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## Credit lines as monitored liquidity insurance: Theory and evidence<sup>☆</sup>



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### ABSTRACT

We propose a theory of credit lines provided by banks to firms as a form of monitored liquidity insurance. Bank monitoring and resulting revocations help control illiquidity-seeking behavior of firms insured by credit lines. The cost of credit lines is thus greater for firms with high liquidity risk, which in turn are likely to use cash instead of credit lines. We test this implication for corporate liquidity management by identifying exogenous shocks to liquidity risk of firms in corporate bond and equity markets. Firms experiencing increases in liquidity risk move out of credit lines and into cash holdings.

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## 1. Introduction

Theory suggests that the main difference between a credit line and standard debt is that a credit line allows the firm to access precommitted debt capacity (e.g., [Shockley and Thakor, 1997](#); [Holmstrom and Tirole, 1998](#)). This pre-commitment creates value for credit lines as a corporate liquidity management tool, in that they help insulate the corporation from negative shocks that could hinder access to capital markets. In particular, credit lines can be an effective, and likely cheaper substitute for corporate cash holdings. Nevertheless, the results in [Sufi \(2009\)](#) challenge the notion that credit lines have perfect commitment. Access to credit lines is often restricted precisely when the firm needs it most, that is, following negative profitability shocks that cause contractual covenant violations. In addition, the survey evidence in [Lins, Servaes, and Tufano \(2010\)](#) suggests that corporate chief financial officers not only use credit lines as precautionary savings against negative profitability shocks, but also to help fund future growth opportunities.

We propose and test a theory of corporate liquidity management that bridges the gap between existing theory and empirical evidence on credit lines. This theory explains how credit line revocation following negative profitability shocks can be optimal, and it shows when the presence of future growth opportunities could induce firms to use credit lines in their liquidity management. The theory generates empirical predictions, which we test using a novel dataset on credit lines, and a new identification strategy.

In the model, a fully committed credit line (that is, full and irrevocable liquidity insurance) creates the following problem. While it protects firms from value-destroying profitability shocks, once full insurance is in place, firms could gain incentives to engage in risky investments that increase the likelihood of liquidity shocks (illiquidity transformation). Bank-provided credit lines can help eliminate the firm's incentive to engage in illiquidity transformation, because the bank retains the right (through credit line covenants, for example) to revoke access to the credit line if it obtains a signal that the firm could have engaged in illiquidity transformation. Crucially, bank monitoring and line revocation tend to happen in the same states in which the firm needs the credit line the most (liquidity-shock states). This coincidence arises because credit line drawdowns are negative net present value (NPV) loans for the bank. Thus, the bank's incentive to monitor is strongest precisely when the firm attempts to draw on the credit line. And, in this way, credit line revocation provides incentives both for the firm to avoid illiquidity transformation and for the bank to pay monitoring costs.

In this framework, the cost of liquidity insurance provided by credit line arises not only from direct monitoring costs, but also because credit line revocations cause the firm to pass on valuable investments. In equilibrium, firms could then choose to switch to cash holdings if the cost of credit lines is too high. In particular, the model points to an important determinant of the choice between cash and credit lines: the firm's total liquidity risk. Firms with greater liquidity risk are monitored more often, causing direct and indirect monitoring costs (i.e., expected costs of credit line revocation) to increase and, as a result,

are particularly likely to forego monitored liquidity insurance and to switch to self-insurance (cash holdings).

We extend the model to allow firms to demand liquidity to be able to absorb negative profitability shocks and to pursue additional investment opportunities. The financing of future investments interacts with liquidity shock insurance through two channels. First, the cost of credit line revocation increases because credit line revocation both limits the continuation of existing projects and stops the firm from undertaking new investments. Second, future growth opportunities could provide incentives for firms to avoid illiquidity transformation independently of monitoring. The first channel is particularly relevant for firms that tend to have investment opportunities in states with low cash flows (in which credit lines are likely to be revoked). The second channel is particularly relevant for firms that tend to have investment opportunities in high cash flow states (whose probability decreases with illiquidity transformation). This setup implies that firms with low hedging needs (high correlation between cash flows and investment opportunities) are less likely to use cash relative to credit lines and are also less likely to require credit line covenants and revocation when using credit lines for liquidity insurance.

Overall, our model provides two sets of empirically testable predictions, one set dealing with the relation between liquidity risk and liquidity management, and another set dealing with the relation between hedging needs, liquidity management, and credit line covenants and revocations. We test these predictions using a novel dataset on credit lines from Capital IQ (CIQ). The data cover a large sample of firms in the United States for the period 2002–2011. CIQ compiles detailed information on capital structure and debt structure by going through financial footnotes contained in firms' 10-K Securities and Exchange Commission (SEC) filings. In particular, CIQ contains detailed information on the drawn and undrawn portions of lines of credit.

We test the implication that an increase in liquidity risk decreases reliance on credit lines using two different identification strategies. We first exploit the downgrade of General Motors (GM) and Ford Motor Co. (Ford) in 2005 as a quasi-natural experiment. The downgrade came as an exogenous and unexpected shock, especially for firms not in the auto sector. [Acharya, Schaefer, and Zhang \(2008\)](#) examine the GM–Ford downgrade in detail and show that it led to a market-wide sell-off of the corporate bonds issued by these two firms. The downgrade had a significant impact on inventory risk faced by financial intermediaries that operated as market makers for the securities issued by the two automakers. The resulting effect on corporate bond prices went beyond the bonds of GM and Ford and of other producers in the auto sector, creating a widespread increase in liquidity risk that affected firms that relied on publicly traded bonds for their financing.

Consistent with the model's predictions, we find that treated firms that experienced an exogenous increase in liquidity risk due to the GM–Ford downgrade – specifically, firms that relied on bonds for financing in the pre-downgrade period – moved out of credit lines and into cash holdings in the aftermath of the downgrade, relative

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