPUSTAT universe. Since the bulk of research in corporate finance is based on COMPUSTAT data, the comparability of our sample is important. Because COMPUSTAT reports information only on public firms, we restrict our survey sample to public firms for the purpose of this comparison. Our CFO survey includes 87 non-financial public company observations. We compare these firms to a sample of about 5,000 non-financial active firms from COMPUSTAT as of the end of the fiscal year 2008.

TABLE 4 ABOUT HERE

Table 4 shows that 47% of our public survey firms have sales below $1 billion. That figure is 68% for COMPUSTAT firms. We also find that 62% of our survey firms are unrated or have a credit rating equal to or below BB+ compared to 52% for COMPUSTAT firms. The two samples

are similar in terms of dividend payout policy and cash flows. We find that 55% of our survey firms did not pay dividends at the end of the fiscal year 2008 compared to 53% of COMPUSTAT firms. Moreover, 16% of our survey firms report negative cash flow compared to 23% in the COMPUSTAT universe. Finally, the two samples appear very similar in terms of cash policy. Cash holdings are about 15% of total assets for our sample compared to 18% for COMPUSTAT firms.

4 Cash Holdings, Cash Flows, and Lines of Credit

We start our analysis on liquidity by contrasting our paper with Sufi (2009). Sufi estimates a regression in which the dependent variable is the ratio between lines of credit to "total liquidity" (that is, lines of credit plus cash holdings) for public firms at times in which credit markets operate normally. On the right-hand side of the model, he includes the firm's cash flow and a set of controls. Sufi finds a positive coefficient associated with cash flow and concludes that firms with high (low) cash flow obtain more (less) lines of credit and rely less (more) on cash holdings. His work provides a number insights into the determinants of lines of credit.

We note that Sufi's inferences are limited to those that one can obtain by studying only public firm data. As already discussed, one may miss the interplay between different sources of liquidity — internal liquidity (cash) and committed liquidity (lines of credit) — when the firm has ample supply to external funds in the credit markets.[14] Sufi considers only public, relatively larger firms. For these firms, cash and lines of credit need not be primary sources of liquidity (see Table 3), and they need not interact. Sufi's analysis may miss the dynamics of the interaction between internal liquidity and lines of credit for bank-dependent firms, precisely the kind of firm for which lines of credit lines matter the most. These are important issues. From a policy standpoint, for example, one wants to understand the role played by lines of credit when these facilities matter the most (credit contractions) and for the firms that are most affected by them (bank borrowers).

Another issue relates to Sufi's empirical model. His dependent variable captures the importance of credit lines relative to cash holdings. However, his specification does not differentiate between positive changes in lines of credit and negative changes in cash savings: when the ratio of lines of credit to cash goes up, it is impossible to ascertain which of the different components of firm liquidity policy are increasing, declining, or staying constant. Moreover, the specification imposes a linear relation between cash flow on one hand, and cash holdings and lines of credit on the other. For example, it might be the case that cash flow helps the firm establish lines of credit, and that at low levels of cash holdings, the firm will raise those lines to help finance its activities. However, at higher levels of cash holdings, the same firm may need not raise additional lines of credit, even if it has large enough cash flows to sustain the new lines. These choice dynamics seem quite plausible, but these nuances cannot be identified

[14] Sufi's dataset covers the 1996–2003 period, when credit standards and the cost of credit in the U.S. have been set at historical lows.

under Sufi's specification because it collapses the cash holding–lines of credit trade-off in one variable.

Our tests address each of the issues just discussed. First, we look at liquidity management in the midst of credit crunch. Second, we have data from both public and private firms. Third, we adopt a flexible modeling approach, one that explicitly allows for rich interactions between the elements of interest: cash holdings, cash flows, outstanding lines of credit (alternatively, drawdowns). Fourth, we corroborate our findings looking at data from Europe and Asia and also extend our analysis to the pricing of lines of credit.

4.1 Cash Holdings and Lines of Credit: Univariate Analysis on Access and Usage

Table 5 reports mean/proportion comparison tests for cash holdings, lines of credit, and drawdowns across firms in our survey. We say that firms are "small," "private," "non-investment grade," have "limited access to credit," and have "negative cash flow" if, respectively, their sales are less than $1 billion, they are privately held, their bonds are unrated or rated below investment grade (BBB–), they rate themselves in the sample bottom 3 deciles for access to external funds during the crisis,[15] and they reported a negative cash flow in fiscal year 2008. To shorten the exposition, we denote these firms generally as "financially constrained." We call the counterparts of the firm types just described, respectively, as "large," "public," "investment grade," "easy access to credit," and "positive cash flow" types. When convenient, we denote these firms collectively as "financially unconstrained."

TABLE 5 ABOUT HERE

Panel A of Table 5 suggests that as of the first quarter of 2009 there was a small decline in the availability of lines of credit relative to the period anteceding the crisis. Indeed, the table's right-most column implies that a statistically significant decline in the availability (quantity) of credit lines in the crisis vis-à-vis the preceding period is only observed for firms who report being constrained. As we see later, while the quantity of lines available to firms declined only slightly, the terms of those facilities (prices, maturity, and other conditions) changed significantly during the crisis.

Panel A also suggests that the use of lines of credit varies significantly across different firm types. In particular, firms in the "financially constrained" categories (small, private, speculative, limited credit, unprofitable) all rely more on lines of credit both before and during the crisis. These firms are most likely to be affected by negative shocks to the economy (Gertler and Gilchrist (1993) and most likely to use their credit lines as a result (Ivashina and Scharfstein (2008) and Campello et al. (2009)).

Panel B of Table 5 focuses on cash holdings. The patterns that we observe for cash holdings are somewhat comparable to those discussed for lines of credit in relationship to the pre- versus during crisis comparison. However, there are significant drops in cash savings following the crisis among

[15] Our survey asks managers to rate (on a 0 to 100 scale) their access to external funds. Their responses are tabulated in Table 1. We rank these responses and obtain a qualitative proxy for the CFOs' reported access to external financing.

firms that have limited access to credit or have negative cash flows. These firms have, on average, a drop in cash savings of around 3% during the crisis period. This change is economically significant relative to the sample average cash holdings of 12%. Panel B reveals additional cross-sectional patterns in cash holdings Consistent with Almeida et al. (2004), smaller firms hold more cash. At the same time, public firms, investment-grade rated firms, firms with easy access to credit, and firms with positive cash flows tend to hold more cash than their financially constrained counterparts; however, the differences are generally not statistically significant.

Panel C of Table 5 focuses on access to lines of credit and drawdowns. Column 1 shows that the proportion of firms with access to a credit line facility is generally higher among firms in the "financially unconstrained" categories. We find that these differences are statistically significant for the size, credit ratings, and cash flow partitions using a two-tail proportional difference test. Recall that we have reported in Panel A that the average line of credit facility is usually larger for constrained firm types. The evidence in Panels A and C suggest that firms that are unconstrained are more likely to have access to lines of credit facilities, but their lines of credit are proportionally smaller compared to their constrained counterparts.

Column 2 of Panel C reports the proportion of firms that have experienced difficulties in initiating or renewing a line of credit. We find that 23% of private firms have difficulties obtaining or maintaining a line of credit during the financial crisis, compared to 14% of public firms. Differences are even sharper if we compare firms that say they have difficult access to credit with those with easy access to credit (41% versus 3%), or negative cash flow versus positive cash flow firms (42% versus 16%). We return to this issue later in the paper when we discuss Table 10, which assesses, in a multivariate framework, how firm characteristics determine the probability of facing difficulties in initiating or renewing a credit line. Perhaps not surprisingly, column 3 shows that constrained firms are more likely to draw down their lines of credit during the crisis, probably in anticipation of being denied the renewal of a line of credit in the future (cf. Campello et al. (2009)). Column 4 shows that they also draw down remarkably more compared to their unconstrained counterparts. For instance, the average private firm draws down 42% of its credit facilities compared to only 26% on average for the public firm partition. Firms with constrained credit and negative profits draw down 54% and 64% of their credit line maximums, respectively.

We also examine the use of credit lines by European and Asian companies. We do this in Table 6. In Panel A, we look at the availability of lines of credit before and during the crisis by firm characteristics. Focusing first on Europe, columns 1 and 2 show that, similarly to the U.S. evidence, firms in the constrained groups have access to larger lines of credit relative to their unconstrained counterparts both before and during the crisis. We note, however, the lower statistical significance of these differences for the European sample. Consistent with the U.S. data, column 3 does not suggest a major change in the availability of lines of credit during the crisis in Europe. For Asian firms, we

do not observe differences in the availability of lines of credit across constrained and unconstrained groups. Interestingly, column 3 reports that lines of credit have moderately increased during the crisis period for Asian firms categorized as financially unconstrained (especially large and public firms).

In Panel B, we look at proportions of firms with lines of credit, as well as proportions and average drawdowns by firm characteristics. European firms in the unconstrained categories are more likely to have access to a line of credit, and draw down less from their credit facilities compared to their unconstrained counterparts. These results are in line with the U.S. evidence, but the statistical power is lower for the European sample. We find less clear patterns across Asian constrained and unconstrained firms regarding access to lines of credit and drawdowns.

TABLE 6 ABOUT HERE

4.2 The Interaction between Cash Holdings and Lines of Credit: Univariate Analysis

Tables 5 and 6 allow us to study the role of lines of credit, drawdowns, and cash holdings across firm types before and during the crisis. The next step is to explain how these three measures of internal liquidity interact with each other. This subsection provides basic evidence on these dynamics via simple univariate tests.

In Table 7, we report the correlations between cash holdings, lines of credit, and drawdowns, for the period of the crisis as well as before the crisis (with the caveat that we do not have drawdowns for the pre-crisis period). One of the most interesting results from Table 7 is the negative correlation between lines of credit and cash holdings during the crisis (statistically significant at the 10% test level). We note that the negative correlation between lines of credit is five times larger (more negative) during the crisis than prior to the crisis (i.e., –0.11 versus –0.02). In addition, there is a strong negative correlation between cash holdings and drawdowns. These correlations suggest that firms might use lines of credit and cash holdings as substitutes in managing their internal liquidity, and perhaps more so during the crisis.

Less surprisingly, Table 7 shows that lines of credit and cash holdings are correlated over time. Indeed, we find that lines of credit before and during the crisis have a correlation coefficient of 0.93. For cash holdings, the equivalent correlation is 0.85. Finally, we find that drawdowns are positively correlated to lines of credit. We return to the interaction between cash holdings and lines of credit lines later in this section in a multivariate regression framework.

TABLE 7 ABOUT HERE

Our survey directly asks CFOs about how they choose between different sources of external funding during the crisis. Their answers allow us to compute the ratio of drawdowns to the sum of overall external funds (including drawdowns, equity issuances, debt issuances, and commercial paper

issuances). Table 8 reports mean comparisons tests of drawdowns relative to other funding sources conditional on "constrained" and "unconstrained" firm partitions. The table reveals some interesting patterns. Within the constrained group, the average drawdown-to-external funding ratio ranges from 24% for firms with low credit ratings to 51% for the negative cash flow partition. In contrast, we find that within the unconstrained group the average drawdown ratio ranges from about 3% for public firms to 18% for profitable firms. The table implies that the average drawdown-to-external funding ratios for the constrained firms are markedly higher than the ratios for the categories in the unconstrained group. Differences in the drawdown-to-external funding ratios range from about 15% for the subsample of small firms relative to large firms, to 33% for the subsample of negative cash flows firms relative to those with positive cash flows; all of these differences are statistically significant.

TABLE 8 ABOUT HERE

While we are unable to perform similar computations for the period preceding the financial crisis, the results in Table 8 suggest that firms that are financially constrained actively rely on their credit lines (i.e., they draw funds from these facilities) to deal with the crisis. In the next section, we examine how these actions interact with the firms' internal sources of liquidity.

