

The Real Effects of Credit Line Drawdowns¹

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¹The views expressed here are those of the author and do not necessarily reflect the views of the Board of Governors or staff of the Federal Reserve System.

Motivation

- ▶ During the first year of the financial crisis, investment spending of nonfinancial firms remained at pre-crisis levels and collapsed only after to the failure of Lehman Brothers in September 2008.
- ▶ Aggregate figures suggest large credit lines drawdowns during the financial crisis, and firms expressed concerns about future funding (Ivashina and Scharfstein, 2010).
- ▶ The purpose of credit line drawdowns during the crisis is yet to be determined.

The Insurance Hypothesis

- ▶ Firms draw on credit line in response to revenue shocks to maintain investment.
- ▶ Banks act as stabilizers by providing liquidity to nonfinancial firms.
- ▶ This should be particularly important in times of low aggregate liquidity.

The Cash Hoarding Hypothesis

Generally, firms are more likely to increase cash balances when they either have only constrained access to external finance or external finance is costly and cash therefore has a higher marginal value (Opler, Pinkowitz, Stulz, and Williamson (1999), Almeida, Campello and Weisbenner (2004), Faulkender and Wang (2006), and Denis and Sibilkov (2010)).

- ▶ Nonfinancial firms became concerned about banks not being able to provide liquidity in the future.
- ▶ Firms draw on their lines and hoard cash in uncertain times.

Goals of the Paper

- ▶ Document new facts on the timing of credit line drawdowns during the crisis.
- ▶ Test the insurance and the hoarding hypothesis by studying whether drawdowns are associated with investment spending or cash holdings.

Credit Lines

- ▶ Financial institutions commit to provide credit up to the credit limit on demand.
- ▶ Revolving credit lines can be repaid and re-drawn.
- ▶ Interest rate is usually LIBOR + margin on drawn portion, commitment fee on unused portion.
- ▶ Typically 5 year maturity.
- ▶ Debt covenants (leverage, collateral, cash-flow constraints) can reduce credit available to firm.

Why do firms have credit lines?

- ▶ Alternative to holding (pre-cautionary) idle cash.
- ▶ Flexible (short-term) financing of working capital.
- ▶ Beneficial if firms have no access to other sources of capital (e.g. bond market).
- ▶ Back-up lines of credit for commercial paper issuances.

Literature Review

- ▶ Theoretical literature: Boot, Thakor, and Udell (1987), Holmström and Tirole (1998), Holmström and Tirole (2000), Thakor (2005), Tirole (2006).
- ▶ Empirical literature emphasizes trade-off between cash and credit lines (Demiroglu and James, 2011).
- ▶ Firm-specific reasons for drawdowns: Barakova and Parthasarathy (2012) and Chen, Hu, and Mao (2011).
- ▶ Simultaneous drawdowns pose liquidity risk for banks (Acharya, Almeida and Campello, 2010).

