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# Access to Liquidity and Corporate Investment in Europe during the Financial Crisis\*

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**Abstract.** We use a unique data set to show how firms in Europe used credit lines during the financial crisis. We find that firms with restricted access to credit (small, private, non-investment-grade, and unprofitable) draw more funds from their credit lines during the crisis than their large, public, investment-grade, profitable counterparts. Interest spreads increased (especially in “market-based economies”), but commitment fees remained unchanged. Our findings suggest that credit lines did not dry up during the crisis and provided the liquidity that firms used to cope with this exceptional contraction. In particular, credit lines provided the liquidity companies needed to invest during the crisis.

*JEL Classification:* G31

## 1. Introduction

A topic of much interest in corporate finance research concerns the connections between access to credit and investment decisions. Identifying the direction of this relation is challenging because access to credit and real outcomes often move together. The 2008–09 crisis is characterized by an exceptional liquidity crunch. We rely on this large, unexpected shock to draw inferences about how firms manage internal and external liquidity, and to examine how interactions between different sources of liquidity affect corporate investment and other real activities.

There is a large literature on the role of internal funds as a source of financing for corporate investment (see Stein, 2003, for a review). According to this literature, liquid assets become crucial to corporate spending when firms face financing constraints (Fazzari, Hubbard, and Petersen, 1988) or when credit is tight in the aggregate economy (Bernanke and Gertler, 1989). While articles in this literature have focused on the impact of firms’ internal liquidity (cash holdings and cash flows) on their real policy variables, little is known about other sources of liquidity firms can draw on, such as bank credit lines.

\* We thank the *CFO* magazine for helping us conduct the survey, although we note that our analysis and conclusions do not necessarily reflect those of *CFO*. We are grateful for comments from an anonymous referee and Holger Muller (the editor). We retain responsibility for any errors.

Theory suggests that a bank line of credit can function as insurance against liquidity shortages (e.g., Holmstrom and Tirole, 1998; Thakor, 2005). Credit lines might become particularly important at times when firms have limited access to the capital markets, and differently from cash, credit lines have very low carry costs. As such, the optionality of access to liquidity that is created by credit lines raises a number of questions. Who resorts to credit lines when capital markets are in distress? How do credit lines interact with sources of internal liquidity? How are these credit facilities priced? Does line of credit access affect real-side decisions such as investment and employment? In this article, we study these and a number of related questions. We do so by examining the role played by credit lines during the 2008–09 financial crisis, a time when there was both an aggregate credit supply shortage and much variation in credit demand by firms. Our focus is on Europe, where the prevalence of “bank-based economies” is likely to make bank credit lines particularly relevant for liquidity management and corporate investment.

Our data come from two anonymous surveys of about 600 CFOs from Europe and North America conducted in the first and second quarters of 2009. The sampling universe is similar across the two surveys, but the actual respondents can be different. In the first survey, we ask CFOs about their holdings of cash, their access to bank lines of credit, their use of available lines (drawdown decisions), and their *planned (ex ante)* expenditure policies regarding investment, technology, and planned employment both in the first quarter of 2009 and the first quarter of 2008 (i.e., 1 year before). The purpose of the second survey is to gather information on the terms of the credit lines (e.g., commitment fees and maturity). This information is obtained for both the second quarter of 2009 and the second quarter of 2008. We focus on the European data, but whenever useful compare our results with evidence from the USA to give context to our conclusions.

To gauge the impact of liquidity management on real corporate policies during the crisis, we need to understand access to lines of credit by firm characteristics. We also need to learn more about drawdown policies and the pricing of credit facilities. Empirical work on this important source of financing is limited because data on lines of credit are not available from standard data sources. Accordingly, the first part of our analysis describes access to lines of credit based on firm characteristics, drawdown activities, and line pricing and maturity. To our knowledge, ours is the first article to examine all of these items with a focus on Europe during the crisis period.<sup>1</sup>

<sup>1</sup> Three contemporaneous survey-based articles study lines of credit. Lins, Servaes, and Tufano (2010) use data collected from twenty-nine countries in the summer of 2005 and provide an international perspective on how firms use lines of credit and cash holdings. Those authors do not have access to data from a crisis period. Campello, Graham, and Harvey (2010) (henceforth CGH, 2010) consider the crisis period, but they ignore interactions between lines of credit and firm internal liquidity. Finally, Campello, Giambona, Graham, and Harvey (2011) (henceforth CGGH, 2011) conduct analysis similar to ours but their focus is solely on US firms.

To characterize the role played by credit lines during the crisis, we first present basic statistics showing that the use of those facilities is widespread across European countries. Those same tabulations point to some notable patterns in the data. For example, firms that are private and have below-investment-grade ratings have generally higher lines-to-asset ratios than public and investment-grade firms. Interestingly, the overall availability of credit lines across those firm types does not seem to change much over the crisis period. What is more striking is the rate with which firms draw funds from their lines during the crisis. Firms that are small, private, junk-rated, and less profitable drew, on average, between 48% and 68% of their available credit, while their counterparts (large, public, investment-grade, profitable) drew only between 30% and 44% of the funds available. Our evidence suggests that firms that are more likely to face financial constraints did not experience a direct (quantity) rationing of credit from the lenders during the crisis.

We also study the interaction between internal liquidity (cash flows and cash holdings) and access to external liquidity (lines of credit). We document a negative relation between the probability that a firm will face difficulties renewing/initiating a credit facility and the availability of cash flows and cash holdings. Our findings highlight, among other things, the importance of internal liquidity in retaining/gaining access to external credit during the financial crisis.

Next, we study the pricing of credit lines. We find that during the crisis commitment fees increased by only 2 basis points on average in Europe, relative to 14 points for the USA. At the same time, interest rate markups increased, on average, by 28 basis points (but only by 16 basis points for firms located in bank-based economies). By comparison, interest markups in the USA increased by 67 basis points.