4.3 The Interaction between Cash Holdings and Lines of Credit: Regression Analysis

In this section, we analyze the interaction between lines of credit and internal liquidity using regression analysis. The regression approach has two main advantages compared to the univariate analysis discussed thus far. First, it allows us to verify whether our inferences are robust to other sources of firm heterogeneity that might affect our results. Second, it allows us to determine whether there are nonlinearities in the way cash flow and cash holdings interact in explaining lines of credit.

The main results of this section are presented in Table 9. Panels A and B display models for lines of credit and drawdowns, respectively. In columns 1 and 2 (both panels) we essentially replicate two of the main models reported in Table 3 of Sufi (2009). Sufi's recent work has contributed to our understanding of firm's demand for credit lines, and we use it as a natural benchmark for our analysis. For comparability, in columns 1 and 2 of Panel A the dependent variable the ratio of lines of credit to the sum of lines of credit and cash holdings; while in Panel B we use the ratio of unused lines of credit to the sum of unused lines of credit and cash holdings. We also split the sample between public and private firms (Sufi bases his analysis on public firms). Following Sufi, we regress lines of credit and unused lines of credit (the complement of drawdowns) on cash flow and several controls for firm characteristics including, long-term investment prospects (denoted *Investment Growth Prospects*), size (*Large*), credit ratings (*Investment Grade*), and ease of access to credit (*Unconstrained Credit*).

Our "Sufi-like" lines of credit specification can be written as follows:

$$LC/(LC + CashHoldings)_i = c + \alpha_1 CashFlow_i + \boldsymbol{\gamma}\mathbf{X}_i + \varepsilon_i, \quad (1)$$

where c is a constant, $\mathbf{X}$ is a matrix containing the control variables just described, and ε is the model's error term. All of our regressions are estimated with heteroskedasticity-consistent errors clustered by industry (Rogers (1993)).

TABLE 9 ABOUT HERE

We first split our sample between public and private firms. Consistent with Sufi (2009), in the public firm regressions of column 1 in Panels A and B we find that cash flow enters both the total lines of credit and the unused lines of credit regressions with a statistically positive coefficient. Economically, we find that when cash flow moves from the first to the ninth decile (=0.20), lines of credit increase by 0.09. Relative to the sample mean for lines of credit of 0.47, this is equivalent to an increase of about 19%, which is notably similar to the 15% increase that Sufi reports for his random sample of public firms. The strong results we report are noteworthy given that we have a limited number of public firms in our regression (only 54). Estimated coefficients for the control variables are also generally consistent with the results reported by Sufi, but they lack statistical significance. For example, investment opportunities are negatively related with lines of credit and to unused lines. Sufi concludes that more profitable firms use significantly more lines of credit than cash because profits allow them to borrow more.

However, we do not see the same significant results in our sample of private firms. Recall from Table 5 that private firms have more lines of credit (both frequency and ratio of lines to assets), are more likely to draw funds from their lines during the crisis, and draw more funds (conditionally on drawing) than public firms. For private firms, profitability is not a major driver of the availability of lines of credit (Panel A), nor does it significantly affect the usage of lines of credit facilities (Panel B). For these firms, which are more likely to be bank dependent, information about short-term cash flows seem to be dominated by factors that are related to access to sources of funds other than bank debt (such as firm size and credit quality). In short, our results imply that cash flows might *not* affect the choice between cash and credit lines for those firms for which credit lines are likely to be a more important source of external funding. Our findings show that is important to control for cross-sectional variation in the access to external funds in understanding liquidity management. We do this in the next set of tests.

In columns 3 through 5 of Panels A and B, the dependent variables are, respectively, the ratio of lines of credit to assets and the ratio of drawdowns to credit lines. As noted above, our specification allows us to isolate changes in lines of credit (alternatively, drawdowns) from changes in cash holdings.[16] Our empirical specifications explicitly model cash holdings as a control variable (that

[16] For instance, it is likely that cash holdings might be falling differentially across firms during the crisis.

is, we do not collapse cash into the denominator of the left-hand side of the regression equation). Importantly, the empirical design allows for nonlinearities in the way cash flows and cash holdings interact in explaining lines of credit. In particular, our model allows us to see whether at higher levels of cash firms rely less on lines of credit even if their cash flows structure would allow them greater access to credit facilities. Identifying this effect is one of our main goals, which is to shed light on the use of credit lines during the crisis as a function of their internal funds. To this end, we explicitly include cash holdings as well as its interaction with cash flows as independent regressors in the lines of credit model. Following previous notation, our full lines of credit model can be written as follows:

$$LC/Assets_i = c + \alpha_1 CashFlow_i + \alpha_2 CashHoldings_i + \alpha_3 \left(CashFlow \times CashHoldings\right)_i + \boldsymbol{\gamma}\mathbf{X}_i + \varepsilon_i, \tag{2}$$

where $\mathbf{X}$ is a matrix containing proxies such as investment growth prospects, size, ownership form, credit quality, and access to external credit to minimize concerns with uncontrolled heterogeneity.

We start in Panel A, column 3, by regressing lines of credit on cash flows. We consider all sample firms in this estimation because we find no relevant differences when we fit the model separately for public and private firms.[17] Consistent with Sufi (2009), we find that cash flows have a positive effect on magnitude of lines of credit that a firm accesses. In column 4, we add cash holdings and find a statistically negative relation between cash holdings and lines of credit, confirming our intuition that firms trade off cash holdings with lines of credit. This negative relation also highlights the need to include an explicit proxy for cash holdings in the lines of credit regression. In column 5, we include cash flows, cash holdings, as well as their interaction in the set of regressors.

We focus on the full model of column 5. Given the interactive structure of this model, one needs care when reading of the economic meaning of the reported coefficients. The positive coefficient on cash flows suggests that cash flows help firms to raise lines of credit. At the same time, the negative coefficient on cash holdings implies that firms trade off lines of credit with cash holdings. The interaction between cash holdings and cash flows delivers an even more interesting insight. This term obtains a negative coefficient that is both statistically and economically significant. Our results indicate that, in a hypothetical situation in which a firm had no cash, a one-interquartile range (IQR) change in cash flows (=0.12) is associated with an increase of about 4% in the firm's ratio of credit lines-to-total assets (note that the sample average ratio is about 24%). That is, in the absence of internal savings, positive cash flow innovations increase the firm's access to credit lines. However, this dynamic between internal liquidity and credit lines is *mitigated* as cash savings increase. At the ninth decile of cash holdings (=0.30), for example, a similar change in cash flows increases the use of credit lines by just over 2%. This estimated effect is economically smaller and statistically indistinguishable from zero. In fact, we find that inferences about a significant positive impact of

[17] We do this for the sake of brevity, but the tabulated results are available from the authors.

cash flows on lines of credit only find statistical support across samples of firms with relatively low cash (those in the first three deciles of the distribution of cash holdings).

Another way to characterize these dynamics is to look at the impact of a one-IQR change in cash holdings (=0.14) at the ninth decile of cash flows (=0.25). We find that this change would lead the firm to *drop* its lines of credit by about 3.7% of total assets. At the average level of cash flow, the decline is 2.7%.[18] That is, even taking into consideration that lines of credit are made available to firms with some minimum profitability, we find that firms with relatively high internal liquidity shy away from the use of credit lines. Noteworthy, these are firms whose healthy cash balances are likely to allow for additional bank borrowing. Our specification is able to identify this dimension of the role for internal liquidity in explaining lines of credit because we include separate (and interactive) terms for cash holdings and lines of credit. Figure 1 more fully characterizes the economics of the rich set of interaction effects we just discussed.

FIGURE 1 ABOUT HERE

One could interpret our lines of credit regressions as suggesting that, regardless of their profitability, firms will save cash in the crisis if they lack access to lines of credit. The next set of tests tackles this concern with the direction of causality in our tests. Columns 3 through 6 of Panel B, report regression results based on drawdowns. We find that firms with more cash flows and high cash savings draw fewer funds from their lines of credit. These results are interesting because they are consistent with our story about the substitution between internal and external liquidity during the crisis, and at same time they are not subject to a reverse-causality story: fewer drawdowns from existing lines cannot cause the firm to have more cash in hand. We note, however, that the interaction term for cash flows and cash holdings is not statistically significant.

Table 10 replicates the tests for Europe and Asia. Here, we focus on the full models for lines of credit and drawdowns (similar to column 5 of Panels A and B of Table 9). The results in the first two columns of Table 10 show similar sorts of dynamics in the relation between cash holdings, cash flows and lines of credit for both Europe and Asia. A few coefficient estimates are statistically weaker nonetheless. For example, in the regression for Europe the *Cash Flow*×*Cash Holding* interaction has the right sign, but is statistically insignificant. In the Asia regression the term attached to *Cash Holding* is statistically insignificant, but that does not imply that the dynamics we have described are not present in the Asian data. In fact, together with the associated interaction term, we find that a one-IQR change in cash holdings at the ninth decile of cash flows leads to a decline in lines of credit by 5.1% of assets in Asia (compared to 3.7% in the U.S.).

[18] Both estimates are statistically different from zero. Indeed, the "derivative" of lines of credit with respect to cash holdings is negative and reliably different from zero across the entire range of cash flow (becoming more negative at higher levels of cash flow).

The next two columns in Table 10 replicate the drawdown tests. The results are close to those performed using U.S. data, except that the interaction between cash flows and cash holdings attains statistical significance in the Asia regression.

TABLE 10 ABOUT HERE

Our empirical findings are consistent with the view that firms see lines of credit as an insurance against liquidity shocks to be used during exceptional times. In particular, our tests show that these credit facilities are largely used when firms run out of internal liquidity. Our tests are performed during a credit contraction and suggest that lines of credit become particularly important when firms have low savings and are unprofitable in crisis environments. Our baseline findings, which are based on U.S. data, are supported by evidence from Europe and Asia.

4.4 Initiating and Renewing a Credit Line during the Crisis

One limitation of our previous credit line regressions is that some of those credit facilities were pre-arranged and the quantities that we observe may not respond to changes in cash flows and cash holdings, but rather covary with them for other reasons. These concerns are minimized by the drawdown regressions, but it is interesting that we gather cleaner evidence on firm's *access* to lines of credit during the crisis.

Our survey asks managers about whether they have recently had difficulty in initiating or renewing a credit line. Presumably, internal liquidity (cash holdings) and operating performance (cash flows) should minimize any difficulties in raising credit lines. This is the premise of the conclusions we draw from the lines of credit regressions in the last section. In particular, we say that firms with high internal funds (cash holdings and cash flows) seem to demand fewer credit lines, even though these firms could probably establish more lines if they wanted. We now check whether this is indeed the case in our data.

In Table 11, we report the results from probit regressions on U.S. data where the dependent variable is assigned to 1 if the firm reported difficulties in initiating or renewing a credit line during the crisis and 0 otherwise.[19] The independent variables are the same as those in the credit line regressions of the previous section and yield expected results. For example, firms that are public and have positive investment prospects are less likely to face difficulties in obtaining or maintaining lines of credit. For our purposes, the more interesting results are that cash flows and cash holdings *both* reduce the likelihood that a firm will find difficulties initiating or renewing credit lines during the crisis.[20] These results agree with the logic of our inferences about the choice between internal

[19] We discard firms that do not respond to this question, but our results do not change if we assign missing values to 0.

[20] Interestingly, the interaction between cash flow and cash holdings implies a substitution effect between those two variables in the extent to which internal liquidity eases access to credit lines. However, the implied economic effect of that interaction term is very small.

and external liquidity that firms seem to make during the current crisis.

