

How committed are bank corporate line commitments?

Irina Barakova

Harini Parthasarathy

Office of the Comptroller of the Currency

FDIC/JFSR 12th Annual Bank Research Conference

October, 2012

The views expressed are those of the authors and do not represent the position of the Office of the Comptroller of the Currency or the Department of the Treasury

Introduction

- Theory suggests credit lines should provide liquidity to firms, however empirical evidence is mixed
- Firms' liquidity needs increase when firm level credit risk is high or aggregate credit conditions worsen
- Banks earn significant commitment fees from lines, but providing liquidity may also increase their portfolio credit risk
- Understanding how banks manage these commitments has important implications for firm liquidity and bank risk, as lines constitute over 70% of bank corporate lending

Our contribution

- We investigate how, as firm-level and aggregate credit risk increase, banks manage line limits and draws on existing lines of credit
- We leverage regulatory data that contains information on credit lines and risk ratings of 13,000 private and public firms over 1997-2009
- Our comprehensive approach integrates various strands in the literature by showing that:
 - Banks seldom cut limits or restrict draws until they rate the exposure as higher risk, or line use is very high
 - Firms that anticipate future deterioration are able to pre-empt banks by drawing more in advance of restrictions
 - During contractions, banks allow firms with unused capacity to draw more from existing lines of credit
- Overall, we infer that existing lines of credit provide liquidity to the vast majority of firms, contrary to much of the literature on cash and credit lines

Outline

- Prior Literature
- Data and Analytical Approach
- Key Results
- Conclusions

Prior literature

- Theoretical papers emphasize the liquidity insurance role of lines of credit (Campbell (1978), Hawkins (1982), Boot, Thakor, and Udell (1991), Avery and Berger (1991), Holmstrom and Tirole (1998 and 2000) and others)
- Several empirical papers find that lines provide at best contingent liquidity insurance, as banks reduce access when a firm's cash flows decline (Sufi (2009), Duchin et. al. (2011), Flannery and Wang (2011), Demiroglu and James (2011) and others)
- Yet, international evidence suggests that utilization is highest for defaulted or otherwise distressed firms (Jimenez et. al. (2009))
- Papers on the role of lines of credit during contractions of the credit cycle, find that existing lines do provide liquidity (Ivashina and Scharfstein (2010), Campello et. al. (2011), Cornett et. al. (2012), Demiroglu and James (2012), Huang (2010))

Our take-aways from the literature

- The mixed evidence in prior research is partly because data availability constraints force authors to investigate only specific aspects of the issue
- These papers do not examine how banks balance liquidity provision and credit risk management objectives
- Further, it is unclear how firm-level credit risk and aggregate lending conditions jointly affect existing line access

Where do we come in?

- We model line limit cuts and additional draws on existing lines to see how banks manage credit line exposure and how firms respond to bank action
- We hypothesize that banks act upon their internally-set credit quality thresholds that capture material deterioration, more so than covenant violations and cash flows
- Further, we expect that firms may make precautionary draws in anticipation of restrictions on lines access that come with a downgrade
(See Flannery and Lockhart (2009), Ivashina and Scharfstein (2010) and Kizilaslan and Manakyan (2011) for other evidence on precautionary draws)
- We expect that, during credit contractions, banks will provide liquidity to clients, provided their credit exposure to these firms is not already high
(Kashyap et.al.(1992), Gatev et. al. (2002), Pennacchi (2006) and Gatev et. al. (2009) and Acharya and Mora (2012) discuss why banks get an inflow of funds during contractions)

Sample design and ratings

- We use annual data on the syndicated credit lines of 13,000 public and private firms over the years 1997-2009 from the Shared National Credit (SNC) database
- We construct an unbalanced firm-year panel with 50,000+ observations by aggregating data on line limits, balances and bank internal credit ratings of lines
 - Ratings are mapped to a well-established regulatory rating scale allowing comparison across banks
 - SNC data is censored since banks only report current obligations each year