Literature: Credit Lines During the Crisis

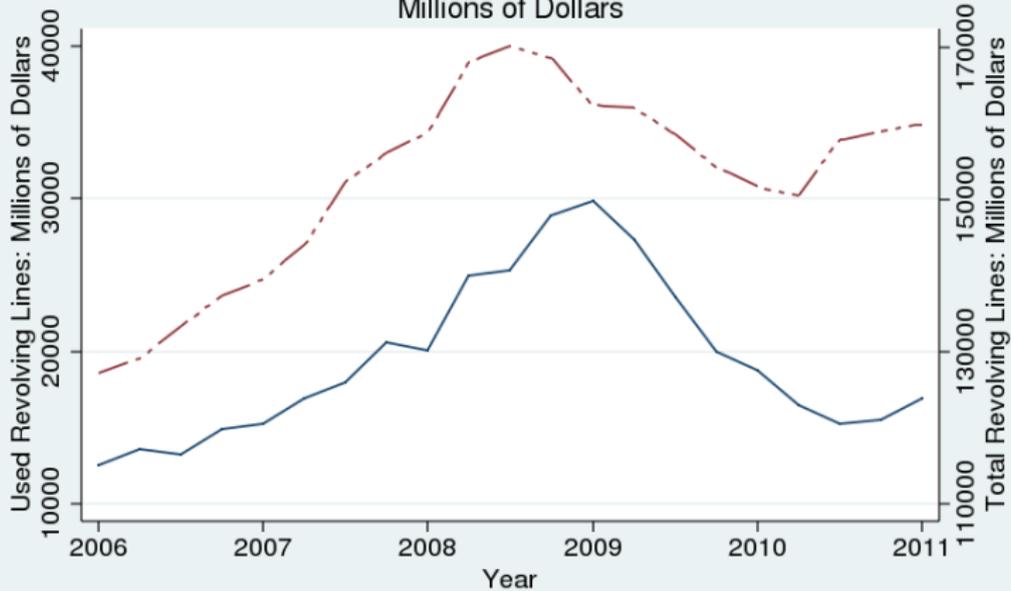
- ▶ “Run” on credit lines after Lehman collapse (Ivashina and Scharfstein (2010), Huang (2010), Montoriol-Garriga and Sekeris (2009)).
- ▶ Campello, Graham, and Harvey (2010), Campello et al. (2011) and Campello et al. (2012), using a CFO survey, find:
 1. more constrained firms were more like to draw on lines,
 2. credit constraints did affect investment, and
 3. less favorable renewal conditions.
- ▶ Weaker banks reduced credit limits on new lines/renewals and charged higher interest rates (Santos, 2011).

Data

- ▶ COMPUSTAT: Random sample of 600 publicly traded U.S. non-financial firms.
- ▶ Regulatory SEC filings (10-K, 10-Q): Extract relevant information on credit lines (size, use, and availability) from 2005:Q4 to 2010:Q4.
- ▶ 467 out of 600 firms in the data have credit lines. We focus on those.
- ▶ The average credit line size is 20 percent of assets.

Revolving Credit Lines

Millions of Dollars



Detour: Unused Commitments vs. Credit Line Availability

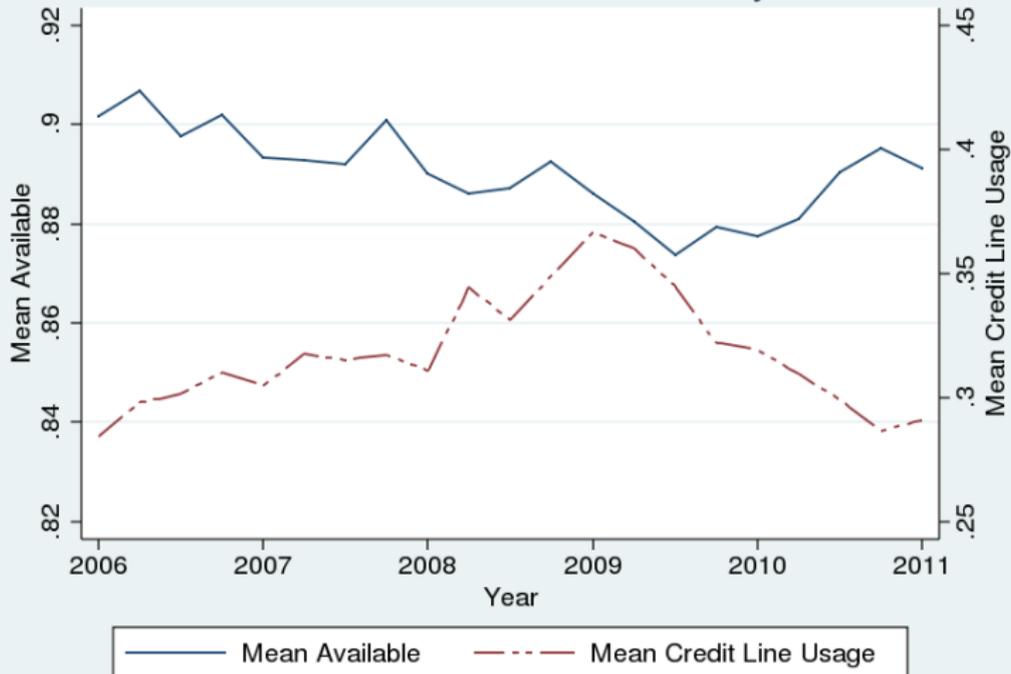
A specific example helps to clarify the difference between *unused* and *available* portion of a credit line.