TABLE 11 ABOUT HERE

4.5 The Pricing of Lines of Credit

The discussion above has shown that firms draw down credit lines less intensively when internal liquidity is high. This suggests that there is a cost wedge between internal funds and lines of credit. In this section, we try to understand the pricing structure of lines of credit with an emphasis on the effect of internal funds both before and during the crisis.

With this purpose in mind, in a follow-up survey conducted in the second quarter of 2009 we gather from CFOs in North America, Europe, and Asia detailed credit line pricing information in 2009Q2 as well as one year prior. We gather information on basis point commitment fees that firms pay to retain the optionality of the line of credit, markup interest rates that banks charge above LIBOR/Prime rate on the used portion of the line of credit,[21] line of credit maturity (or "tenor"), and whether the bank has required that the firm provide collateral to back the line of credit.

In addition to the information on the pricing structure of lines of credit, the 2009Q2 survey includes information about cash flows, cash holdings, and several other firm attributes. This allows us to study how firm characteristics relate to credit line pricing and how these relations might have changed in the midst of the financial crisis.

Table 12 provides basic pricing figures for lines of credit both before and during the financial crisis. For the U.S., we document an increase of 14 basis points in the commitment fee (i.e., it nearly doubled) during the crisis. The increase is less pronounced for Europe and Asia. However, we find that the markup on LIBOR/Prime Rate has increased sharply across firms in the three continents. For the U.S., the markup has increased by about 58 basis points during the financial crisis. This increase has been as high as 69 basis points for Asia, but lower for Europe, where we report an increase of 23 basis points. Finally, Table 12 shows that lines of credit tenor has generally decreased during the financial crisis by about 2.6 months in the U.S. and Asia, and by 3.5 months in Europe. To put these numbers in context, note that the average maturity of outstanding lines of credit in these markets prior to the crisis was between 28 and 30 months. The evidence on the *pricing* of credit lines contrasts to our previous findings on the *quantity* of those credit facilities. We have shown in Table 5 that the average size of credit lines facilities appeared to decline only slightly during the crisis. However, Table 12 shows that the crisis had markedly adverse effects on the terms used in establishing those credit facilities.

TABLE 12 ABOUT HERE

In Table 13, we relate the key pricing numbers to firm characteristics both before and during

[21] Many firms report interest rate markups for their lines of credit on both LIBOR and Prime rates.

the crisis. For sake of brevity, we focus on the U.S., but the results are qualitatively comparable for Europe and Asia, albeit with weaker statistical significance.

Panel A reports basis point markups by firm characteristics both before and during the crisis. Column 3 shows that markups have increased sharply during the financial crisis for all firm types. However, these increases are much higher for constrained firms. We find, for example, that the markup has increased by about 137 basis points for firms that report constrained access to credit versus "only" 36 basis points for firms with unconstrained credit.

Panel B reports changes in the maturity of lines of credit. Column 3 documents a decline in the average maturity of lines of credit during the financial crisis for all firm categories. The constrained/unconstrained comparisons reveal an interesting pattern in this case. The decline in the tenor of the credit lines is comparable across those partitions, but one has to observe that the unconstrained firms' lines had much larger tenors to begin with; that is, prior to the crisis. For example, the average maturity for large firms' lines fell by 6 moths with the crisis, compared to a decline of only 2 months for small firms' lines. However, prior to the crisis, the average maturity of lines used by large firms was 43 months, compared to only 27 months for small firms.

TABLE 13 ABOUT HERE

We use a regression framework to relate the pricing structure of lines of credit to firm attributes, with an emphasis on internal liquidity variables (cash flow and cash holdings). This analysis is motivated in part by the work of Shockley and Thakor (1997), who show that the commitment fee structure can be used with lines of credit as a device to separate firms according to their quality. In particular, those authors argue that banks will not charge a commitment fee to well-known, high quality firms because information asymmetry is small in this case. For lower quality firms, whose assets and growth prospects are more difficult to value, one should expect the bank to charge a commitment fee.

The results are reported in Table 14. Following Shockley and Thakor (1997), in columns 1 through 3 of Panel A, we use a logit specification where we regress an indicator that equals 1 if a firm pays a commitment fee on its current credit lines (and zero otherwise) on firm attributes for quality such as size, ownership form, debt rating, credit constraints, growth prospects, as well as controls for the size of the credit line, the maturity, and the presence of collateral backing. In columns 4 and 5, we augment Shockley and Thakor's specification by including cash flows, cash holdings, and an interaction term for those two internal liquidity variables. In Panel B, we estimate similar models, but now we employ OLS and use a continuous commitment fee dependent variable, focusing only on the non-zero observations of the fee. In this way, Panel B contains a model that captures the effect of firm liquidity on the "intensive margin" of the commitment fee structure. The model in Panel A, in contrast, captures the "extensive margin" of the fee determination.

Results in column 1 and 2 of Panels A and B suggest that there are not major differences in the

way firm attributes affect the presence or the size of a commitment fee across public and private firms. This stands in contrast to the results of tests dealing with the size of the credit lines (Table 9). In columns 3 to 6 (both panels), we pool public and private firms in one sample. Focusing on the results reported in column 5, we note that the internal liquidity variables enter the commitment fee logit and OLS regressions with the expected negative sign. In particular, the evidence for the logit specification in Panel A suggests that firms with high cash flows and cash holdings are less likely to pay a commitment fee. The OLS evidence in Panel B implies that the commitment fee decreases with firms' cash flows and cash holdings (conditional on paying a fee). Economically, a one-IQR increase in cash flow leads to a decline in the probability of paying a commitment fee of about 5.3%. Similarly, a one-IQR increase in cash decreases this probability by about 8.5%. On the intensive margin, our OLS results imply that, conditional on paying a commitment fee, a one-IQR increase in cash flow reduces the commitment fee by 9.1 basis points, which is an 18% decrease relative to the sample mean commitment fee. Similarly, a one-IQR increase in cash, reduces the commitment fee by almost 12 basis points, a 24% drop relative to the sample mean.

Turning briefly to the variables of the original Shockley and Thakor specification, we find that attributes for higher quality usually diminish the presence or the size of the commitment fee. In fact, controls for public firm or unconstrained credit status and investment growth prospects enter both the logit and OLS specifications with the expected negative sign. The investment grade dummy enters both regression specifications with the "wrong" positive sign, but the estimate is generally insignificant. At the same time, our large firm dummy enters the OLS regression with the "correct" negative coefficient, while the coefficient is positive in the logit specification. Finally, the usage of collateral to back the line of credit increases both the probability that the firm will pay a commitment fee as well as the size of the commitment fee. This is consistent with the argument in Berger and Udell (1992) that banks might require collateral when there is unresolved differential information.[22]

TABLE 14 ABOUT HERE

The evidence in Panels A and B is consistent with the prediction of Shockley and Thakor that higher quality firms pay lower commitment fees. They are also in line with our earlier inferences that firms with more internal liquidity are likely to have easier access to lines of credit and be charged lower prices for those facilities.

[22] Another feature of the Shockley and Thakor's theoretical analysis is the prediction that firms that pay a commitment fee also pay higher interest rate markups. We correlate our markup and commitment fee data and find a positive significant correlation coefficient of 0.68. This is quite similar to the estimate of 0.72 reported by those authors.

5 Corporate Liquidity and Real-Side Policies

In this section, we study the effects of liquidity on real corporate policies. We consider liquidity coming from internal sources (cash holdings and cash flows) and also "options" on external liquidity, namely lines of credit. As we discussed earlier, one would like to learn how firms conduct their liquidity management and how it affects their spending at times when liquidity is scarce. Our real-side policy variables include forward-looking capital investment, technology spending, and employment growth. These are measured by way of asking the CFOs in our survey about their pro forma *planned* percentage changes in these real-side expenditures over the next 12 months. We are able to assess, in the midst of the crisis, the effects of liquidity availability on *ex-ante* investment decisions (rather than *ex-post* realizations).

We regress the real-side variables on cash holdings, lines of credit, and their interaction. We also look at drawdowns during the crisis. We control for heterogeneity by including indicators for firm size, ownership type, credit ratings, and financing constraints. We initially study each real policy regression using OLS estimations. However, we recognize the potential for endogeneity and thus also estimate them using a 2-Step GMM Instrumental Variable (IV) estimator. This estimator yields standard errors that are robust to heteroskedasticity and clustering at the industry level. Following the notation we have previously used, our full planned expenditures model can be written as follows:

$$PlannedExpenditure_i = c + \alpha_1 CashFlow_i + \alpha_2 LCs_i + \alpha_3 \left(CashFlow \times LCs\right)_i + \boldsymbol{\gamma}\mathbf{X}_i + \varepsilon_i, \quad (3)$$

where the dependent variable ($PlannedExpenditure$) is the firm's planned expenditures with, alternatively, fixed capital, technology, or employment; all expressed in percentage changes of the next 12 months over the last 12 months.

Because we have information on firms' cash and credit lines prior to the crisis, we use that information as instruments in our IV regressions. The interaction term between cash and credit lines will also be endogenous if cash, credit lines, or both liquidity measures are endogenous. Therefore, we instrument the interaction term with the lagged interaction term.[23] For our purposes, the advantage of doing so is that we can use lagged cash holdings, lines of credit, their interaction, and the interaction of their predicted values to instrument three endogenous variables (namely cash holdings, lines of credit, and their interaction term). Accordingly, we use four overidentifying restrictions. We focus our discussion on capital investment plans, noting that our main inferences also hold for the other real-side policy models, although sometimes at lower levels of statistical significance.

The regression results are reported in Table 15. Similar to the liquidity analysis, the economic meaning of the reported coefficients needs to account for the interactive structure of the equations.

[23] Wooldridge (2002) explains that one can use the interaction of the predicted values from the first stage regressions as an additional instrument in this case. Therefore, we include the interaction of the predicted values of cash holdings and lines of credit as an additional instrument.

The estimates suggest that at the average level of cash holdings, an increase in lines of credit does not significantly alter investment plans, and a similar effect applies for an increase in cash at the average level of credit lines. This internal–external liquidity dynamic changes at higher levels of cash holdings, however. Firms with more cash have their investment plans boosted by greater access to lines of credit. Considering the IV estimation of column 2, for example, a one-IQR increase in lines of credit (=0.23) at the ninth decile of cash (=0.25) leads the firm to increase investment by 2.8% over the next year. Recall, these are times of large spending cuts and our estimates suggest that lines of credit may provide the "edge" firms may need to invest, provided they have internal funds that can be used for other needs. Since those lines of credit were pre-committed (arranged prior to the crisis), our findings support the notion that lines of credit contribute to firm investment in the financial crisis.

TABLE 15 ABOUT HERE

There is another interesting way to interpret the coefficients we report. In the hypothetical situation when the firm had no access to lines of credit (consider the uninteracted term for *Cash Holdings*), we see a negative relation between cash and investment. The regression estimates suggest that, in the absence of immediate access to external funds, cash and investment accounts seem to "compete" for funds: firms that save the most are also planning the largest investment cuts. However, as lines of credit increase, this relation is reversed: lines of credit seem to "free up" internal funds for investment when the firm has more options on external liquidity (liquidity that can be used for other purposes when needed). For example, at the ninth decile of lines of credit (=0.50), a one-IQR increase in cash (=0.10) would lead investment to *grow* by 3.2%. By contrast, for a firm with no lines of credit, investment would *fall* by 5.4%; where policy differences are both economically and statistically significant.[24] Figure 2 more fully depicts how investment spending changes as a function of these internal–external financing substitution effects.

FIGURE 2 ABOUT HERE

Regarding our IV models, the diagnostic statistics for our first-stage regressions (reported at the bottom of Table 15) do not reject the validity of the first-stage specifications. The p-values for the Hansen J-test of overidentifying restrictions indicate that we never reject the joint null hypothesis that our instruments are uncorrelated with the residuals in the real-side policy regressions and the excluded instruments are correctly excluded from the second-stage regressions. Furthermore, the low p-values associated with the first stage F-test of excluded instruments confirm that our instruments are relevant in explaining the variation of our endogenous variables.