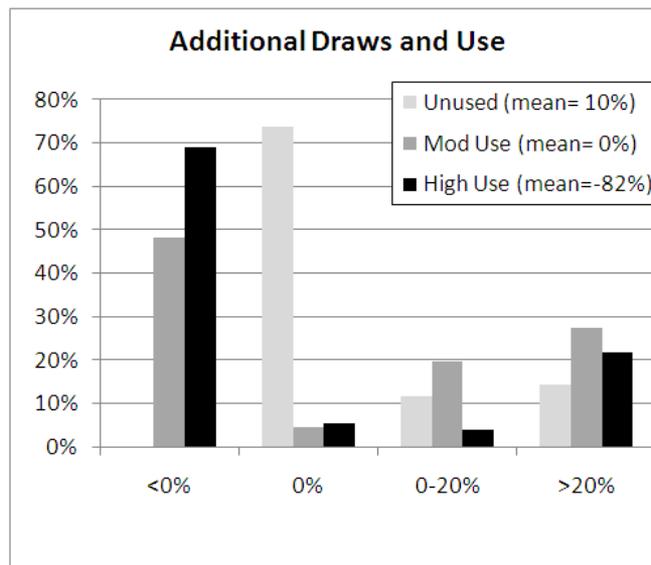
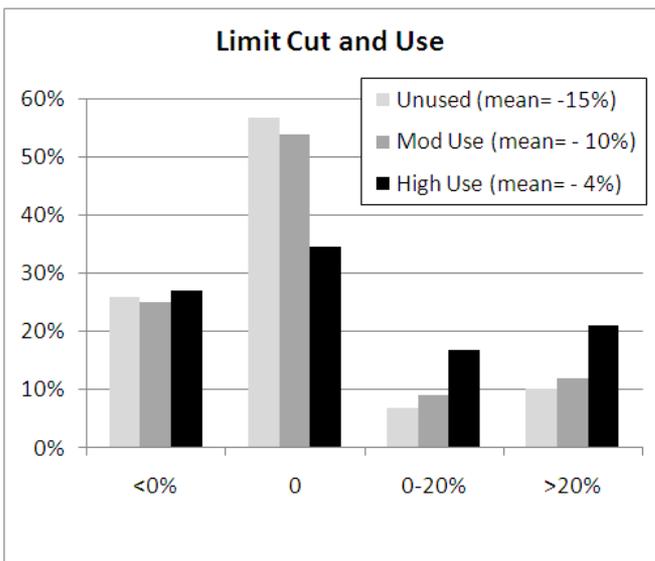
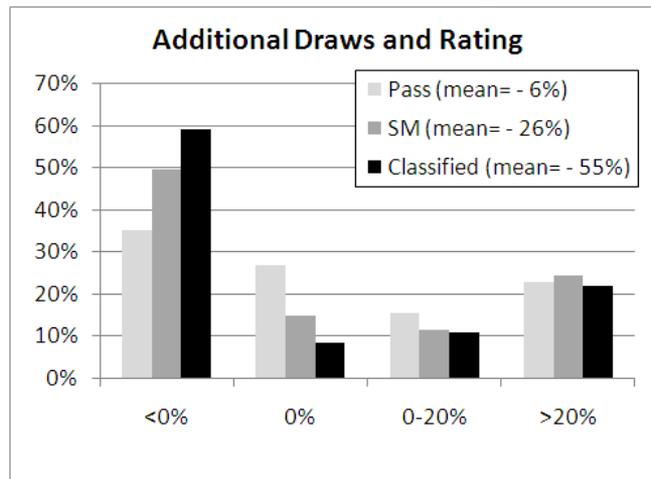
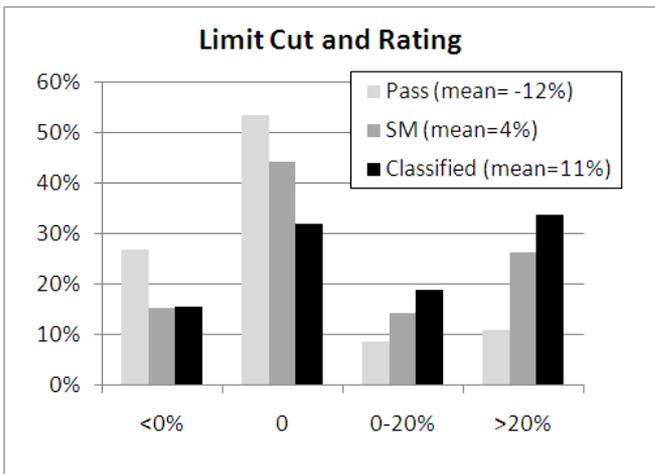
Rating	Description	%	Other risk measures (means)			
			Use	PD	Cov. Viol.	Income
Pass	current and in good standing	89%	27%	0.76%	7.5%	13.6%
Special Mention	currently protected but potentially weak	4%	44%	7.46%	38.9%	8.6%
Classified	inadequately protected, collection or liquidation in full is highly improbable	7%	63%	17.20%	53.6%	7.4%