The 2007 10-K of IEC Electronics Corp. states that:

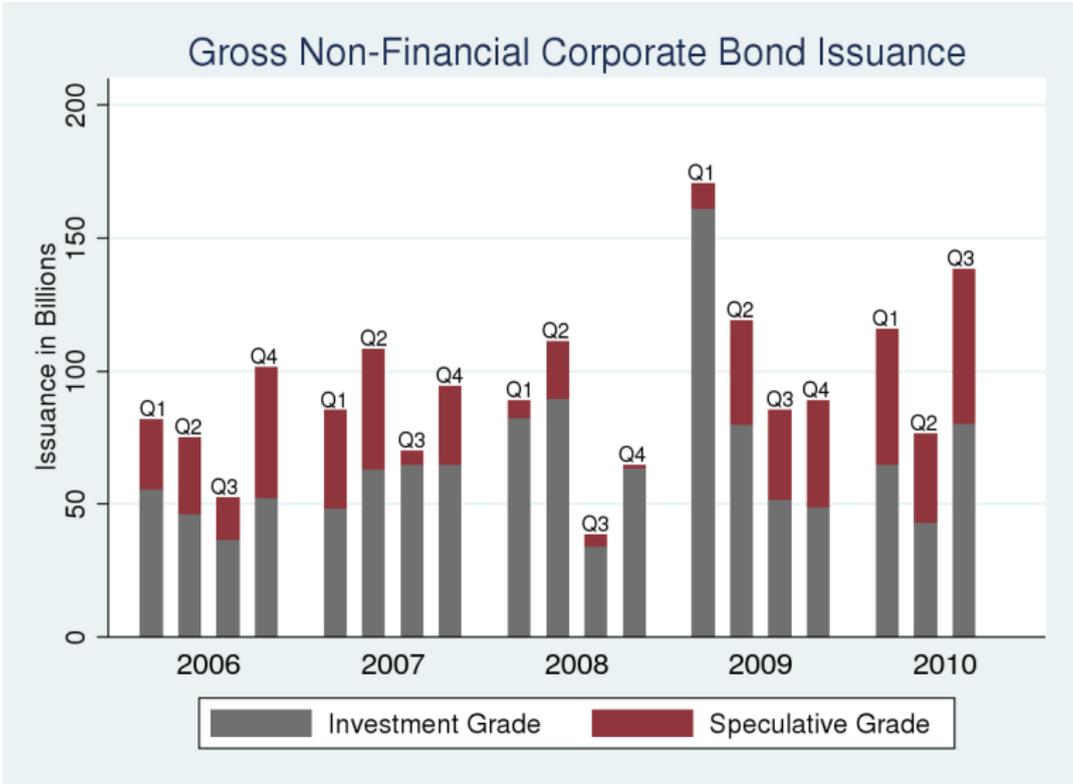
“..., IEC has a line of credit with a maximum borrowing limit up to \$6.0 mill based upon advances on eligible accounts receivable and inventory.”

- ▶ The *unused* portion is \$6 mill less the used portion.
- ▶ The base formula for the *available* portion is the minimum of
 1. \$6 mill and
 2. $0.85 * \text{accounts receivable} + 0.35 * \text{inventory}$.
- ▶ A firm can draw at most the *available* portion less the used portion.