We also study how companies' cash holdings and credit lines affect real activities during the crisis. Surprisingly, this relation has not been explored in the literature until very recently (see CGGH, 2011). In this analysis, we regress capital investment on cash holdings, lines of credit, and an interaction term between these 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-fixed effects. Because we have information on cash and credit lines prior to the crisis, we can use that data as instruments in our estimations.<sup>2</sup>

Our evidence suggests that access to lines of credit boosts corporate investment plans during the crisis, but mainly for firms with large cash holdings. To give a concrete example, our estimates suggest that firms with cash holdings at the ninth decile of the sample distribution are able to increase planned investment by 3% if

<sup>2</sup> These instrumental variables regressions help alleviate concerns about empirical biases. Admittedly, however, their ability to do so is limited and hinge on a number of assumptions about the data process.

lines of credit shift from the 25th to 75th percentile of the sample distribution. In contrast, firms without lines of credit cut investment in order to increase their cash savings. Our findings suggest that pre-committed lines of credit might have ameliorated the negative impact of scarce credit on real activities in a period when the average firm is planning to cut investment by 11%.

Our evidence on the availability of lines of credit, drawdown activity, and pricing suggests that bank credit did not dry up during the crisis. Importantly, firms with generally limited access to credit—small, private, junk-rated, credit-limited, and less profitable firms—could draw down significant amounts of funds from their credit lines during the crisis (consistent with the pre-committed nature of these facilities). The overall evidence for European firms seems more consistent with a story where lenders increased interest rates on committed facilities (at least for firms located in market-based economies) because credit quality generally worsened during the crisis. At the same time, the fact that commitment fees remained unchanged during the same period suggests that direct rationing of credit supply was limited. Our findings generally support the theoretical argument that lines of credit provide insurance against states in which firms face liquidity shortages.

The remainder of the article is organized as follows. The next section provides a review of the literature and the priors motivating our analysis. We describe the survey data in Section 3. Section 4 describes the role of lines of credit during the financial crisis, their relation with different sources of internal liquidity (cash holdings and cash flows), and their pricing structure. Section 5 examines the interaction between liquidity and investment. 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 management. We also discuss the related empirical literature.

### 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 its contractual obligations (pay financiers, employees, suppliers) or invest in positive net present value projects. The insurance idea is behind theories dealing with the motivations for cash savings (e.g., Kim, Mauer, and Sherman 1998; Almeida, Campello, and Weisbach, 2004; Acharya, Almeida, and Campello,

2007) and theories explaining the optimality of credit lines (Boot, Thakor, and Udell, 1987; Holmstrom and Tirole, 1998; and Thakor, 2005).

Theories looking at the role of cash in providing for liquidity insurance have largely discussed its role in transferring funds across time (Almeida, Campello, and Weisbach, 2004) or across states of the world (Acharya, Almeida, and Campello, 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.

Credit line models 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.

Boot, Thakor, and Udell (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 the insurance provided by 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 prearranged low rate. To compensate for the loss, the bank charges an *ex ante* commitment fee.<sup>3</sup>

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.<sup>4</sup> 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 that credit lines provide for committed lending in the private sector, Holmstrom and Tirole (1998) also discuss aggregate implications for the insurance-like feature.

Despite the similarities among the literatures on cash holdings and lines of credit, there is no unifying theory considering these two sources of funding.<sup>5</sup> Both sets of

<sup>3</sup> Many other insurance-like characterizations can be found in the literature. Maksimovic (1990) provides a rationale 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.

<sup>4</sup> Evidence in Ivashina and Scharfstein (2010), CGH (2010), and Montoriol-Garriga and Sekeris (2009) 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).

<sup>5</sup> Acharya, Almeida, and Campello (2010) model firms’ use of cash versus credit lines as a function of their exposure to systematic risk.

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 shock to the supply of external financing. This observation motivates our empirical test strategy, which focus on a severe credit shock.

## 2.2 EMPIRICAL EVIDENCE

A large empirical literature on cash holdings has emerged in recent years. A partial list of papers includes Kim, Mauer, and Sherman (1998), Opler *et al.* (1999), Pinkowitz and Williamson (2001), Mikkelsen and Partch (2003), Almeida, Campello, and Weisbach (2004), Faulkender and Wang (2006), and Haushalter, Klasa, and Maxwell (2007). Bates, Kahle, and Stulz (2009) provide a 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) study credit line usage (drawdowns). Examining a sample of ninety nonfinancial 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, Lopez, and Saurina. (2007) find a negative relation between cash flows and drawdowns. Agarwal, Chomsisengphet, and Driscoll (2004) use a proprietary data set of lines extended by a single bank to small, privately held firms in the five US markets. They find that firms with higher profits establish fewer credit lines, but they have inconclusive results for drawdowns. Agarwal, Ambrose, and Liu (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 evidence that lines of credit are used as liquidity insurance and show how prices are determined from a contract design viewpoint.<sup>6</sup>

Starting with Sufi (2009), a number of papers have focused on the covenants attached to credit lines and their implications for corporate liquidity management. Using a sample of 300 public firms, Sufi finds that credit line access and usage is influenced by profitability. More specifically, he 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

<sup>6</sup> 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.

the firm has violated covenants, and finds that low cash flow is a strong predictor of violations. Nini, Smith, and Sufi (2009) document the existence of explicit credit line restrictions on capital expenditures. In general, poor performance triggers covenant violations, which in turn trigger larger renegotiation processes that eventually change the terms of the original loan.

Other articles focus on the feedback effects between macroeconomic aggregates (such as 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 (2010) find that many of the drawdowns observed in the current credit crisis were undertaken by low-credit quality firms. Their inferences find support in CGH (2010) and CGGH (2011).

Articles 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.

### 3. Data

#### 3.1 THE TWO SURVEYS

We obtain our data from two surveys conducted in the midst of the financial crisis of 2008–09. The first survey was conducted in the first quarter of 2009 (“the 2009Q1 survey”). In that survey, we ask managers about their firms' liquidity management and investment plans at the end of the first quarter of 2009. We also ask about information on those same variables 1 year before (first quarter of 2008). We conducted an additional survey in the second quarter of 2009 (“the 2009Q2 survey”) to obtain information on pricing for lines of credit at the end of the second quarter of 2009 and a year earlier (second quarter of 2008).