- By matching 3,000 of these firms to other sources, we add data on firm financials (Compustat), covenant violations (Sufi) and 1 year default probability (Kamakura)

- We form 3 use categories:

unused lines (use= 0)	mod use (0% < use ≤ 70%)	high use (use > 70%)
30%	60%	10%

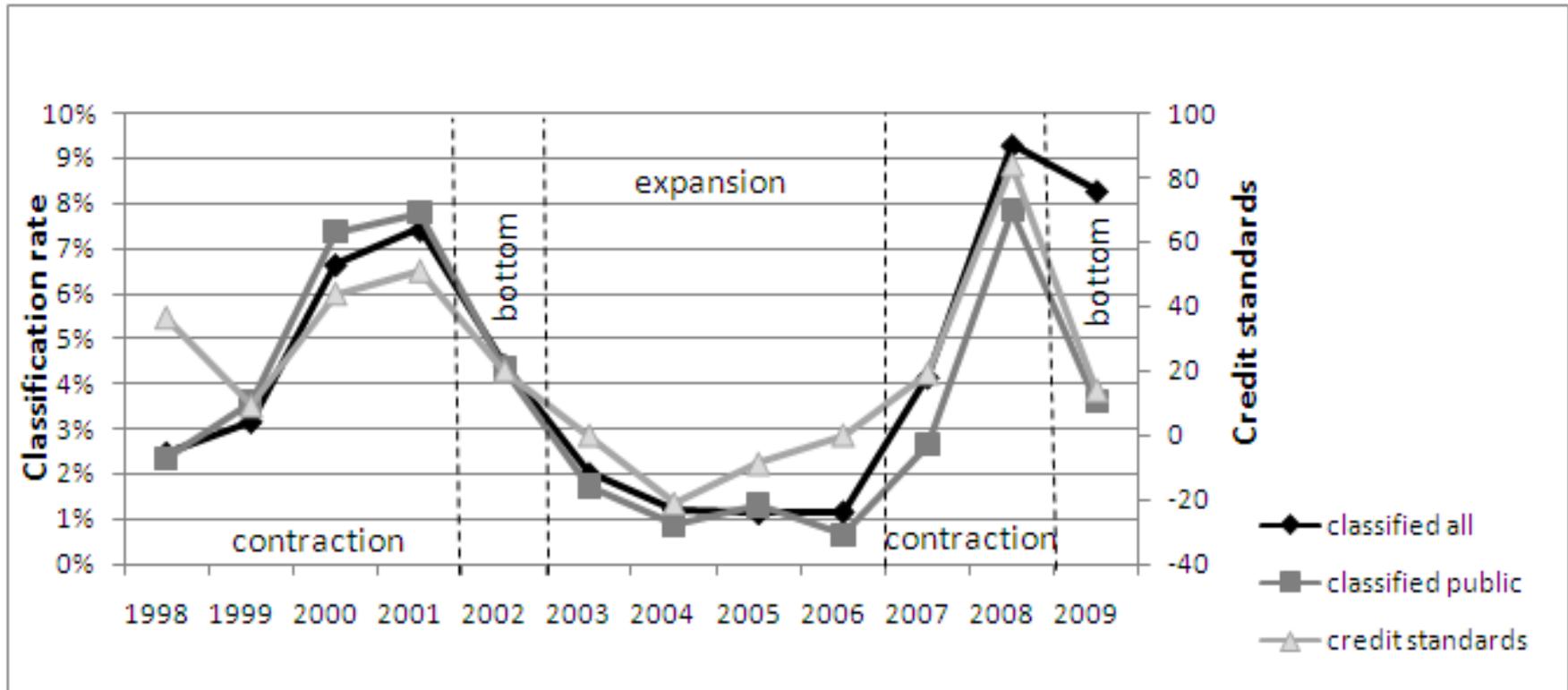
Limit cuts and draws with bank ratings and use



$$\text{Limit cut}_{t+1} = (\text{limit}_t - \text{limit}_{t+1}) / \text{limit}_t$$