Credit Line Use and Availability

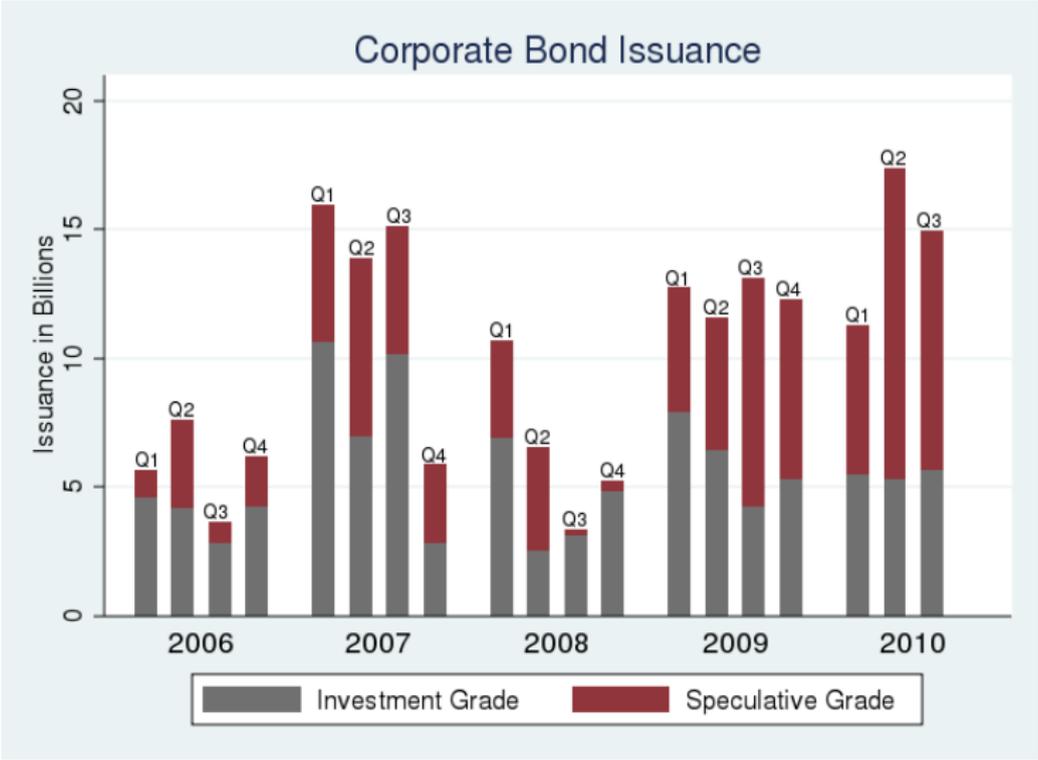


Economy-wide Bond Issuances



Roche issued bonds totaling \$30 bn in 2009:Q1.

Bond Issuances in the Sample



Recap: Credit Lines in the Financial Crisis

- ▶ We find that drawdowns already increased in 2007 with the ABCP collapse and accelerated after the Bear Stearns failure.
- ▶ Large firms appear to have drawn down more.
- ▶ Covenants restricted the use of credit lines after the Lehman collapse.
- ▶ Little evidence for substitution through bonds, especially for non-investment grade firms.

Drawdown Regression

$$\text{Drawdown}_{i,t} = c_i + \tau_t + \beta_1 \cdot \text{shock}_{i,t-1} + \gamma \cdot X_{i,t-1} + \epsilon_{i,t}.$$

Drawdown: Drawdown amount between t and $t - 1$ divided by assets.

Shocks are innovations to Cashflow, Sales Growth, or Income relative to the firm average.

We expect β_1 to be negative.

Table: Regression Results: Drawdown Size

	(1)	(2)	(3)	(4)
Cashflow/TA	-0.029** (0.012)			
Oper. Inc./TA		-0.056*** (0.024)		
Sales Growth			-0.008*** (0.002)	
Crisis Indicator				0.003 (0.002)
Controls	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
Time Effects	yes	yes	yes	yes
No. Obs	6606	6602	6305	6661