[24] For comparison purposes, we replicate our tests using COMPUSTAT data for the end-year of 2008. We regress capital expenditures scaled by assets on the ratio of cash holdings to assets, a dummy for firms whose sales exceed $1 billion, and an indicator for whether the firm has investment grade bonds. Consistent with our survey evidence, we find that cash holdings enter the investment regression with a negative and highly significant coefficient. In contrast, when we use data for the period preceding the crisis (starting from 1985) cash obtains a positive, statistically insignificant coefficient.

Beyond data on the outstanding lines of credit at the time of the crisis, we have information on the amount of funds that are drawn from those credit facilities. Unfortunately, we do not know what is drawn before the crisis. There exists, however, ample evidence that firms are proactively (more than ever) drawing funds from their lines of credit in the current crisis (see Ivashina and Scharfstein (2008) and Campello et al. (2009)). If we assume that a significant fraction of drawdowns have been done since the crisis started — and recall, these credit facilities are not long-lived to begin with — we can estimate the relation between investment, cash savings, and *usage* of funds from lines of credit during the crisis. These tests are important because one could argue that the size of pre-committed facilities may proxy for investment during the crisis, and that the facilities themselves need not be used to fund investment spending.

We conduct our tests of the impact of drawdowns in Table 16. The models reported for investment, technology, and employment are similar to those of Table 15, except that we replace lines of credit by drawdowns and we only have the OLS versions of those estimations (we do not have lagged drawdowns to use as instruments). The estimates from these new regressions suggest similar implications for the impact of funds drawn from lines of credit on corporate spending. Noteworthy, the interplay between internal (cash) and external (drawdowns) funds is both more economically and statistically significant in the investment and the technology spending equations. For example, a one-IQR increase in drawdowns (=0.70) at the ninth decile of cash leads the firm to increase planned investment by 14.8%. While until now we relied on the total size of the credit line facility to gauge the impact of external funds on investment, we find markedly stronger results when we look at the actual funds that are drawn from these facilities. The limitation of these latest tests, nonetheless, is that we cannot determine the exact timing of the drawdown activity.

TABLE 16 ABOUT HERE

One might still be concerned that unobserved heterogeneity (perhaps exacerbated during the financial crisis) could influence our results. For example, there could be some mechanism in place during the crisis that might both drive managers' investment and influence their firms' use of lines of credit and savings policy. It is difficult to think of a story in which uncontrolled investment prospects would explain the countervailing effects that we obtain for internal–external interactions; however, further exploring this possibility help us to take the tests performed thus far to their next logical step.

Recall, our results suggest that firms trade off saving cash and spending funds with capital investment. Presumably, it is costlier for firms to cancel their investment plans when investment has more positive prospects. Accordingly, the choice between saving and investing is likely to "tilt" at different levels of access to lines of credit, depending on the firm's investment prospects. For firms with high opportunity cost of investment (more positive investment prospects), it will be rational to switch from cash savings into investment starting at lower levels of lines of credit. In the context of

our econometric model, this would be equivalent to having a stronger interaction effect between cash holdings and lines of credit for firms with higher investment growth opportunities. In other words, while cash savings and capital investment may compete for funds in the absence of credit lines, the effect of cash holdings on investment switch from negative to positive at a relatively lower level of credit facilities for firms with higher investment opportunities (since sacrificing those investments for the sake of saving funds is particularly costly).

This is what we observe in the data when we estimate our investment regressions separately over subsamples of firms with high and low investment opportunities. The results are reported in Table 17, where we split our sample between firms that are in the top three deciles of the distribution of reported long-term growth prospects ("high investment opportunity") and those that are in the lowest three deciles of the same distribution ("low investment opportunity"). We find that the effect of cash holdings on investment switch from negative to positive when line of credits are at around 26% of total assets for firms with high investment prospects. In contrast, for those firms with low prospects, the switch occurs only when lines of credit exceed 62% of total assets. The effects of investment opportunity on the investment–liquidity interplay are depicted in Figure 3.

Table 17 About Here

Figure 3 About Here

Table 18 shows planned investment regressions for Europe and Asia. Results for Europe on the interplay between cash and lines of credit are very similar to those we report for the U.S. The same is not the case, however, for the Asian sample, where few coefficients are statistically significant and regressions have a lower explanatory power.

Table 18 About Here

To sum up, our evidence points to an important role for internal and external liquidity in driving planned spending (investment, technology, and employment) during the current financial crisis. Importantly, our tests highlight novel, important interaction effects between these two sources of liquidity. At relatively lower levels of internal liquidity (represented by cash holdings) investment does not benefit from the firm's access to external liquidity (lines of credit). It appears that such funds might be used for other purposes. At higher levels of internal liquidity, however, access to external funds seem to contribute to investment spending in a significant way during the current crisis.

6 Conclusions

In the depth of the 2008-9 financial crisis companies were affected by a severe credit-supply shock. We exploit this abrupt change in the availability of credit to shed light on the interaction between

internal and external liquidity, and on the effects of liquidity on investment and other real-side decisions. We start by examining how lines of credit interact with internal funds (cash flow and cash holdings) and whether these different forms of liquidity act as substitutes or complements during the current crisis. We then study how lines of credit are priced and how they affect ex-ante plans on capital spending and other real-side decisions in the crisis.

Our data come from two surveys in early 2009, each conducted with 800 CFOs in over 30 countries from North America, Europe, and Asia. We find that the overall average size of the available lines of credit has not changed much during the crisis. We observe, however, significant variation in the use of lines of credit across different demographics. Firms that are small, private, speculative, and unprofitable ("constrained categories") rely more on lines of credit, before and during the crisis, than their less constrained counterparts (large, public, investment grade, and profitable firms). We also find that constrained firms draw more heavily on their credit lines at the same time that they are more likely to face difficulties in renewing or initiating lines of credit in the crisis.

Having characterized the use of credit lines during the crisis, we study how these facilities relate to internal liquidity. We find that a positive shock to cash flows has a direct positive effect on access to lines of credit. However, this effect is significantly mitigated at high levels of cash holdings. Our tests imply that the option to access liquidity from lines of credit becomes less valuable when internal liquidity is abundant (even accounting for the fact that more profitable, liquid firms should find it easier to establish lines of credit).

Our results suggest that firms reduce their use of lines of credit when internal liquidity is available, implying a cost wedge between these two forms of liquidity. We thus conduct a second survey focusing on the pricing structure of lines of credit before and during the crisis. For the U.S., we find that during the crisis lines of credit commitment fees have increased on average by 14 basis points, markups over prime rate (LIBOR) have increased by 46 (41) basis points, and the average credit line maturity has declined by 2.6 months (down from 30 months on average). Our tests show that these changes are sharper for constrained firms. We also find that firms with more internal liquidity are less likely to pay a commitment fee, and conditional on paying a commitment fee, they pay a lower fee.

Finally, we examine how liquidity interacts with managerial plans concerning capital investing, technology spending, and employment growth. We find that firms seem to substitute cash savings for investments at low levels of lines of credit. One can interpret our results as implying that when other sources of liquidity are scarce firms decide whether to save or invest. This internal–external liquidity dynamics changes at higher levels of cash holdings, however. In fact, firms with more cash have their investment plans boosted by greater access to lines of credit. Our estimates imply that lines of credit may provide the "edge" firms may need to invest in the crisis, provided they have internal funds that can be used for other needs.

In all, our study uncovers important aspects of the role of lines of credit as "options on liquidity"

when financial markets fail. This is relevant because we know relatively little about credit lines in general (who uses them, when they are accessed, how they are priced), and much less about how they function during a credit supply shock. We find that the current crisis has not severely hindered ability to access lines of credit and draw down existing facilities. This has proven to be crucial since lines of credit are an important instrument in easing the impact of the financial crisis on corporate investment and other real-side decisions, such as technology spending and employment. Our findings give context to observed policy efforts to coordinate policies that help financial intermediaries across different countries during the current crisis.

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Table 1 – Survey Invitations and Response Rates

This table reports number of invitations, responses and response rates by size category and industry types. The number of invitations includes the 10,500 U.S. E-mail invitations sent out by *CFO* magazine in the first quarter of 2009. The figures include the E-mail invitations that did not reach the intended recipients "bounce back" and financial firms (excluded from the remaining analysis).

Characteristics	Category	Number of Invitations	Number of Responses	Response Rate (%)
Size (Sales)	Small (< $1 Billion)	7,165	405	5.7%
	Large (>= $1 Billion)	3,335	138	4.1%
Industry	Retail/Wholesale	1,166	77	6.6%
	Manufacturing	2,471	132	5.3%
	Mining	504	26	5.2%
	Transportation	563	29	5.2%
	Communication	406	10	2.5%
	Software/Biotech	511	27	5.3%
	Services	764	48	6.3%
	Healthcare	807	40	5.0%
	Banking/Finance/Insurance	2,359	71	3.0%
	Other	1,451	73	6.8%

Table 2 – Sample Descriptive Statistics

This table reports summary statistics for the main variables used in the paper's empirical estimations. The data are from the CFO survey of the U.S. sample first quarter of 2009. We include all firms with the exception of financial, governmental, and nonprofit organizations. Planned Investments, Planned R&D (technology) and Planned Employment are CFO's expected percentage changes in these variables over the next 12 months. Cash Holdings is cash holdings and marketable securities as a percentage of total assets. LCs are bank lines of credit as a percentage of total assets. Investment Growth Prospects is the CFO's rating of the firm's growth opportunities, ranging from 0 (no growth opportunities) to 100 (excellent growth opportunities). Cash Flow is return on assets (expressed as a percentage) in the year 2008. Large is a dummy variable taking a value of 1 if the firm's sales revenue are equal to or more than $1 billion, and zero otherwise. Investment Grade is a dummy variable taking a value of 1 if the firm has a rating of BBB– or higher, and zero otherwise. Public Firm is a dummy variable taking a value of 1 if the firm is publicly listed and zero otherwise. Drawdown is the credit that is drawn as a percentage of total credit line. Access to Credit is the CFO's reported score of the firm ability to raise eternal funds during the crisis, ranging from zero (no access to external funds) to 100 (unlimited access to external funds).

Variables	Descriptive Statistics					
	Mean	St. Dev.	25th Pct.	50th Pct.	75th Pct.	Obs.
Planned Investments	-14.727	43.112	-30.000	-10.000	0.000	345
Planned R&D	-5.763	30.970	-10.000	0.000	0.000	311
Planned Employment	-5.709	33.016	-15.000	-5.000	0.000	341
Cash Holdings (Current)	12.217	15.738	2.000	5.500	16.000	334
Cash Holdings (Last Year)	12.562	15.215	2.000	9.000	18.000	323
LCs (Current)	23.852	20.954	10.000	20.000	33.000	287
LCs (Last Year)	23.995	21.265	9.000	18.000	33.000	282
Investment Growth Prospects	63.169	24.595	50.000	70.000	80.000	393
Cash Flow	8.977	17.065	3.000	8.000	15.000	338
Large	0.222	0.416	0.000	0.000	0.000	397
Investment Grade	0.181	0.386	0.000	0.000	0.000	397
Public Firm	0.219	0.414	0.000	0.000	0.000	397
Drawdowns	38.469	36.896	0.000	30.000	75.000	245
Access to Credit	51.000	30.863	25.000	50.000	80.000	378

Table 3 – Lines of Credit and Cash Holdings by Industry

This table reports the proportion of firms with available lines of credit by industry. The table also reports lines of credit and cash holdings as a percentage of total assets before and during the crisis. The data are from the CFO survey of the U.S. sample first quarter of 2009. We include all firms with the exception of financial, governmental, and nonprofit organizations.