In each survey round, we sent out approximately 10,500 e-mail invitations to CFOs who are subscribers of *CFO* magazine and other executives who have taken part to previous surveys conducted by the Duke University. Exhibit I shows that our sample of respondents for the two surveys includes about 600 CFOs from twenty countries in Europe and North America. While the surveyed population is identical for both the 2009Q1 and the 2009Q2 surveys, the respondents are not necessarily the same across surveys. As such, the two surveys can be treated as two

“independent” cross-sections. Our analysis is based on the European sample, but we compare these results with the US evidence whenever it is interesting to give context to our findings.

### Exhibit I. Surveys conducted

	Quarter	Release date	Number of respondents	Used in tables
Survey 1	2009Q1	March 4 2009	580	1, 2, 3, 4, 5, 6, 8
Survey 2	2009Q2	June 3 2010	565	1, 7

Table I reports the country breakdown for the observations in our two surveys. The table also reports a breakdown of the countries according to whether they are considered “bank-based economies” or “market-based economies.” In this classification, we follow Demirguc-Kunt and Levine (2001), who separate between economy types on the basis of the importance of the stock market capitalization relative to the size of the banking sector. Following their approach, the majority of the countries in our sample, including France and Germany, can be classified as bank-based economies. These countries represent about 61% of all the observations used in our analysis. As we discuss below, the prevalence of bank-based economies

*Table I.* Type of financial system by country. This table reports type of financial system and number of observations by country. Our classification of bank-system economies is based on Demirguc-Kunt and Levine (2001), who define an economy as a bank-system economy on the basis of total banks’ assets as a proportion of market capitalization. The data are from the CFO survey of the European sample, first quarter of 2009 (2009Q1) and second quarter of 2009 (2009Q2). The 2009Q1 survey includes information for the same respondents during the first quarter of 2009 and a year earlier (first quarter 2008). The 2009Q2 survey includes information for the same respondents during the second quarter of 2009 and a year earlier (second quarter 2008). The sample includes all firms except financial, governmental, and nonprofit organizations.

Country	2009Q1 survey	2009Q2 survey	Bank-system economy, Demirguc-Kunt and Levine (2001) (yes = 1)
Austria	7	2	1
Belgium	9	6	1
Denmark	8	7	0
Finland	9	6	1
France	23	22	1
Germany	13	19	1
Greece	6	3	1
Italy	5	3	1
The Netherlands	14	20	0
Portugal	9	11	1
Spain	8	10	1
Sweden	18	14	0
Switzerland	5	1	0
UK	26	21	0
Other	24	17	N.A.

in our sample could explain differences in access to credit for European and US firms during the financial crisis.

Our premise is that a test of theories dealing with firm's choice of liquidity tools such as cash holdings and lines of credit should have more power when access to liquidity becomes particularly important (during a credit squeeze). We ask CFOs about 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 for investment, technology, and employment expenditures. As 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 during 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.

The main limitation of our survey approach is that we can only rely on one cross-section of firms. Therefore, it is not possible to control for unobserved firm-fixed effects using a within estimator. However, we do have access to lagged values for some of the key variables used in this study, including cash holdings and lines of credit, which we use in instrumental variable (IV) regressions. Finally, bearing in mind the limitations of a survey instrument, we can estimate 2008–09 difference-in-differences (DID) estimates for some quantities of interest.

### 3.2 DESCRIPTIVE STATISTICS

Table II presents descriptive statistics for our European sample. The table includes information on lines of credit and other liquidity variables, such as cash holdings and cash flow; firm characteristics, such as size or listing in a public exchange; and real activities, including CFOs' planned percentage changes over the next 12 months in investment, technology spending, and employment. On average, firms planned to cut investments by about 11% for 2009–10. This is about five times as much the cut planned for technology spending. By comparison, in the USA the planned cut in investment was 15%.

Table II also shows evidence of the widespread use of lines of credit by European firms. On average, lines of credit represent about 27% of total assets, compared to about 14% for cash holdings and 12% for cash flows. The averages reported in Table II seem to imply that lines of credit have not noticeably changed during the financial crisis, but further analysis below gives context to these aggregate numbers. In the USA, lines of credit represent 24% of total assets, while cash holdings represent 12% of assets.

*Table II.* Summary statistics. This table reports summary statistics for the main variables. All data are from the CFO survey of the first quarter of 2009. The survey includes information for the same respondents during the first quarter of 2009 and a year earlier (first quarter 2008). The sample includes all firms except financial, governmental, and nonprofit organizations. “Planned investments,” “planned technology,” and “planned employment” are expected percentage changes in these variables by the CFO over the next 12 months. “Cash holdings” is the ratio of cash holdings and marketable securities total assets in percentage terms. LCs are bank lines of credit as a percentage of total assets. “Investment growth prospects” is the rating of the firm’s growth opportunities provided by the CFO, ranging from 0 (no growth opportunities) to 100 (excellent growth opportunities). “Cash flow” is return on assets in the year 2008 in percentage terms. “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 0 otherwise. “Investment grade” is a dummy variable that takes a value of 1 if the firm has a rating of BBB– or higher, and 0 otherwise. “Public firm” is a dummy variable taking a value of 1 if the firm is publicly listed and 0 otherwise. “Drawdown” is the percentage of credit drawn from total credit line. “Access to credit” is the CFO’s reported score of the firm ability to raise external funds during the crisis, ranging from 0 (no access to external funds) to 100 (unlimited access to external funds).