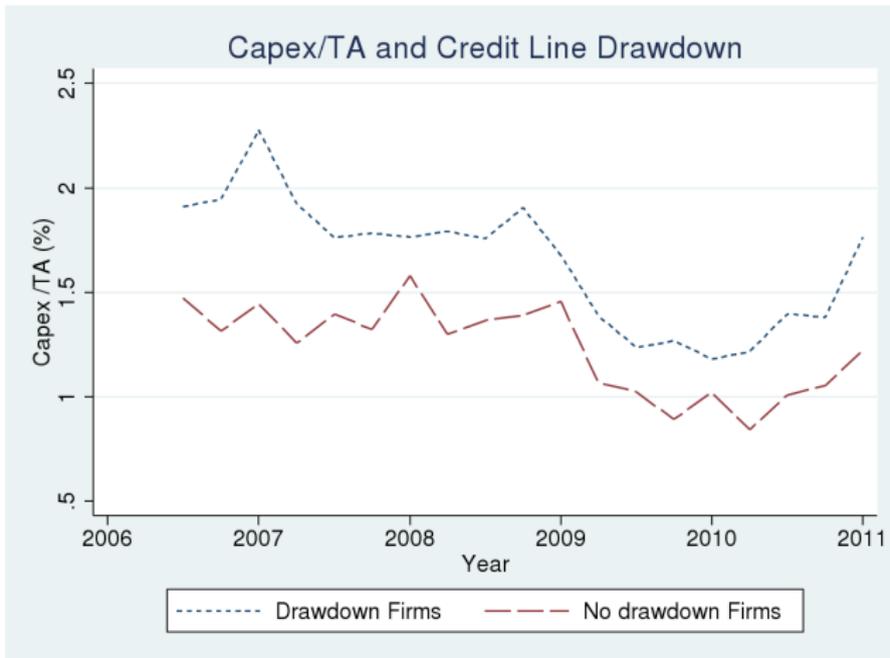
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Controls: Size, Cash/Assets, Leverage, Credit Line Usage, Market to Book Ratio, Tangible Assets/Assets, Z-score.

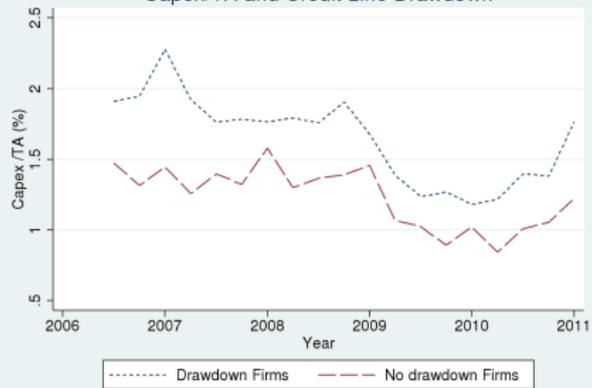
What were drawdowns used for?

- ▶ The Insurance Hypothesis: Firms draw on their credit lines in response to shocks to maintain investment. This should be particularly important in times of low aggregate liquidity.
- ▶ The Cash Hoarding Hypothesis: Ivashina and Scharfstein (2010) document that at least some firms drew on their lines because of concerns about financial stability. Commonly this is interpreted as (precautionary) cash hoarding.

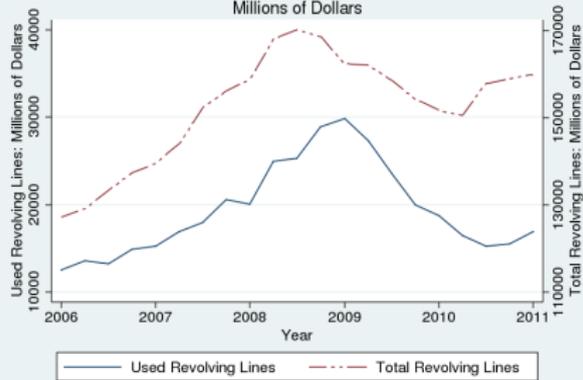
Investment Spending (Capex)



Capex/TA and Credit Line Drawdown



Revolving Credit Lines Millions of Dollars



Real Effects

Do firms use drawdowns to finance investment?

$$\text{Capex}_{i,t} = c_i + \tau_t + \alpha \cdot \text{drawdown}_{i,t-1} + \beta_1 \cdot \text{aggregate shock}_t + \beta_2 \cdot \text{drawdown}_{i,t-1} \times \text{aggregate shock}_t + \gamma \cdot X_{i,t-1} + \epsilon_{i,t},$$

Drawdown: Drawdown amount between t and $t - 1$ divided by assets.

Aggregate Shock: Crisis Dummy.

Controls: Size, Cash/Assets, Leverage, Market to Book Ratio, Tangible Assets/Assets, Cash-flow Volatility, Operating Profit, Sales growth, Z-score.