	Proportion of Firms w/ LC	Avg. LC/A During Crisis	Avg. LC/A Before Crisis	Avg. Cash/A During Crisis	Avg. Cash/A Before Crisis
Industry					
Retail/Wholesale	0.833	28.347	30.276	8.000	9.000
Manufacturing	0.873	24.423	22.415	8.646	8.260
Mining	0.783	17.500	16.813	21.938	18.838
Transportation	0.920	21.100	20.685	4.250	5.650
Communication	0.600	28.400	29.000	10.740	10.940
Software/Biotech	0.538	17.077	16.769	15.615	15.167
Services	0.784	25.711	27.811	11.633	12.059
Healthcare	0.520	24.136	29.045	16.250	16.917

Table 4 – Survey and COMPUSTAT Samples

This table compares public firms in our CFO survey sample with active firms in the COMPUSTAT database as of 2009Q1. We report number of observations and percentages based on several firm characteristics. We also report basic descriptive statistics on cash holdings for the two samples. We include all firms with the exception of financial, governmental, and nonprofit organizations. Firms are defined as "Small" if their sales are less than $1 billion, and "Large" otherwise. "Non-Investment Grade" firms have a credit rating BB+ or below. "Investment Grade" firms are those with a credit rating BBB– or higher. Cash Holdings is the ratio of current cash holdings and marketable securities to total assets.

Firm Types	Survey Sample		COMPUSTAT Sample	
	Obs. (N)	Freq. (%)	Obs. (N)	Freq. (%)
Small	41	47%	3,647	68%
Large	46	53%	1,698	32%
Non-Investment Grade	54	62%	997	52%
Investment Grade	33	38%	907	48%
Non-Dividend Payer	46	53%	2,667	55%
Dividend Payer	41	47%	2,173	45%
Negative Cash Flow	11	16%	1,152	23%
Positive Cash Flow	58	84%	3,875	77%
	Mean	Median	Mean	Median
Cash Holdings	0.146	0.071	0.178	0.078

Table 5 – Lines of Credit and Cash Holdings by Firm Characteristics

This table reports – respectively in Panels A and B – lines of credit and cash holdings as a percentage of total assets, conditional on firm characteristics, before and during the crisis. Panel C reports proportions of firms with lines of credit and drawdowns conditional on having access to a line of credit as well as average drawdowns by firm characteristics. The data are from the CFO survey of the U.S. sample first quarter of 2009. We include all firms with the exception of financial, governmental, and nonprofit organizations. Firms are defined as "Small" if their sales are less than $1 billion, and "Large" otherwise. "Private" firms are those not listed on any stock exchange, while "Public" firms are listed on the NYSE, NASDAQ or AMEX. "Non-Investment Grade" firms have a credit rating of BB+ or below. "Investment Grade" firms are those with a credit rating BBB– or higher. "Constrained Credit" are those firms with a CFO's reported score of the firm ability to raise external funds during the crisis in the samples bottom 3 deciles. "Unconstrained Credit" firms are those for which the CFO has reported a score in the sample's top 3 deciles.

Panel A: Lines of Credit	During Crisis	Before Crisis	Difference During – Before the Crisis
Small	24.654	25.123	-0.469
Large	21.445	20.306	1.139
Diff. Small – Large	3.208	4.817	
Private	25.840	25.774	0.066
Public	15.909	16.655	-0.745
Diff. Private – Public	9.931***	9.119***	
Non-Investment Grade	25.280	25.354	-0.074
Investment Grade	18.089	18.259	-0.170
Diff. Non-Inv. – Inv. Grade	7.191**	7.095**	
Constrained Credit	29.124	31.334	-2.210*
Unconstrained Credit	20.400	19.760	0.640
Diff. Constrained – Unconstrained	8.724**	11.574***	
Negative Cash Flow	29.250	30.400	-1.150
Positive Cash Flow	23.241	23.125	0.116
Diff. Negative – Positive Cash Flow	6.009*	7.275**	
Panel B: Cash Holdings	**During Crisis**	**Before Crisis**	**Difference During – Before the Crisis**
Small	12.989	13.265	-0.276
Large	9.399	9.823	-0.424
Diff. Small – Large	3.590	3.442	
Private	11.655	11.772	-0.117
Public	14.733	15.821	-1.087
Diff. Private – Public	-3.079	-4.049***	
Non-Investment Grade	12.018	12.161	-0.143
Investment Grade	13.340	14.391	-1.052
Diff. Non-Inv. – Inv. Grade	-1.322	-2.230	
Constrained Credit	9.252	12.020	-2.768***
Unconstrained Credit	14.379	13.332	1.047
Diff. Constrained – Unconstrained	-5.127**	-1.312	
Negative Cash Flow	8.984	12.366	-3.381***
Positive Cash Flow	13.016	12.543	0.473
Diff. Negative – Positive Cash Flow	-4.031*	-0.177	

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Panel C: LC Access and Drawdowns	Proportion of Firms w/ LCs > 0	Proportion of Firms w/ Difficulty in Renewing LCs	Proportion of Firms w/ Drawdowns > 0	Average Drawdowns (% of Maximum)
Small	0.746	0.207	0.692	42.633
Large	0.915	0.216	0.581	27.258
Diff. Small – Large	-0.169***	-0.009	0.112	15.375***
Private	0.797	0.229	0.686	41.719
Public	0.731	0.138	0.565	25.587
Diff. Private – Public	0.066	0.091*	0.121	16.132***
Non-Investment Grade	0.776	0.225	0.683	42.444
Investment Grade	0.815	0.139	0.571	20.786
Diff. Non-Inv. – Inv. Grade	-0.039	0.086	0.111	21.659***
Constrained Credit	0.676	0.414	0.782	53.855
Unconstrained Credit	0.833	0.031	0.525	25.443
Diff. Constrained – Unconstrained	-0.157***	0.384***	0.257***	28.412***
Negative Cash Flow	0.625	0.424	0.829	63.600
Positive Cash Flow	0.831	0.158	0.609	33.552
Diff. Negative – Positive Cash Flow	-0.206***	0.266***	0.219**	30.048***

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 6 – Lines of Credit by Firm Characteristics: Europe and Asia

Panel A of this table reports lines of credit as a percentage of total assets for European and Asian firms by characteristics before and during the crisis. Panel B reports proportions of firms with lines of credit and drawdowns conditional on having access to a line of credit as well as average drawdowns by firm characteristics. The data are from the CFO survey of the first quarter of 2009. We include all firms with the exception of financial, governmental, and nonprofit organizations. Firms are defined as "Small" if their sales are less than $1 billion, and "Large" otherwise. "Private" firms are those not listed in any stock exchange, while "Public" firms are listed on the NYSE, NASDAQ or AMEX. "Non-Investment Grade" firms have a credit rating of BB+ or below. "Investment Grade" firms are those with a credit rating BBB− or higher. "Constrained Credit" are those firms with a CFO's reported score of the firm ability to raise external funds during the crisis in the sample bottom 3 deciles. "Unconstrained Credit" firms are those where the CFO has reported a score in the sample top 3 deciles.

Panel A: Lines of Credit Europe	During Crisis	Before Crisis	Difference During − Before the Crisis
Small	28.221	27.652	0.570
Large	23.405	24.351	-0.946
Diff. Small − Large	4.816	3.300	
Private	29.914	29.444	0.470
Public	21.100	21.775	-0.675
Diff. Private − Public	8.814	7.669*	
Non-Investment Grade	28.929	29.857	-0.929
Investment Grade	21.321	19.273	2.048
Diff. Non-Inv. − Inv. Grade	7.607	10.584**	
Constrained Credit	31.857	30.762	1.095
Unconstrained Credit	26.773	28.682	-1.909
Diff. Constrained − Unconstrained	5.084	2.080	
Negative Cash Flow	17.350	18.700	-1.350
Positive Cash Flow	27.257	27.171	0.087
Diff. Negative − Positive Cash Flow	-9.907	-8.471	
Asia	During Crisis	Before Crisis	Difference During − Before the Crisis
Small	32.562	31.457	1.105
Large	39.000	31.235	7.765*
Diff. Small − Large	-6.438	0.222	
Private	34.330	33.443	0.886
Public	31.206	26.206	5.000**
Diff. Private − Public	3.124	7.237	
Non-Investment Grade	32.648	31.011	1.637
Investment Grade	35.839	32.645	3.194
Diff. Non-Inv. − Inv. Grade	-3.190	-1.634	
Constrained Credit	32.667	31.944	0.722
Unconstrained Credit	32.951	31.155	1.796
Diff. Constrained − Unconstrained	-0.285	0.789	
Negative Cash Flow	32.125	31.250	0.875
Positive Cash Flow	33.221	31.558	1.663
Diff. Negative − Positive Cash Flow	-1.096	-0.308	

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Panel B: LC Access and Drawdowns Europe	Proportion of Firms w/ LCs > 0	Proportion of Firms w/ Difficulty in Renewing LCs	Proportion of Firms w/ Drawdowns > 0	Average Drawdowns (% of Maximum)
Small	0.592	0.111	0.857	53.179
Large	0.824	0.193	0.767	30.400
Diff. Small – Large	-0.232***	-0.082	0.090	22.779***
Private	0.670	0.120	0.836	48.036
Public	0.648	0.160	0.806	40.258
Diff. Private – Public	0.022	-0.040	0.030	7.778
Non-Investment Grade	0.659	0.122	0.847	49.220
Investment Grade	0.667	0.173	0.778	36.519
Diff. Non-Inv. – Inv. Grade	-0.008	-0.051	0.070	12.702*
Constrained Credit	0.512	0.295	0.952	68.571
Unconstrained Credit	0.619	0.044	0.778	39.833
Diff. Constrained – Unconstrained	-0.107	0.251***	0.175*	28.738***
Negative Cash Flow	0.600	0.188	0.889	63.556
Positive Cash Flow	0.650	0.131	0.833	44.136
Diff. Negative – Positive Cash Flow	-0.050	0.057	0.056	19.419*
Asia	Proportion of Firms w/ LCs > 0	Proportion of Firms w/ Difficulty in Renewing LCs	Proportion of Firms w/ Drawdowns > 0	Average Drawdowns (% of Maximum)
Small	0.698	0.145	0.825	51.613
Large	0.815	0.143	0.786	39.214
Diff. Small – Large	-0.117	0.002	0.039	12.398
Private	0.734	0.138	0.794	46.088
Public	0.672	0.157	0.885	59.385
Diff. Private – Public	0.062	-0.019	-0.090	-13.296*
Non-Investment Grade	0.683	0.154	0.803	46.986
Investment Grade	0.818	0.109	0.870	58.348
Diff. Non-Inv. – Inv. Grade	-0.135*	0.046	-0.067	-11.362
Constrained Credit	0.952	0.318	0.933	65.333
Unconstrained Credit	0.683	0.125	0.808	47.410
Diff. Constrained – Unconstrained	0.270***	0.193**	0.126	17.923*
Negative Cash Flow	0.471	0.222	1.000	47.143
Positive Cash Flow	0.754	0.152	0.831	52.091
Diff. Negative – Positive Cash Flow	-0.283**	0.070	0.169	-4.948

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 7 – Correlations between Lines of Credit, Cash Holdings, and Drawdowns Before and During Crisis

This table reports correlation coefficients between lines of credit, cash holdings, and drawdowns before and during the crisis. Refer to Table 2 for detailed variable definitions. The data are from the CFO Survey of the U.S. Sample first quarter of 2009. We include all firms with the exception of financial, governmental, and nonprofit organizations.