Variables (%)	Descriptive statistics					Observations
	Mean	Standard deviation	25th percentile	50th percentile	75th percentile	
Planned investments	−11.2	42.5	−25.0	−10.0	0.0	120
Planned technology	−1.7	54.0	−10.0	0.0	1.0	101
Planned employment	−6.4	15.5	−10.0	−5.0	0.0	127
Cash holdings (2009Q1)	14.2	17.7	2.8	8.0	20.0	148
Cash holdings (2008Q1)	15.3	18.9	4.0	10.0	20.0	146
LCs (2009Q1)	27.0	24.9	10.0	20.0	40.0	105
LCs (2008Q1)	26.5	23.2	10.0	20.0	40.0	103
Investment growth prospects	63.9	23.6	50.0	70.0	80.0	181
Cash flow	11.9	16.2	5.0	10.0	18.0	146
Large	31.0	46.0	0.0	0.0	100.0	183
Investment grade	28.0	45.0	0.0	0.0	100.0	183
Public firm	41.0	49.0	0.0	0.0	100.0	183
Drawdowns	44.2	34.2	10.0	50.0	75.0	91
Access to credit	57.9	27.8	42.5	60.0	80.0	172

Table II also shows that only 41% of firms in our European sample are publicly listed (the rates are lower in the USA). This is a unique feature of our data relative to other corporate finance studies, which usually rely on public firm data. About one in three of our sample firms have revenues higher than \$1 billion and have an investment-grade rating for their debt.

The numbers in Table III show considerable cross-country variation in the proportion of firms with access to lines of credit. Lines of credit as a percentage of total assets are low in the UK and Sweden relative to France, Germany, and the Netherlands. Notably, UK firms do not generally have larger cash holdings relative to firms with more access to lines of credit.

Looking closely at cross-country patterns of credit lines usage in Europe, we find that those facilities are a particularly important source of liquidity in bank-based

*Table III.* Lines of credit and cash holdings by country. This table reports the number of observations by country of headquarters. The table also reports the percentage of firms with available lines of credit (LC) as well as lines of credit (LC/A) and cash holdings (Cash/A) as a percentage of total assets before and during the crisis. The data are from the CFO survey of the European sample, first quarter of 2009. The survey includes information for the same respondents during the first quarter of 2009 and a year earlier (first quarter 2008). The sample includes all firms except financial, governmental, and nonprofit organizations.

Country	Observations	Proportion of firms with LC	Average LC/A during crisis	Average LC/A before crisis	Average Cash/A during crisis	Average Cash/A before crisis
Austria	7	83.3	21.8	27.5	15.8	16.3
Belgium	9	66.7	47.0	29.3	7.5	12.8
Denmark	8	85.7	37.8	36.0	9.4	9.8
Finland	9	55.6	16.8	17.6	19.5	19.4
France	23	72.2	27.5	25.6	14.8	19.3
Germany	13	50.0	26.8	25.0	8.1	8.6
Greece	6	100.0	49.3	41.4	23.2	25.0
Italy	5	33.3	31.0	38.5	17.5	20.0
Luxembourg	3	100.0	41.7	38.3	2.5	2.5
The Netherlands	14	91.7	35.1	33.6	11.3	11.4
Portugal	9	87.5	27.6	27.9	5.5	5.0
Russia	5	60.0	27.7	30.0	12.8	8.2
Spain	8	85.7	22.0	27.8	11.5	16.5
Sweden	18	58.3	22.6	24.3	13.3	13.8
Switzerland	5	75.0	15.0	14.0	14.5	9.3
UK	26	31.6	12.0	16.2	15.8	18.1
Other	16	77.8	25.2	24.0	5.1	6.8

*Table IV.* Lines of credit and cash holdings by industry. This table reports the percentage of firms with available lines of credit (LC) by industry. The table also reports lines of credit (LC/A) and cash holdings (Cash/A) as a percentage of total assets before and during the crisis. The data are from the CFO survey of the European sample, first quarter of 2009. The survey includes information for the same respondents during the first quarter of 2009 and a year earlier (first quarter 2008). The sample includes all firms except financial, governmental, and nonprofit organizations.

Industry	Percentage of firms with LC	Average LC/A during crisis	Average LC/A before crisis	Average cash/A during crisis	Average cash/A before crisis
Retail/wholesale	63.6	34.3	33.9	14.5	15.2
Manufacturing	80.3	26.6	24.7	11.8	13.2
Mining	90.0	14.0	16.5	7.7	8.3
Transportation	100.0	22.5	22.5	2.5	6.0
Communication	36.4	16.0	17.5	12.7	13.2
Software/biotech	28.6	11.5	8.0	26.4	30.5
Services	52.4	20.5	21.7	21.4	22.6
Health care	64.3	26.9	28.9	14.3	12.0

economies vis-à-vis market-based economies. For example, the percentage of firms reporting access to lines of credit is 72% in bank-based economies versus only 59% in market-based economies. In addition, the average lines-to-assets ratio is 29% for firms from bank-based versus 22% for market-based economies.

Table IV shows that there is significant cross-industry variation in the proportion of companies with a line of credit. In Europe, this proportion ranges from 29% of biotech firms with a line of credit to 100% for transportation. The table also points to the possibility of a broad substitution effect between lines of credit and cash savings across industries. For instance, 14% of health care firms' assets are composed by cash, compared to only 2.5% for firms in the transportation industry. We return to these issues in the firm-level tests in Section 4.

#### 4. Lines of Credit, Financing Conditions, and Internal Liquidity

In this section, we investigate the effects of the crisis on the availability of bank credit. From a policy standpoint, this question is important for Europe because most of the firms are located in bank-based economies, where bank credit is the most important channel of debt financing (Demirguc-Kunt and Levine, 2001). We first contrast available lines of credit, drawdown activities, and cash holdings both before and during the peak of the crisis. In this analysis, we separate firms in two groups according to whether they have "limited" or "easy" access to credit (defined shortly). We then study the importance of internal liquidity (cash flows and cash holdings) for the ability of a firm to retain/gain access to credit lines. Finally, we analyze the effect of the crisis on pricing of lines of credit and commitment fees, separating between bank-based economies and market-based economies.