Instruments for Drawdowns: Next slides

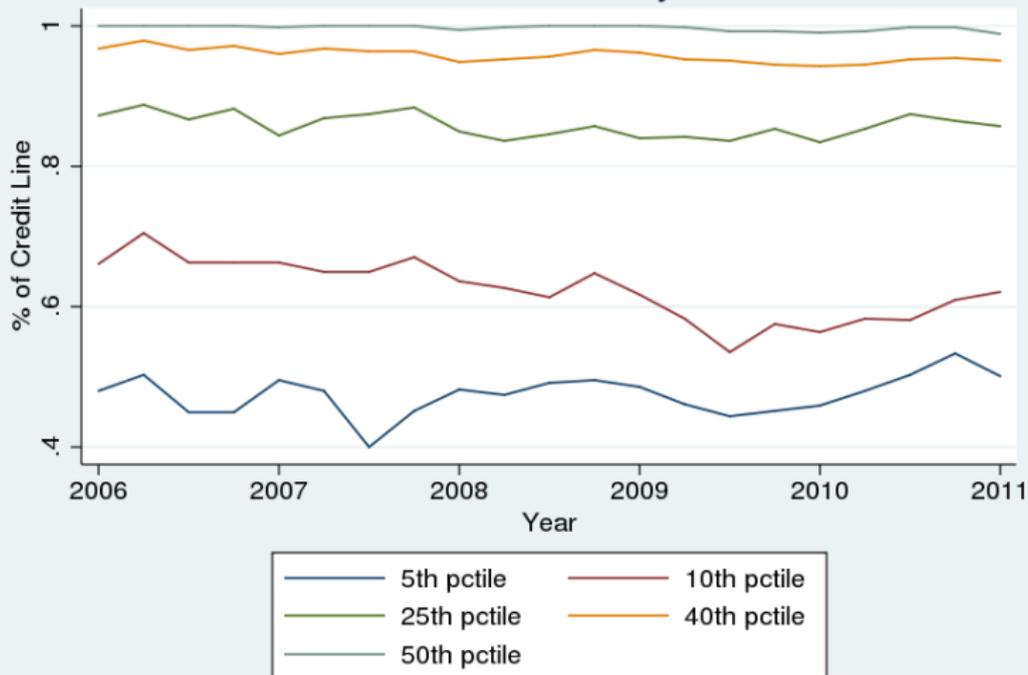
Identification Strategy

Our identification relies on the fact that contract terms specifying credit line availability formulas are fixed.

- ▶ Measure access to the credit line with the availability ratio (available line/total line).
- ▶ Measure remaining debt capacity (used line / available line).

Works only if there is enough (firm-level) variation in credit line availability.

Credit Line Availability Ratios



Firm-level Stddev of Availability Ratio: Mean 0.08 (0.09)

Real Effects

$$\text{Capex}_{i,t} = c_i + \tau_t + \alpha \cdot \text{drawdown}_{i,t-1} + \beta_1 \cdot \text{aggregate shock}_t + \beta_2 \cdot \text{drawdown}_{i,t-1} \times \text{aggregate shock}_t + \gamma \cdot X_{i,t-1} + \epsilon_{i,t}$$

Drawdown: Drawdown amount between t and $t - 1$ divided by assets.

Aggregate Shock: Crisis Dummy.

Table: Regression Results: Capital Expenditures

	Panel Regression		Panel IV Regression	
	(1)	(2)	(3)	(4)
Drawdown	0.019*** (0.005)	0.018*** (0.005)	0.052*** (0.013)	0.037*** (0.013)
Drawdown * Crisis		-0.001 (0.010)		0.031*** (0.007)
Crisis		0.002*** (0.000)		0.003*** (0.001)
Controls	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
Time Effects	yes	yes	yes	yes
No. Obs	6320	6320	4914	4914

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table: Regression Results: Capital Expenditures - Never Paid Dividends

	Panel Regression		Panel IV Regression	
	(1)	(2)	(3)	(4)
Drawdown	0.018*** (0.007)	0.016* (0.008)	0.045** (0.018)	0.038** (0.018)
Drawdown * Crisis		0.006 (0.014)		0.053*** (0.013)
Crisis		0.001 (0.000)		0.002 (0.001)
Controls	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
Time Effects	yes	yes	yes	yes
No. Obs	2826	2826	2044	2044

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Investment: Economic Significance

- ▶ A one standard deviation increase in the drawdown is associated with a 11 percent increase in capital expenditures (an increase of 0.15 percent of total assets).
- ▶ The coefficient on the crisis is positive. BUT: average capital expenditures
 - ▶ 2007:Q3-2008:Q4: 1.3 percent of total assets
 - ▶ 2009:Q1-2010:Q4: 1 percent of total assets.
- ▶ The effect is significantly larger in the crisis.
- ▶ The most constrained (never paid dividends) firms exhibit largest effects.