	LCs During Crisis	LCs Before Crisis	Cash During Crisis	Cash Before Crisis	Drawdowns During Crisis
LCs During Crisis	1.000				
LCs Before Crisis	0.926***	1.000			
Cash Holdings During Crisis	-0.106*	-0.090	1.000		
Cash Holdings Before Crisis	-0.042	-0.022	0.863***	1.000	
Drawdowns During Crisis	0.241***	0.249***	-0.332***	-0.239***	1.000

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 8 – Drawdowns versus External Financing During the Crisis

This table reports mean comparison tests of the ratio of drawdowns to the sum of total external funds (drawdowns, equity issuances, short-term debt issuances, long-term debt issuances, and commercial paper issuances). "Constrained Category" includes firms that are small, private, non-investment grade rated, with a rating for access to external funds in the bottom 3 deciles, and with negative cash flows. "Unconstrained Category" includes firms that are large, public, investment-grade rated, with a rating for access to external funds in the top 3 deciles, and with positive cash flows. The data are from the CFO survey of the U.S. sample first quarter of 2009. We include all firms with the exception of financial, governmental and nonprofit organizations.

	Constrained Category	Unconstrained Category	Difference Constrained – Unconstrained
By Size	0.244	0.097	0.147*
By Ownership	0.253	0.035	0.218**
By Ratings	0.237	0.071	0.166*
By Access to Credit	0.305	0.070	0.234***
By Cash Flow	0.512	0.180	0.333**

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 9 – The Substitution between Cash Holdings, Cash Flows, Lines of Credit, and Drawdowns: Regression Analysis

This table reports OLS results from credit lines regressions. Columns 1 and 2 of Panel A use as dependent variable the ratio between the amount of lines of credit available to the sum of lines of credit plus cash holdings (similar to Sufi's (2009) specification). The dependent variable is the amount of lines of credit available as a percentage of total assets in columns 3 to 6. In Panel B, the dependent variable is the ratio between the amount of unused lines of credit available to the sum of lines of credit plus cash flow in Columns 1 and 2 (Sufi's (2009) specification). The dependent variable is the percentage drawn down from available lines of credit in columns 3 to 5. All regressions include a constant term (not reported). The data are from the CFO survey of the U.S. sample first quarter of 2009. Refer to Table 2 for detailed independent variable definitions. *t*-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations of a given industry.

Panel A: Lines of Credit	Dep. Var.: LC / (LC + Cash) (Sufi-like Specification)		Dep. Var.: LC / Assets (All Firms)		
	Public Firms	Private Firms			
	(1)	(2)	(3)	(4)	(5)
Cash Flow	0.471***	0.060	0.226**	0.240*	0.325**
	(2.64)	(0.31)	(1.97)	(1.92)	(2.20)
Cash Holdings				-0.192**	-0.161**
				(-2.33)	(-2.43)
Cash Flow×Cash Holdings					-0.424**
					(-2.33)
Large	0.108	0.191**	0.080**	0.076**	0.075**
	(1.20)	(2.37)	(2.47)	(2.45)	(2.45)
Public Firm			-0.089**	-0.056*	-0.061**
			(-2.50)	(-1.85)	(-2.04)
Investment Grade	0.026	-0.195**	-0.053	-0.079**	-0.077**
	(0.25)	(-2.31)	(-1.09)	(-2.12)	(-2.10)
Unconstrained Credit	0.093	-0.013***	-0.022	-0.015	-0.016
	(1.34)	(-2.58)	(-1.46)	(-0.80)	(-0.84)
Inv. Growth Prospects	-0.210	-0.121**	-0.035	-0.014	-0.024
	(-0.77)	(-2.11)	(-1.04)	(-0.40)	(-0.63)
Obs.	54	226	309	282	282
Adj.-R^2	0.092	0.056	0.087	0.112	0.120
Panel B: Drawdowns	**Dep. Var.: Unused LC / (Unused LC + Cash) (Sufi-like Specification)**		**Dep. Var.: Drawdowns / LC (All Firms)**		
	Public Firms	Private Firms			
	(1)	(2)	(3)	(4)	(5)
Cash Flow	0.129***	0.096	-0.643***	-0.496***	-0.571***
	(5.29)	(0.93)	(-4.35)	(-3.51)	(-2.57)
Cash Holdings				-0.763***	-0.847***
				(-5.28)	(-3.77)
Cash Flow×Cash Holdings					0.644
					(0.65)
Large	-0.009	0.042	-0.117**	-0.112***	-0.110***
	(-0.58)	(0.75)	(-2.41)	(-2.72)	(-2.67)
Public Firm			-0.047	-0.048	-0.045
			(-0.95)	(-1.18)	(-1.08)
Investment Grade	0.031	0.002	-0.093***	-0.069	-0.070
	(0.96)	(0.05)	(-3.37)	(-1.15)	(-1.14)
Unconstrained Credit	-0.003	0.022	-0.068**	-0.086**	-0.085**
	(-0.11)	(0.81)	(-2.31)	(-2.29)	(-2.26)
Inv. Growth Prospects	-0.045	0.097	-0.098	-0.140	-0.139
	(-0.88)	(1.38)	(-0.51)	(-0.66)	(-0.66)
Obs.	37	149	208	189	189
Adj.-R^2	0.055	0.023	0.161	0.249	0.250

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 10 – The Substitution between Cash Holdings, Cash Flows, Lines of Credit, and Drawdowns: Europe and Asia

This table reports OLS results from credit lines regressions of column 5 in Table 9. All regressions include a constant term (not reported). The data are from the CFO survey of the first quarter of 2009. Refer to Table 2 for detailed independent variable definitions. *t*-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations of a given industry.

	Dep. Var.: LC / Assets		Dep. Var.: Drawdowns /LC	
	Europe (1)	Asia (2)	Europe (3)	Asia (4)
Cash Flow	0.206***	0.499***	-0.344***	-0.971***
	(2.59)	(3.73)	(-2.63)	(-2.83)
Cash Holdings	-0.426***	0.067	-0.610***	-0.779***
	(-7.74)	(0.37)	(-5.03)	(-5.04)
Cash Flow×Cash Holdings	-0.061	-0.965*	-0.809	2.592**
	(-0.51)	(-1.66)	(-0.27)	(2.23)
Large	0.079***	0.107*	-0.139	-0.051
	(3.26)	(1.92)	(-0.91)	(-0.98)
Public Firm	-0.147***	-0.079***	-0.032	0.132
	(-3.50)	(-4.78)	(-0.26)	(1.30)
Investment Grade	-0.047	0.088*	-0.150	0.097**
	(-1.14)	(1.90)	(-1.51)	(2.13)
Unconstrained Credit	-0.003	-0.053*	-0.052	-0.165*
	(-0.08)	(-1.77)	(-0.54)	(-1.84)
Inv. Growth Prospects	0.061	0.048	-0.087	0.073
	(1.34)	(0.70)	(-0.61)	(0.44)
Obs.	117	132	67	73
Adj.-R^2	0.193	0.089	0.297	0.260

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 11 – Difficulty to Initiate/Renew a Line of Credit and Firm Characteristics: Probit Regressions

This table reports results from a probit regression where the dependent variable takes the value of 1 for firms that experienced difficulty in initiating/renewing a line of credit during crisis and zero otherwise. All regressions include a constant term (not reported). The data are from the CFO Survey of the U.S. sample first quarter 2009. Refer to Table 2 for detailed independent variable definitions. *t*-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations of a given industry.

	(1)	(2)	(3)
Cash Flow	-0.009*	-0.007	-0.018**
	(-1.79)	(-1.17)	(-2.32)
Cash Holdings		-0.014*	-0.025**
		(-1.69)	(-2.14)
Cash Flow×Cash Holdings			0.001**
			(2.19)
Large	0.165	-0.021	0.021
	(0.61)	(-0.08)	(0.07)
Public Firm	-0.668*	-0.334	-0.360
	(-1.71)	(-0.89)	(-0.94)
Investment Grade	-0.101	-0.046	-0.008
	(-0.36)	(-0.19)	(-0.04)
Unconstrained Credit	-0.800***	-1.03***	-1.056***
	(-8.22)	(-9.46)	(-8.85)
Inv. Growth Prospects	-0.007**	-0.009**	-0.008**
	(-2.04)	(-2.32)	(-2.04)
Obs.	318	286	286
Pseudo-R^2	0.116	0.154	0.168

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 12 – Lines of Credit Commitment Fee Structure Before and During the Crisis

This table reports loan commitment fee structure, variable rate markup on prime and LIBOR rates, and maturity for lines of credit in the U.S., Asia, and Europe before and during the crisis. The data are from the CFO survey of the second quarter of 2009. We include all firms with the exception of financial, governmental, and nonprofit organizations.

Panel A: U.S.	During Crisis (1)	Before Crisis (2)	Difference During – Before the Crisis (3)
Basis Point Commitment Fee	26.408	12.668	13.740***
Basis Point Markup on LIBOR/Prime Rate	182.610	124.144	58.467***
LC Maturity (in months)	27.559	30.133	-2.574***
Panel B: Europe			
Basis Point Commitment Fee	22.556	20.772	1.784
Basis Point Markup on LIBOR/Prime Rate	111.302	87.886	23.415*
LC Maturity (in months)	26.850	30.500	-3.650**
Panel C: Asia			
Basis Point Commitment Fee	12.509	8.854	3.655*
Basis Point Markup on LIBOR/Prime Rate	193.459	124.501	68.958***
LC Maturity (in months)	25.273	27.740	-2.468*

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 13 – Lines of Credit Commitment Fee Structure by Firm Characteristics

This table reports variable rate markup on prime and LIBOR rates and maturity of lines of credit by firm characteristics before and during the crisis. The data are from the CFO Survey of the U.S. sample second quarter of 2009. We include all firms with the exception of financial, governmental, and nonprofit organizations. Firms are defined as "Small" if their sales are less than $1 billion, and "Large" otherwise. "Private" firms are those not listed in any stock exchange, while "Public" firms are listed on the NYSE, NASDAQ or AMEX. "Non-Investment Grade" firms have a credit rating of BB+ or below. "Investment Grade" firms are those with a credit rating BBB– or higher. "Constrained Credit" are those firms with a CFO's reported score of the firm ability to raise external funds during the crisis in the sample bottom 3 deciles. "Unconstrained Credit" firms are those where the CFO has reported a score in the sample top 3 deciles.

Panel A: Basis Point Markup on LIBOR/Prime Rate	During Crisis	Before Crisis	Difference During – Before the Crisis
Small	189.473	127.511	61.962***
Large	152.300	109.272	43.028**
Diff. Small – Large	37.173	18.239	
Private	188.724	124.340	64.385***
Public	158.155	123.360	34.794*
Diff. Private – Public	30.569	0.980	
Non-Investment Grade	182.375	119.179	63.196***
Investment Grade	184.074	155.037	29.037
Diff. Non-Inv. – Inv. Grade	-1.699	-35.858	
Constrained Credit	328.808	191.366	137.442***
Unconstrained Credit	141.252	105.127	36.125***
Diff. Constrained – Unconstrained	187.556***	86.239***	
Negative Cash Flow	213.145	117.936	95.210***
Positive Cash Flow	184.127	128.424	55.702***
Diff. Negative – Positive Cash Flow	29.018	-10.488	
Panel B: LC Maturity (in months)	**During Crisis**	**Before Crisis**	**Difference During – Before the Crisis**
Small	25.093	26.780	-1.687
Large	37.289	43.368	-6.079***
Diff. Small – Large	-12.196***	-16.588***	
Private	24.967	26.424	-1.457
Public	38.135	45.270	-7.135***
Diff. Private – Public	-13.168***	-18.846***	
Non-Investment Grade	25.857	29.050	-3.193***
Investment Grade	37.704	36.593	1.111
Diff. Non-Inv. – Inv. Grade	-11.847***	-7.543*	
Constrained Credit	22.488	28.326	-5.837***
Unconstrained Credit	29.062	30.669	-1.607
Diff. Constrained – Unconstrained	-6.574*	-2.343	
Negative Cash Flow	20.536	23.000	-2.464
Positive Cash Flow	28.822	31.212	-2.390**
Diff. Negative – Positive Cash Flow	-8.286*	-8.212**	

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 14 – Lines of Credit Commitment Fees and Firm Characteristics

This table reports logit and OLS results from the commitment fee model based on Shockley and Thakor (1997). In Panel A, the dependent variable is equal to 1 if the firm reports a commitment fee for its outstanding line of credit and zero otherwise. In Panel B, the dependent variable is the commitment fee in basis points. All regressions include a constant term (not reported). The data are from the CFO survey of the U.S. sample second quarter of 2009. Refer to Table 2 for detailed independent variable definitions. *t*-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations of a given industry.