##### 4.1 CASH HOLDINGS AND LINES OF CREDIT: UNIVARIATE ANALYSIS ON ACCESS AND USAGE

Table V reports mean comparison tests for cash holdings, lines of credit, and drawdowns. One of the objectives of our study is to understand whether lines of credit dried up during the credit crisis. If the market for credit lines did not function well during this period, one should expect this effect to be stronger for firms that are more likely to face credit frictions. For this purpose, we split firms in two different groups depending on whether they have "limited" or "easy" access to credit. We define firms as "small," "private," "non-investment-grade," "credit-constrained," and "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 bottom 3 deciles for access to external funds during the crisis,<sup>7</sup> and they reported a negative cash flow in the fiscal year

<sup>7</sup> Managers rate (on a 0–100 scale) their access to external funds. Summary information is shown in Table II.

*Table V.* Lines of credit by firm characteristics: Europe. This table reports lines of credit (Panel A) and cash holdings (Panel B) as a percentage of total assets, conditional on firm characteristics, for European firms before and during the crisis. Panel C reports proportions of firms with lines of credit (LC) 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 European sample, first quarter of 2009. The survey includes information for the same respondents during the first quarter of 2009 and a year earlier (first quarter 2008). The sample includes all firms except 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 in a stock exchange. “Non-investment-grade” firms are unrated or have a credit rating of BB+ or below. “Investment-grade” firms are those with a credit rating BBB– or higher. “Credit-constrained” firms are those with a CFO’s reported score of the firm’s ability to raise external funds during the crisis in the bottom 3 deciles. “Credit-unconstrained” firms are those where the CFO has reported a score in the top 3 deciles. Firms that are small, private, non-investment-grade, credit-constrained, and with negative cash flows are classified as “limited-credit category” firms. Firms that are large, public, investment-grade, credit-unconstrained, and with positive cash flows are classified as “easy-credit category” firms. The table also reports in parentheses the difference between the change in available lines of credit and cash holdings during the crisis period (during minus before the crisis) for firms in the “limited-credit category” and for those in the “easy-credit category” (DID). “\*\*\*,” “\*\*,” and “\*” indicate statistical significance at the 1%, 5%, and 10% (two-tailed) test levels, respectively.

Panel A: Lines of credit	During crisis	Before crisis	Difference, during – before the crisis (DID)
Limited versus easy-credit categories			
Small	28.22	27.65	0.57
Large	23.41	24.35	–0.95
Difference	4.82	3.30	(1.52)
Private	29.91	29.44	0.47
Public	21.10	21.78	–0.68
Difference	8.81	7.67*	(1.15)
Non-investment grade	28.93	29.86	–0.93
Investment grade	21.32	19.27	2.05
Difference	7.61	10.58**	(–2.98*)
Credit constrained	26.77	28.68	–1.91
Credit unconstrained	31.86	30.76	1.10
Difference	–5.08	–2.08	(–3.01)
Negative cash flow	17.35	18.70	–1.35
Positive cash flow	27.26	27.17	0.09
Difference	–9.91	–8.47	(–1.44)
Panel B: Cash holdings			
During crisis	Before crisis	Difference, during – before the crisis (DID)	
Limited versus easy-credit categories			
Small	16.47	17.75	–1.29*
Large	9.35	9.95	–0.60
Difference	7.12**	7.80**	(–0.69)

(Continued)

Table V. (Continued)

Private	17.29	18.91	-1.62**	
Public	10.09	10.40	-0.31	
Difference	7.20**	8.51***	(-1.31)	
Non-investment grade	11.48	12.82	-1.34**	
Investment grade	20.21	20.74	-0.53	
Difference	-8.73***	-7.92**	(-0.81)	
Credit constrained	18.38	20.99	-2.62*	
Credit unconstrained	15.88	16.21	-0.32	
Difference	2.50	4.78	(-2.30)	
Negative cash flow	6.07	10.23	-4.17	
Positive cash flow	16.46	17.29	-0.83	
Difference	-10.39	-7.06	(-3.34*)	

  

Panel C: LC access and drawdowns	Proportion of firms with LCs > 0	Proportion of firms with difficulty in renewing LCs	Proportion of firms with drawdowns > 0	Average drawdowns (% of maximum)
Limited versus easy-credit categories				
Small	0.59	0.11	0.86	53.18
Large	0.82	0.19	0.77	30.40
Difference	-0.23***	-0.08	0.09	22.78***
Private	0.67	0.12	0.84	48.04
Public	0.65	0.16	0.81	40.26
Difference	0.02	-0.04	0.03	7.78
Non-investment grade	0.66	0.12	0.85	49.22
Investment grade	0.67	0.17	0.78	36.52
Difference	-0.01	-0.05	0.07	12.70*
Credit constrained	0.51	0.30	0.95	68.57
Credit unconstrained	0.62	0.04	0.78	39.83
Difference	-0.11	0.25***	0.18*	28.74***
Negative cash flow	0.60	0.19	0.89	63.56
Positive cash flow	0.65	0.13	0.83	44.14
Difference	-0.05	0.06	0.06	19.42*

2008. To shorten the exposition, we denote these firms generally as “limited-credit category.” We call the counterparts of the firm types just described, respectively, as “large,” “public,” “investment-grade,” “credit-unconstrained,” and “positive cash flow” types. When useful, we denote these firms collectively as “easy-credit category.”

Panel A of Table V indicates that lines of credit vary significantly across firm types. In particular, firms in the “limited-credit category” generally have large credit facilities both before and during the crisis. These firms are most likely to be affected by negative shocks to the economy (Gertler and Gilchrist, 1994) and are most likely to rely on credit lines as a result (CGH, 2010; Ivashina and Scharfstein, 2010).