Investment: Robustness

The results of credit lines drawdowns on investment are robust to:

- ▶ using the change in property, plant and equipment as investment measure.
- ▶ including other macro variables (SLOOS, TED spread) instead of crisis dummy.
- ▶ including additional lags of the control variables.

Cash Hoarding?

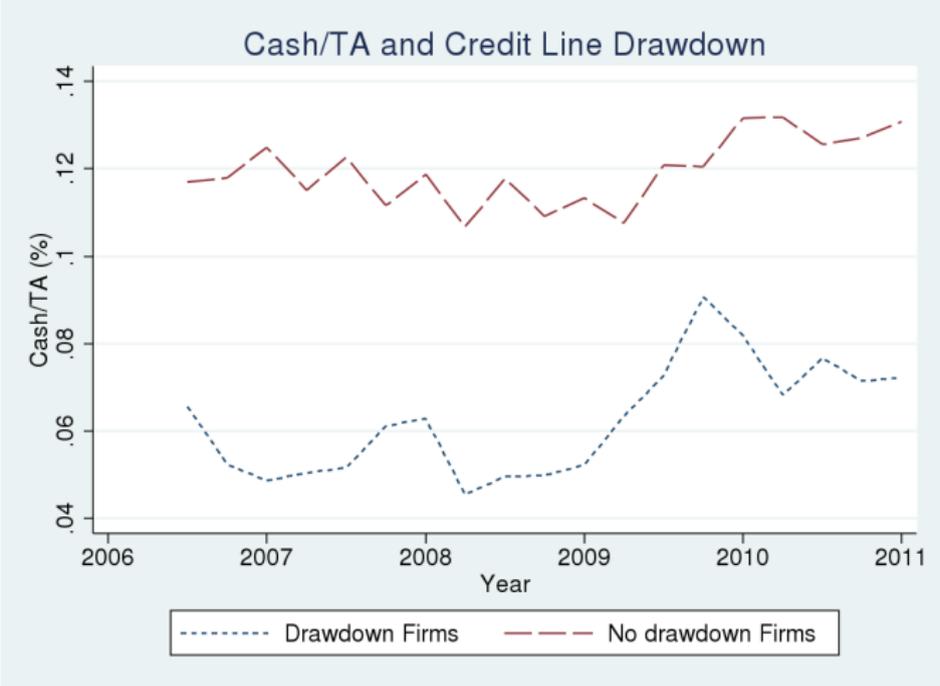


Table: Regression Results: Cash Holdings

(5)	Panel Regression		Panel IV Regression	
	(1)	(2)	(3)	(4)
Drawdown	-0.010 (0.026)	-0.012 (0.031)	0.524** (0.085)	0.517*** (0.090)
Drawdown * Crisis		-0.045 (0.051)		0.035 (0.046)
Crisis		-0.021*** (0.005)		-0.024*** (0.005)
Controls	yes	yes	yes	yes
Firm Fixed Effects	yes	yes	yes	yes
Time Effects	yes	yes	yes	yes
No. Obs	6320	6320	4914	4914

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Bank Regulation

- ▶ For banks, drawdowns are the realization of off-balance sheet liquidity risk.
- ▶ 11 percent of 2007:Q2 unused commitments were drawn in the crisis.
- ▶ Credit lines are part of liquidity regulation.
- ▶ Problem: If regulation makes credit lines more costly, non-financial firms may have less access to credit lines, are not able to smooth shocks and therefore cut investment.

Conclusion

- ▶ Run on credit lines started already in fall 2007.
- ▶ Our results are consistent with the insurance role hypothesis of credit lines.
 1. Firms draw on credit lines in response to adverse idiosyncratic and aggregate liquidity shocks.
 2. Firms use drawdowns to finance investment. The effect is more pronounced during the crisis.
- ▶ However, we do not find that firms drew on credit lines to hoard cash in the financial crisis.