Panel A: Logit Model	Public Firms	Private Firms	All Firms			
Shockley-Thakor-like Specification	(1)	(2)	(3)	(4)	(5)	(6)
Cash Flow				-0.019	-0.022*	-0.015
				(-1.22)	(-1.66)	(-0.69)
Cash Holdings					-0.025**	-0.022*
					(-2.51)	(-1.68)
Cash Flow×Cash Holdings						0.000
						(-0.44)
Large	1.265	1.645***	1.406***	1.255***	1.272***	1.261***
	(1.37)	(3.56)	(3.08)	(3.02)	(3.17)	(3.06)
Public Firm			-1.001*	-0.923*	-0.985**	-0.967**
			(-1.66)	(-1.90)	(-2.08)	(-2.01)
Investment Grade	1.922	-0.187	0.118	0.254	0.071	0.080
	(1.28)	(-0.22)	(0.15)	(0.36)	(0.09)	(0.10)
Unconstrained Credit	-2.150	-0.124	-0.325	-0.319	-0.236	-0.221
	(-1.23)	(-0.61)	(-1.13)	(-1.57)	(-1.20)	(-1.01)
Size of LCs	0.034***	0.000	0.000	-0.001	-0.008	-0.009
	(3.62)	(0.02)	(0.05)	(-0.14)	(-0.94)	(-0.94)
Inv. Growth Prospects	-0.090***	0.005	-0.005	-0.005	-0.006	-0.007
	(-3.45)	(0.69)	(-0.88)	(-0.86)	(-0.94)	(-1.08)
LC Collateral Dummy (Yes=1)	0.680	0.481	0.580**	0.483**	0.438*	0.429*
	(0.64)	(1.55)	(2.30)	(2.02)	(1.75)	(1.70)
LC Maturity (in Months)	0.024	0.051***	0.045***	0.046***	0.045***	0.044***
	(0.66)	(4.22)	(4.08)	(3.72)	(3.61)	(3.42)
Obs.	36	141	177	165	160	160
Pseudo-R^2	0.393	0.142	0.129	0.138	0.156	0.157

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Panel B: OLS Model	Public Firms	Private Firms	All Firms			
	(1)	(2)	(3)	(4)	(5)	(6)
Cash Flow				-0.009	-0.010**	-0.020***
				(-1.20)	(-2.05)	(-4.98)
Cash Holdings					-0.014**	-0.015***
					(-2.27)	(-3.07)
Cash Flow×Cash Holdings						0.058***
						(6.08)
Large	-0.011*	-0.001	-0.004**	-0.003**	-0.002*	-0.003**
	(-1.72)	(-0.41)	(-2.50)	(-2.33)	(-1.95)	(-2.50)
Public Firm			-0.004*	-0.002	-0.002	-0.003
			(-1.90)	(-0.94)	(-1.07)	(-1.11)
Investment Grade	0.000	0.015***	0.011***	0.005***	0.005***	0.005***
	(-0.36)	(3.03)	(3.33)	(3.04)	(3.63)	(3.11)
Unconstrained Credit	-0.017***	-0.016***	-0.015***	-0.010***	-0.010***	-0.010***
	(-4.43)	(-4.27)	(-5.45)	(-6.77)	(-5.97)	(-6.29)
Size of LCs	-0.015**	0.002	0.003	0.003	0.002	0.002
	(-2.23)	(0.51)	(0.95)	(1.58)	(1.18)	(1.27)
Inv. Growth Prospects	-0.001	-0.016***	-0.015***	-0.010***	-0.010***	-0.009***
	(-0.19)	(-6.58)	(-4.81)	(-4.56)	(-5.82)	(-6.64)
LC Collateral Dummy (Yes=1)	-0.007***	0.002	0.000	0.001	0.002	0.003
	(-3.01)	(0.52)	(0.06)	(-0.23)	(-0.12)	(-0.25)
LC Maturity (in Months)	0.000**	0.000***	0.000***	0.000**	0.000**	0.000*
	(2.24)	(-3.09)	(-3.80)	(-2.30)	(-2.25)	(-1.87)
Obs.	21	74	95	90	92	90
R^2	0.649	0.433	0.384	0.343	0.369	0.393

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% (two-tail) test levels, respectively.

Table 15 - The Interplay between Cash Holdings and Lines of Credit in the Corporate Spending Process: All Policies

This table reports OLS and Instrumental Variable (IV) estimation results from investment regressions. Regressions include industry-fixed effects. The data are from the CFO survey of the U.S. sample first quarter of 2009. Refer to Table 2 for detailed variable definitions. Test-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations of a given industry using the 2-Step GMM estimator. The table also reports diagnostic statistics for instruments' overidentification (Hansen's *J*-stat *p*-val. reported) and first-stage *F*-test of excluded instruments (lowest *p*-val. reported).

	Planned Investment		Planned Tech Spending		Planned Employment	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Cash Holdings	-0.136	-0.565**	-0.003	-0.484*	-0.552**	-0.170
	(-0.52)	(-2.14)	(-0.02)	(-1.93)	(-2.12)	(-0.51)
LCs	-0.203***	-0.332***	-0.114	-0.219***	-0.009	-0.125*
	(-3.43)	(-3.00)	(-1.01)	(-2.58)	(-0.14)	(-1.73)
Cash Holdings×LCs	1.127*	1.814**	0.539	1.569***	2.665	1.438
	(1.78)	(2.53)	(1.19)	(2.75)	(1.55)	(0.76)
Large	0.023	0.018	0.019	0.021	0.026	0.027
	(0.62)	(0.54)	(0.85)	(0.88)	(1.50)	(1.54)
Public Firm	-0.061	-0.049	-0.112	-0.110	-0.017	-0.030*
	(-1.54)	(-1.26)	(-1.23)	(-1.21)	(-0.95)	(-1.94)
Investment Grade	0.028	0.031	0.109	0.120	0.011	-0.008
	(0.84)	(0.97)	(1.09)	(1.17)	(0.58)	(-0.42)
Unconstrained Credit	0.081***	0.084***	0.047*	0.052*	0.030***	0.024**
	(2.57)	(2.74)	(1.73)	(1.94)	(3.96)	(1.99)
Obs.	215	208	208	203	220	213
Adj.-R^2	0.033	0.016	0.037	0.022	0.142	0.071
Diagnostic Statistics						
Hansen's *J*Stat. (*p*-val.)		0.618		0.760		0.233
First-Stage *F*-test (lowest *p*-val)		0.000		0.000		0.000

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 16 - The Interplay between Cash Holdings and Drawdowns in the Corporate Spending Process: All Policies

This table reports OLS estimation results from investment regressions. Regressions include industry-fixed effects. The data are from the CFO survey of the U.S. sample first quarter of 2009. Refer to Table 2 for detailed variable definitions. Test-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations of a given industry.

	Planned Investment	Planned Tech Spending	Planned Employment
Cash Holdings	-0.352*	-0.216**	-0.026
	(-1.74)	(-2.05)	(-0.10)
Drawdowns	-0.142***	-0.099***	-0.077***
	(-4.49)	(-3.23)	(-3.2)
Cash Holdings×Drawdowns	1.416***	0.869***	0.190
	(3.01)	(2.83)	(0.46)
Large	0.014	0.032***	0.012
	(0.34)	(3.35)	(0.35)
Public Firm	-0.027	-0.008	-0.044**
	(-0.78)	(-0.43)	(-2.36)
Investment Grade	0.034	-0.023	0.004
	(0.66)	(-0.53)	(0.28)
Unconstrained Credit	0.123***	0.044***	0.019
	(3.72)	(2.99)	(0.83)
Obs.	176	172	181
Adj.-R^2	0.070	0.057	0.022

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Table 17 - The Interplay between Cash Holdings and Lines of Credit in the Investment Process Conditional on Growth Prospects

This table reports Instrumental Variable (IV) estimation results from investment regressions for firms below and above the sample median Investment Growth Prospects. The data are from the CFO survey of the U.S. sample first quarter of 2009. Refer to Table 2 for detailed variable definitions. Test-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations of a given industry using the 2-Step GMM estimator. The table also reports diagnostic statistics for instruments' overidentification (Hansen's *J*-stat *p*-val. reported) and first-stage *F*-test of excluded instruments (lowest *p*-val. reported).

	Below Median Investment Prospects		Above Median Investment Prospects	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Cash Holdings	0.200	-0.272	-0.708**	-0.790
	(0.52)	(-0.83)	(-2.45)	(-1.64)
LCs	0.157	-0.102	-0.561***	-0.461
	(1.26)	(-0.49)	(-3.90)	(-1.55)
Cash Holdings×LCs	-0.423	0.428	3.380***	3.499***
	(-0.46)	(0.48)	(6.76)	(2.58)
Large	0.028	0.030	0.039	0.041
	(0.58)	(0.63)	(0.75)	(1.00)
Public Firm	0.004	-0.017	-0.067	-0.053
	(0.05)	(-0.22)	(-1.58)	(-1.17)
Investment Grade	-0.041	-0.028	0.016	0.011
	(-0.45)	(-0.33)	(0.24)	(0.18)
Unconstrained Credit	-0.020	-0.037	0.107***	0.117***
	(-0.35)	(-0.66)	(3.80)	(6.07)
Obs.	102	100	111	106
Adj.-R^2	0.015	0.000	0.095	0.087
Diagnostic Statistics				
Hansen's *J*-Stat. (*p*-val.)		0.934		0.368
First-Stage *F*-test (lowest *p*-val)		0.000		0.000