Panel A also suggests that during the first quarter of 2009, there was no significant decline in the lines-to-asset ratio for our sample firms, relative to the previous year. This is true for firms in the “easy-credit category” as well as firms in the “limited-credit category.” The evidence for the “limited-credit category” is particularly interesting. It suggests that lines of credit provided the liquidity that firms needed to deal with the crisis, including firms that are usually seen as financially constrained. Notably, the differences between the 2008–09 change in the availability of lines for firms in the “limited-credit category” and those in the “easy-credit category” (DID) are economically small and statistically insignificant. For example, the availability of lines of credit increased by 0.57% for “small” firms in the 2008–09 period, and decreased by 0.95% for “large” firms. Accordingly, the DID credit lines estimate for the “small” versus “large” contrast is only 1.52%; this estimate is statistically insignificant. We reach very similar conclusions across other firm categories, with the exception of the “non-investment-grade” versus “investment-grade” contrast. In this case, the DID estimate is statistically significant at the 10% level, but still economically small (only  $-2.98\%$ ).

Panel C of Table V shows that firms in the “limited-credit category” are more likely to draw funds from their lines (frequency), and draw down more funds from their available lines as a percentage of the total line amount (volume). We show later that interest markups have changed significantly during the crisis in the USA. In Europe, only firms located in market-based economies experienced a sizable increase in interest markups. Interestingly, commitment fees did not increase significantly in Europe during the financial crisis, while US firms experienced an average increase of about 14 basis points. The pricing evidence for European firms seems consistent with a story where lenders increased the average interest markups (at least for firms located in market-based economies) because credit quality has deteriorated during the crisis, but the fact that commitment fees did not generally increase in Europe suggests that the rationing of credit was limited.

The evidence that the terms of credit facilities became tighter in the USA than in Europe during the crisis is possibly related to the fact that 61% of respondents in our European survey are located in bank-based economies. It is widely believed that firm–bank relationships are particularly closer in those economies (see, among others, Rajan and Zingales, 1995; Demirguc-Kunt and Levine, 2001). In that case, banks might be more reluctant to cut credit to their corporate borrowers (impose severe quantity constraints). At the same time, in light of the increase in systemic risk during the crisis, banks might change other terms of the lines they offer to firms (such as interest markups).

Panel B of Table V focuses on cash holdings. The evidence suggests that cash holdings declined during the crisis period especially for firms in the “limited-credit category.” The drop in cash savings during the crisis is significant among 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% in the period. This change is economically significant relative to the sample average cash holdings of 14%. Interestingly, however, the differences between the 2009Q1–2008Q1 change in cash holdings for firms in the “limited-credit category” and those in the “easy-credit category” (DID estimates) are economically small and statistically insignificant. Overall, the evidence in Panel B suggests that firms in the “limited-credit category” did not rely significantly more on cash reserves to deal with the crisis relative to firms in the “easy-credit category.” This might be explained by their ability to draw down from existing lines of credit during the crisis.

Panel C of Table V focuses on access to lines of credit and drawdowns.<sup>8</sup> Column 1 shows that the proportion of firms with access to a credit line facility is generally larger among firms in the “easy-credit category.” These differences are statistically significant for the size partition using a two-tail proportional difference test. Recall that Panel A reports that the average line of credit is usually larger (as a proportion of total assets) for firms in the “limited-credit category.” The evidence in Panels A and C together suggest that firms in the “easy-credit category” are more likely to have access to credit facilities, but their lines of credit are generally 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 30% of “credit-constrained” firms have difficulties obtaining or maintaining a line of credit during the financial crisis, compared to only 4% of “credit-unconstrained” firms. The pattern is less clear across other different credit constraints categories. Perhaps not surprisingly, column 3 shows that “credit-constrained” firms are generally more likely to rely on their lines of credit during the crisis, probably in anticipation of being denied the renewal of a line in the future (cf. CGH, 2010). Column 4 shows that “credit-constrained” firms also draw down significantly more relative to their counterparts. For instance, the average small firm draws down 53% of its credit facilities compared to only 30% on average for the large firm partition. Credit-constrained firms and firms with negative profits draw down 69% and 64% of their credit line maximums, respectively.

#### 4.2 INTERNAL LIQUIDITY AND THE DIFFICULTY IN NEGOTIATING A CREDIT LINE

Our findings thus far suggest that line availability did not decrease significantly during the credit crisis. It is therefore important that we understand what factors

<sup>8</sup> Unfortunately, we did not gather information on drawdown activity prior to the crisis period. Therefore, we cannot report in Panel C a comparative analysis of drawdowns from before the crisis to the peak of the crisis, similar to what we do in Panels A and B.

allowed firms to retain access to credit lines. This section investigates this issue by focusing on the role of internal liquidity (cash flows and cash holdings), which presumably, could minimize difficulties in initiating or renewing a credit line.

Our analysis is based on the estimation of a probit model. We report our estimation results in Table VI. The dependent variable in the regressions is an indicator that assumes the value of 1 if the firm reports difficulties in initiating/renewing a line and 0 otherwise.<sup>9</sup> The independent variables include proxies for investment growth prospects, size, ownership form, credit quality, and access to external credit.

*Table VI.* Difficulty in initiating/renewing a line of credit: 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 0 otherwise. Regressions include a constant term (unreported). The data are from the CFO survey of the European sample, first quarter 2009. The survey includes information for the same respondents during the first quarter of 2009 and a year earlier (first quarter 2008). Independent variables' definitions are reported in Table I. *t* statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations within industry. “\*\*\*,” “\*\*,” and “\*” indicate statistical significance at the 1%, 5%, and 10% (two-tailed) test levels, respectively.

	(1)	(2)	(3)
Cash flow	-0.017** (-2.04)		-0.019* (-1.73)
Cash holdings		-0.021** (-2.10)	-0.016* (-1.74)
Large	0.632* (1.70)	0.424 (1.38)	0.528 (1.40)
Public firm	0.179 (0.81)	0.075 (0.32)	0.121 (0.42)
Investment grade	0.280 (1.01)	0.209 (0.54)	0.327 (0.92)
Credit unconstrained	-0.675** (-2.43)	-0.507 (-1.47)	-0.588* (-1.90)
Investment growth prospects	-0.011 (-1.47)	-0.010 (-1.35)	-0.013 (-1.42)
Observations	142	144	128
Pseudo- <i>R</i> <sup>2</sup>	0.144	0.099	0.158

<sup>9</sup> We discard firms that do not respond to this question, but our results do not change if we set missing values to 0.