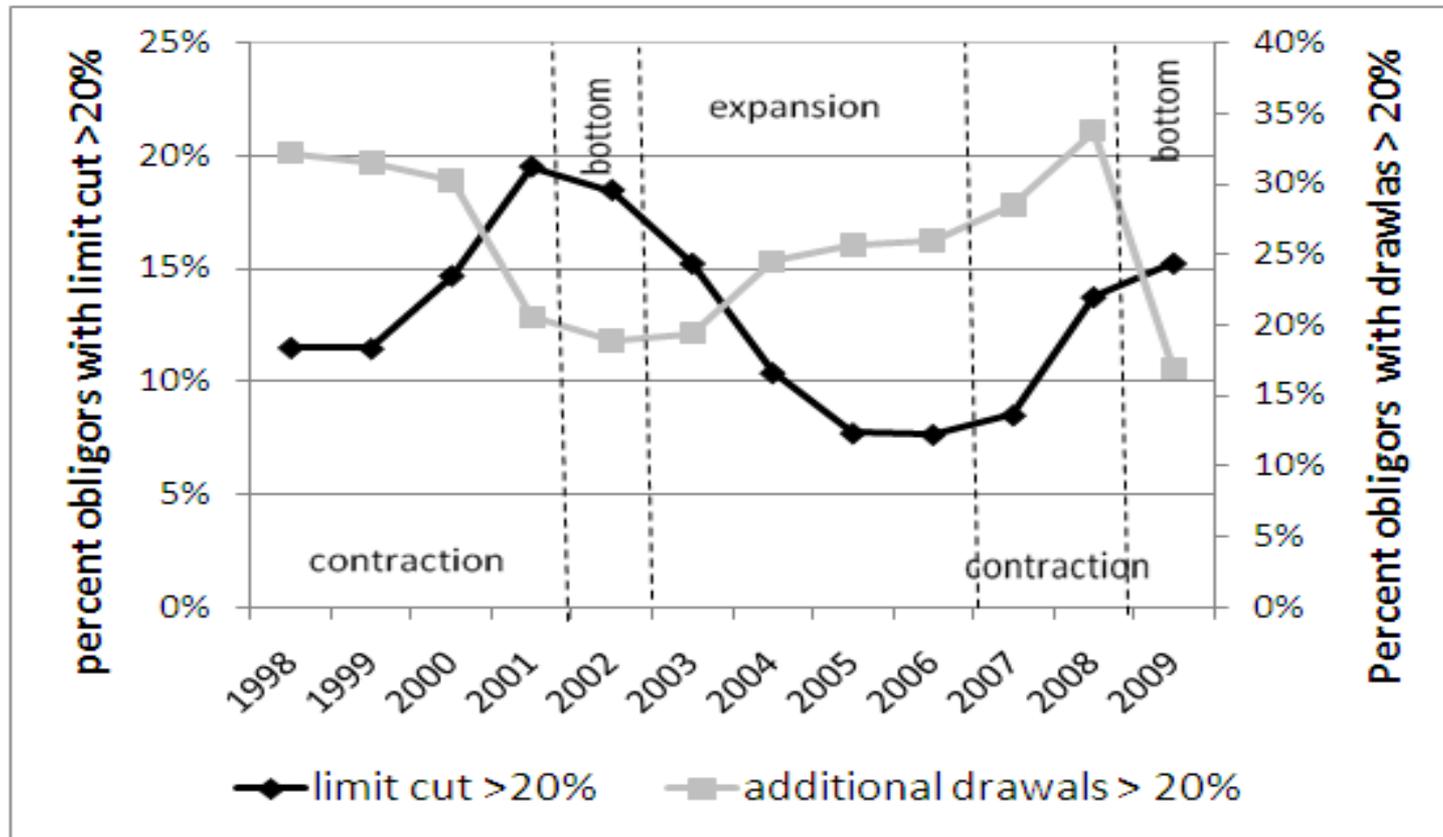
$$\text{Additional Draw}_{t+1} = (\text{balance}_{t+1} - \text{balance}_t) / (\text{limit}_t - \text{balance}_t)$$

Our measure of aggregate credit conditions



- We identify three phases of the credit cycle, expansion, contraction and bottom, using the rate of new classifications in the SNC data, and their year-to-year change
- Years corresponding to these credit cycle stages are similar if we use data from the Fed Survey of Bank Lending Practices