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

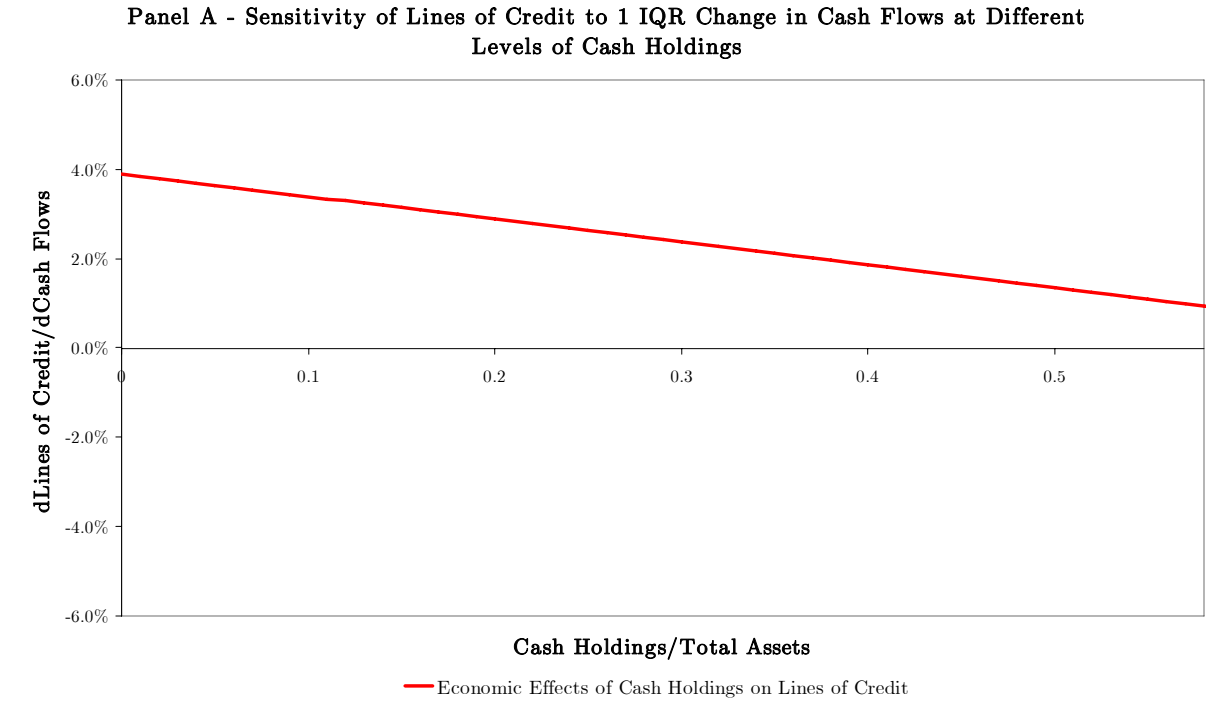
Table 18 - The Interplay between Cash Holdings and Lines of Credit for Planned Investments: Europe and Asia

This table reports OLS and Instrumental Variable (IV) estimation results from investment regressions. Regressions include industry-fixed effects and parallel those in Table 15, columns 1 and 2. The data are from the CFO survey of the European and Asian sample first quarter of 2009. Refer to Table 2 for detailed variable definitions. Test-statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations of a given industry using the 2-Step GMM estimator. The table also reports diagnostic statistics for instruments' overidentification (Hansen's *J*-stat *p*-val. reported) and first-stage *F*-test of excluded instruments (lowest *p*-val. reported).

	Europe		Asia	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Cash Holdings	-0.088	-0.287	0.286	1.209**
	(-0.20)	(-1.31)	(0.58)	(2.49)
LCs	-0.666***	-0.875***	-0.204	0.061
	(-3.97)	(-2.73)	(-0.84)	(0.31)
Cash Holdings×LCs	1.462***	1.626***	0.324	-0.844
	(3.80)	(5.54)	(0.48)	(-1.42)
Large	-0.279	-0.311*	0.099	0.111*
	(-1.57)	(-1.78)	(1.19)	(1.92)
Public Firm	0.107	0.136***	0.060	0.002
	(1.40)	(2.59)	(0.48)	(0.02)
Investment Grade	0.043	-0.081	0.075	0.112
	(0.25)	(-0.48)	(0.60)	(0.95)
Unconstrained Credit	0.163	0.260*	-0.157	-0.342
	(0.93)	(1.78)	(-0.58)	(-1.55)
Obs.	64	62	74	72
Adj.-R^2	0.172	0.132	0.117	0.022
Diagnostic Statistics				
Hansen's *J*-Stat. (*p*-val.)		0.160		0.514
First-Stage *F*-test (lowest *p*-val)		0.000		0.000

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% (two-tail) test levels, respectively.

Figure 1 – Economic Effect of Internal Liquidity on Lines of Credit



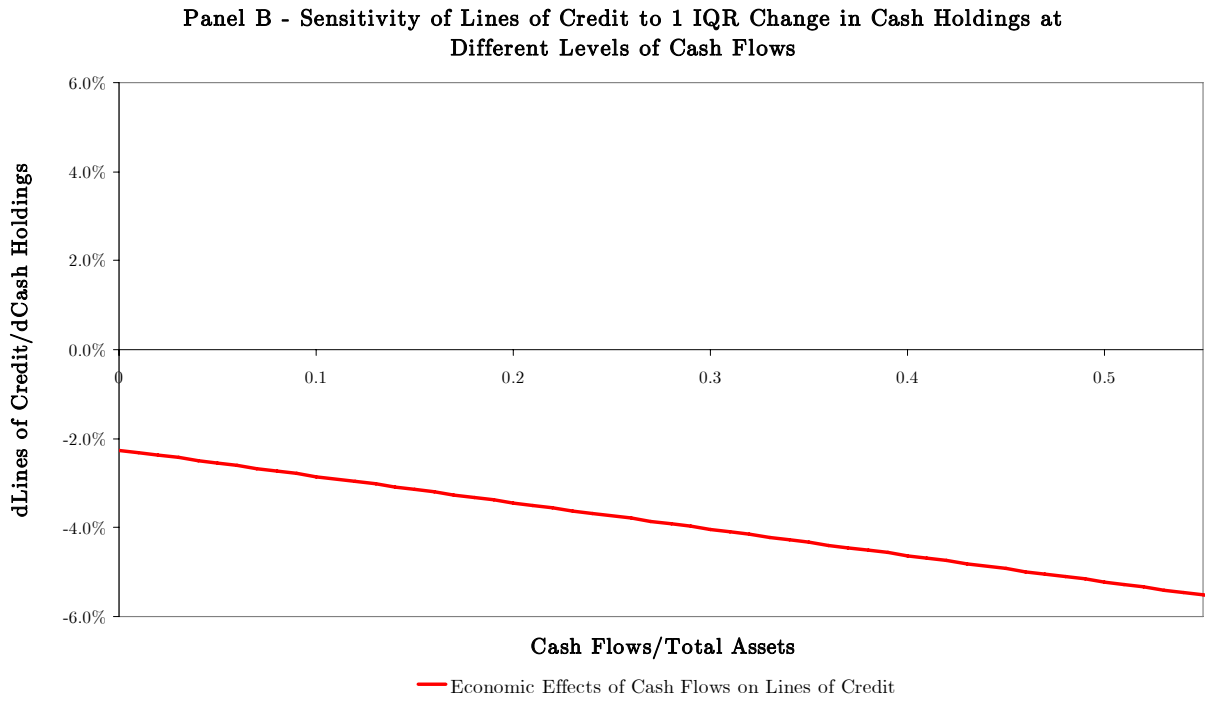
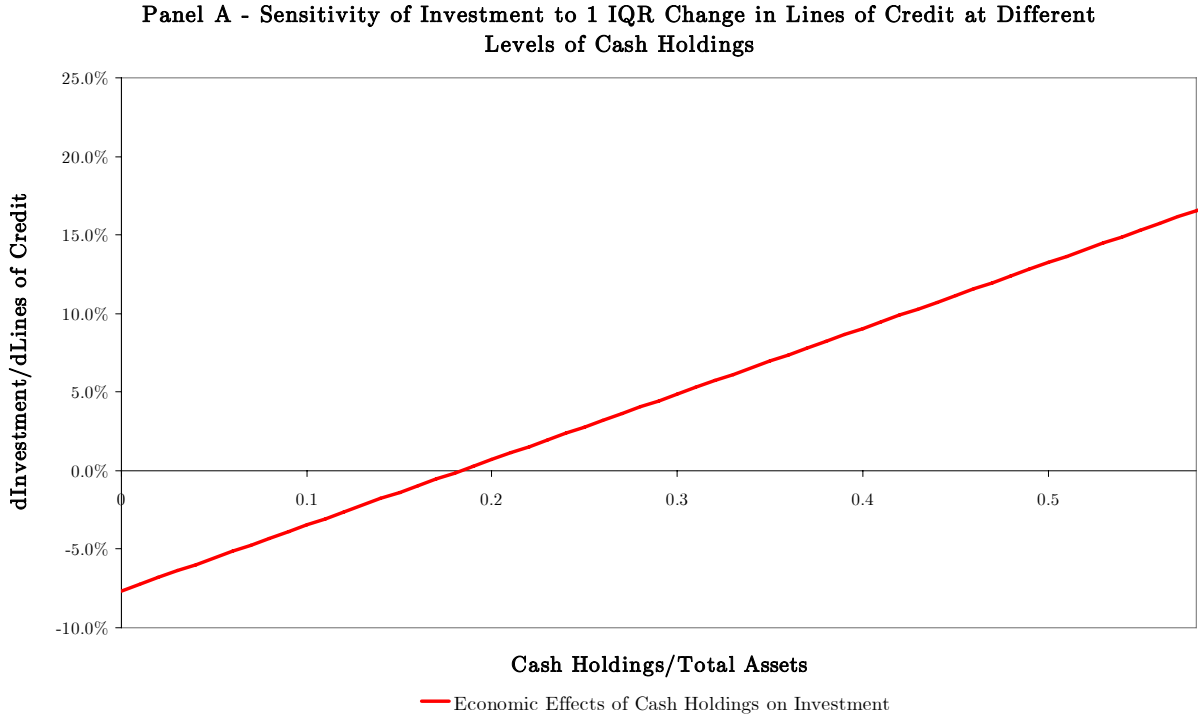


Figure 2 – Economic Effect of Liquidity on Investment



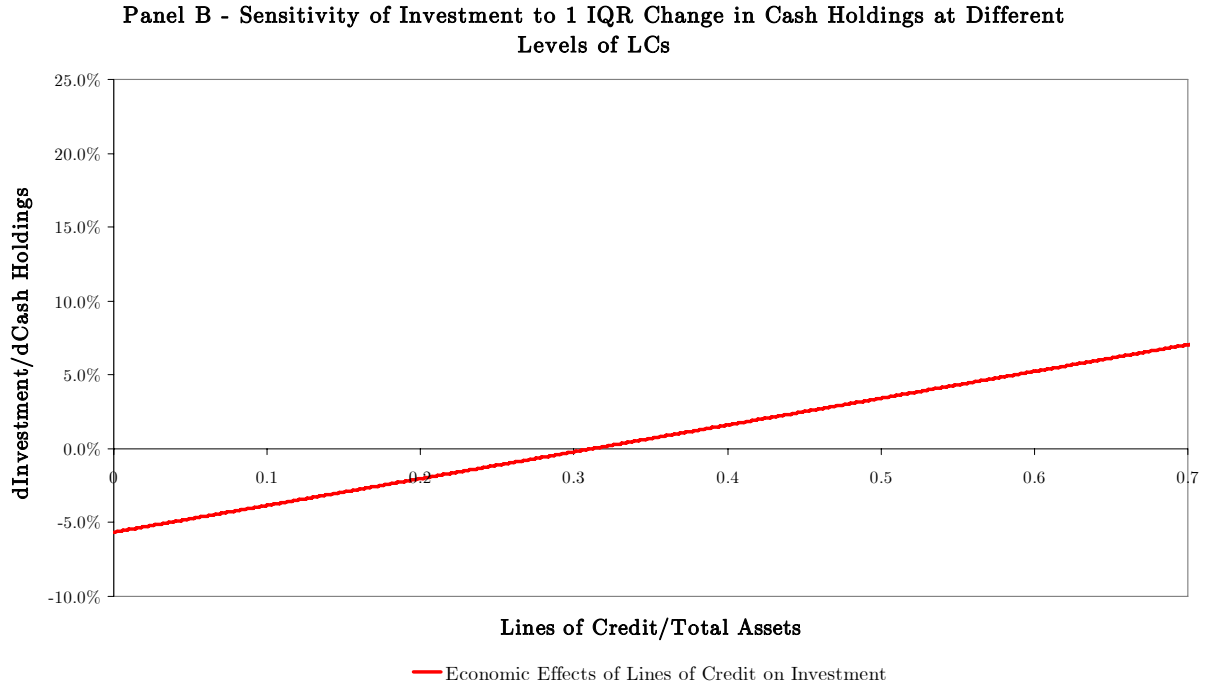


Figure 3 – Economic Effect of Liquidity on Investment by Growth Prospects