These proxies obtain the expected coefficients. For example, credit-unconstrained firms are less likely to face difficulties in obtaining or maintaining lines of credit. More importantly, we find that the availability of cash flows and cash holdings reduce the likelihood that a firm will face difficulty in initiating/renewing a line of credit during the financial crisis. These findings highlight the importance of internal liquidity to retain access to external credit during the crisis. They suggest that banks provided firms with access to external funds for as long as firms had sufficiently high levels of cash or were minimally profitable.

#### 4.3 COMMITMENT FEES AND INTEREST MARKUPS FOR LINES OF CREDIT

Our results suggest that access to lines of credit did not dry up during the credit crisis. It is possible, however, that while lenders allowed firms to retain access to their credit lines, the terms of these facilities became tighter. In this section, we investigate the pricing structure of lines of credit during the crisis in Europe, with an emphasis on the differences between bank-based and market-based economies.

With this purpose in mind, in the second quarter of 2009 we surveyed CFOs to collect pricing data on credit lines. The new survey includes information on basis point commitment fees that firms pay to maintain the availability of credit lines, markup interest rates on LIBOR/Prime rate on drawdowns,<sup>10</sup> and line maturity.

Table VII provides descriptive statistics on line pricing both before and during the peak of the financial crisis. We find that the markup on LIBOR/Prime rate has increased sharply in both Europe and the USA. This could be explained by a deterioration of borrowers' quality during the credit crisis. On average, interest markups increased by 28 basis points in Europe. However, the increase is only 16 basis points for firms located in bank-based economies relative to 59 basis points for firms located in market-based economies. By comparison, the markup increased by about 64 basis points in the USA during the financial crisis. Table VII also shows that credit lines tenor dropped during the crisis by about 3.7 months in Europe and by 2.6 months in the USA. For the European sample, we find that the average tenor decreased by 5 months for the subsample of bank-based economies, while firms operating in market-based economies actually experienced a small increase in the average tenor. Notably, commitment fees increased only modestly in Europe during the crisis (1.5 basis points in bank-based economies versus 2.8 points in market-based economies). The fact that these fees remained essentially unchanged suggests only a modest credit rationing based on pricing for Europe. By comparison, in the

<sup>10</sup> Most firms report basis point markups for their lines of credit on both LIBOR and Prime rates.

*Table VII.* Lines of credit fee structure and maturity before and during the crisis. This table reports information on loan commitment fee structure, variable rate markup on prime and LIBOR rates, and maturity for lines of credit (LC) in Europe and the USA before and during the crisis. For the European sample, we also separate observations in two groups according to whether firms are located in “bank-based economies” or “market-based economies” following Demircuc-Kunt and Levine (2001). See Table I for details on how countries in our sample are separated between the two groups. The data are from the European and US samples, second quarter of 2009. The survey includes information for the same respondents during the second quarter of 2009 and a year earlier (second quarter 2008). We delete firms that are financial, governmental, or nonprofit organizations. “\*\*\*\*,” and “\*\*,” indicate statistical significance at the 1%, and 5%, and 10% (two-tailed) test levels, respectively.

	During crisis (1)	Before crisis (2)	Difference, during – before the crisis (3)
Panel A: Europe			
Basis point commitment fee	22.56	20.77	1.78
Basis point markup on LIBOR/Prime rate	115.55	87.89	27.66**
LC maturity (in months)	26.85	30.50	–3.65**
Panel A1: Europe—bank-based economies			
Basis point commitment fee	12.75	11.30	1.45
Basis point markup on LIBOR/Prime rate	113.43	97.08	16.35
LC maturity (in months)	24.20	29.28	–5.09**
Panel A2: Europe—market-based economies			
Basis point commitment fee	53.60	50.77	2.83
Basis point markup on LIBOR/Prime rate	121.33	62.77	58.57**
LC maturity (in months)	35.57	34.50	1.07
Panel B: USA			
Basis point commitment fee	26.41	12.67	13.74***
Basis point markup on LIBOR/Prime rate	188.58	124.14	64.43***
LC maturity (in months)	27.56	30.13	–2.57***

USA we document an increase of 14 basis points in the commitment fees. This comparative evidence suggests that lenders might be more reluctant to cut credit in bank-based economies, which are the majority of countries in our European sample.

Although our data are limited, we gain some insight about the workings of the credit line market during the financial crisis. While nominal value of lines of credit outstanding remained relatively unchanged (as a proportion of firm assets), drawdowns from outstanding lines of credit were very high during the crisis period (Table IV). As we have documented, the terms associated with those facilities worsened from the perspective of borrowers (higher interest markups and lower maturities) both in Europe (especially market-based economies) and the USA during the crisis. Commitment fees, however, remained mostly unchanged in Europe. Our evidence suggests that lenders increased the average interest markups because credit quality has deteriorated during the crisis. However, the fact that commitment fees did not increase suggests that direct rationing of credit supply was limited.

## 5. Corporate Liquidity and Real Corporate Policies

The effect of liquidity on real corporate policies has long received attention from researchers in corporate finance. In this section, we assess the effect of liquidity management (internal liquidity and “options” on external liquidity) on *ex ante* investment plans for our European sample in the midst of the financial crisis, when external credit “suddenly” became scarce.

We regress the CFO’s pro-forma planned percentage changes in capital expenditures on cash holdings, lines of credit, and their interaction (the last term captures substitution/complementarity effects between internal and external sources of liquidity). We control for heterogeneity by including indicators for firm size, ownership type, credit ratings, and financing constraints. We estimate each investment regression using ordinary least squares, but repeat each estimation using a two-step Generalized Method of Moments (GMM) method to mitigate concerns with endogeneity. The GMM estimator yields standard errors that are robust to heteroskedasticity and clustering at the industry level. Our regression specification assumes the following form:

$$\text{Capital Expenditure}_i = c + \alpha_1 \text{Cash Flow}_i + \alpha_2 \text{LCs}_i + \alpha_3 (\text{Cash Flow} \times \text{LCs})_i + \gamma X_i + \epsilon_i \quad (1)$$

where the dependent variable is the firm’s planned capital expenditures expressed in percentage changes over the next 12 months relative the past 12 months and  $X_i$  represents the previous mentioned control variables.

In our IV analysis, we 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).<sup>11</sup> Accordingly, we use four overidentifying restrictions.

The regression results are reported in Table VIII. We start by noting that the economic meaning of the reported coefficients needs to account for the interactive structure of the equations. Our estimates suggest that access to external liquidity (lines of credit) significantly affects corporate investments for firms with large cash reserves. Focusing on the IV results for Europe (column 2), our findings suggest that a one-Interquartile Range Change (IQR) increase in lines of credit (=0.30) at the ninth decile of cash (=0.31) leads firms to increase investment by 2.8% over the next year. One possible interpretation of this finding is that lines of credit provide the financial resources needed for investment when firms hoard cash.<sup>12</sup> Since those

<sup>11</sup> See Wooldridge (2002) on the use of interactions between predicted values of endogenous variables as instruments.

<sup>12</sup> Admittedly, we cannot rule out alternative explanations. For instance, the availability of cash and lines of credit could be a proxy for investment opportunity. In this case, firms with more cash and lines of credit could be investing more because they have better investment opportunities.

*Table VIII.* The interplay between cash holdings and lines of credit in the corporate spending process. This table reports ordinary least squares (OLS) and IV estimation results from investment regressions. Regressions include industry-fixed effects. The dependent variable is the CFO's pro-forma planned percentage changes in capital expenditures over the next 12 months. The data are from the European and US samples, first quarter of 2009. The surveys include information for the same respondents during the first quarter of 2009 and a year earlier (first quarter 2008). Regressions include a constant term (unreported). Test statistics reported in parentheses are based on heteroskedasticity-consistent standard errors adjusted for clustering across observations within industry using the two-step GMM estimator. The table also reports diagnostic statistics for instruments' overidentification (Hansen's  $J$  statistic  $p$  value reported) and first-stage  $F$  test of excluded instruments (lowest  $p$  value reported). "\*\*\*\*," "\*\*\*," and "\*\*" indicate statistical significance at the 1%, 5% and 10% (two-tailed) test levels, respectively.

	Europe		USA	
	OLS (1)	IV (2)	OLS (3)	IV (4)
Cash holdings	-0.527** (-2.03)	-0.641* (-1.75)	-0.136 (-0.52)	-0.565** (-2.14)
LCs	-0.389*** (-5.28)	-0.367** (-2.31)	-0.203*** (-3.43)	-0.332*** (-3.00)
Cash Holdings $\times$ LCs	1.265*** (4.24)	1.489*** (3.09)	1.127* (1.78)	1.814** (2.53)
Large	-0.135 (-1.05)	-0.162 (-1.37)	0.023 (0.62)	0.018 (0.54)
Public firm	0.049 (0.49)	0.009 (0.09)	-0.061 (-1.54)	-0.049 (-1.26)
Investment grade	0.109*** (2.93)	0.096*** (5.58)	0.028 (0.84)	0.031 (0.97)
Credit unconstrained	-0.018 (0.17)	0.008 (0.10)	0.081*** (2.57)	0.084*** (2.74)
Observations	68	66	215	208
Adjusted $R^2$	0.150	0.122	0.033	0.016
Diagnostic statistics				
Hansen's $J$ statistic ( $p$ value)		0.194		0.618
First-stage $F$ test (lowest $p$ value)		<0.001		<0.001

lines of credit were pre-committed (arranged prior to the crisis), our findings support the notion that lines of credit contribute to corporate investment in the financial crisis.

Diagnostic statistics for the IV analysis are reported at the bottom of Table VIII. 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

error term in the investment regressions and the model is properly specified. 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.

The evidence presented in this section highlights the role internal and external sources of liquidity played in driving spending (planned investment, technology, and employment) during the crisis. Noteworthy, our tests point to important interaction effects between these two sources of liquidity. At relatively lower levels of internal liquidity (low levels of cash), investment does not benefit from the firm's access to external liquidity (credit lines). This suggests that liquidity under committed facilities 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.

## 6. Conclusions

During the financial crisis of 2008–09, credit suddenly became scarce in the international financial markets. We use this “shock” in the market for credit to study how firms manage internal and external liquidity and how the interaction between the different sources of liquidity facilitates corporate investment and other real-side activities.

Our data come from two surveys in early 2009, each representing approximately 600 CFOs from Europe and North America. We find that the average size of the available lines of credit did not change much during the crisis. We observe, however, significant variation in the use of credit lines across companies. Firms that are small, private, and speculative rely more on lines of credit, before and during the crisis, than their less “limited-credit category” counterparts (large, public, and investment-grade). We also find that limited-credit category 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 during the crisis.

Our empirical investigation also looks at the pricing structure of credit lines before and during the crisis. We find that during the crisis, markups over LIBOR/Prime rate increased by 28 basis points, while commitment fees increased by 2 points. While these figures are indicative of deteriorating credit conditions for companies in Europe, they are relatively small by comparison with figures for US firms during the crisis (markups in the US increased 64 basis points).

Our findings conform to the view that outstanding lines of credit provided the liquidity that firms needed to deal with the crisis. The terms of those facilities (especially markups) have changed, but this might be consistent with credit being riskier during the crisis and not necessarily with a credit rationing story based

on pricing. These inferences are tentative, however. Our sample is essentially limited to a snapshot of the aggregate data. Accordingly, in our analysis, we focus largely on cross-sectional characterizations related to the use of lines of credit and the pricing of those facilities.

In all, our study uncovers important aspects of the role of credit lines as “options on liquidity” when financial markets are in distress. We find that the recent crisis did not severely hinder firms’ ability to access lines of credit and draw down existing facilities. This proved to be crucial for European companies since, as we show, credit lines became a key source of financing and eased the impact of the financial crisis on investment.

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