Limit cuts and additional draws over the credit cycle



- Limit cuts increase as credit conditions worsen, and peak at the last stage of a contraction and during the bottom stage
- Additional draws are high during contractions and drop off significantly thereafter

Model Specification

$$\text{Action}_{t \text{ tot}+1} = \alpha_1 \text{SM}_t + \alpha_2 \text{C}_t + \beta_1 \text{mod use}_t + \beta_2 \text{high use}_t + \lambda \text{income}_t + \\ + \varphi \text{cov. viol.}_t + \gamma_1 \text{CC_contraction}_{t \text{ tot}+1} + \gamma_2 \text{CC_bottom}_{t \text{ tot}+1} + \text{CONTROLS}_t$$

Action\Variables	Prior obligor rating		Prior usage		Inc.	Cov. Viol.	Credit Cycle CC	
	α_1	α_2	β_1	β_2	Λ	φ	γ_1	γ_2
Equation\coefficient	α_1	α_2	β_1	β_2	Λ	φ	γ_1	γ_2
Limitcut	<0	>>0	0	>0	<0	>0	0	>>0
Additional Draw	≤ 0	<<0	>0	≤ 0	>0	<0	>>0	≤ 0

- We test a variety of specifications such as OLS, Heckman, ordered probit, etc.
- All results presented next are from the 2nd stage of the Heckman model, since this accounts for censoring in our data; further, errors are clustered at the firm level

Drivers of Limit cuts and Draws for all firms

- Limit cuts increase and draws decrease as firm ratings worsen and use increases
- Limit cuts are higher during contractions and bottoms, relative to expansions
- Additional draws are higher during contractions
- Private firms have more limit cuts and draws relative to all public firms

Variables	Limitcut	Addl. Draws
Rating: SM	0.202*** [0.013]	-0.113*** [0.020]
Rating : Classified	0.357*** [0.013]	-0.271*** [0.022]
Moderate Use	-0.002 [0.007]	-0.075*** [0.005]
High Use	0.052*** [0.009]	-0.787*** [0.015]
CC: Contraction	0.068*** [0.006]	0.046*** [0.007]
CC: Bottom	0.090*** [0.007]	-0.085*** [0.010]
Public, Spec. grade	0.051*** [0.011]	0.035*** [0.010]
Public, unrated	0.024** [0.009]	0.060*** [0.010]
Private	0.133*** [0.007]	0.091*** [0.007]
Firm-year obs	50469	

Drivers of Limit cuts and Draws for public firms

- Results are preserved for public firms, controlling for financials
- Ratings remain significant with added PD variable, implying a credit quality threshold criteria
- Covenant violations and income have the expected impact on limit cuts and draws
- Asset size, Growth rate and line size also have a significant impact
- Explanatory power of the limit cut equation remains low, relative to the draw equation

Variables	Limitcut		Additional Draws	
	With PD	With Cov. Viol	With PD	With Cov. Viol
Rating: SM	0.138*** [0.025]	0.149*** [0.027]	-0.076* [0.034]	-0.072* [0.035]
Rating : Classified	0.295*** [0.031]	0.317*** [0.029]	-0.137** [0.046]	-0.163*** [0.044]
Moderate Use	0.009 [0.013]	0.005 [0.014]	-0.115*** [0.009]	-0.107*** [0.009]
High Use	0.057** [0.021]	0.055** [0.021]	-0.971*** [0.034]	-0.962*** [0.035]
CC: Contraction	0.052*** [0.012]	0.051*** [0.012]	0.071*** [0.011]	0.078*** [0.011]
CC: Bottom	0.110*** [0.013]	0.127*** [0.016]	-0.075*** [0.015]	-0.038* [0.019]
Income	-0.755*** [0.085]	-0.735*** [0.091]	0.03 [0.089]	-0.047 [0.090]
PD	0.003*** [0.001]		-0.001 [0.001]	
Cov. Viol.		0.068*** [0.018]		-0.061* [0.025]
with further financial ratio controls				
Firm - year obs	13484	12634	13,484	12,634

Impact of Income and Covenants relative to Ratings

- Risk ratings have a considerable impact on line access
- Controlling for rating, income and covenant violations have a lower impact
- Low income, and covenant violations are common for SM and C firms
- This correlation can explain prior findings about cash-flow based covenants and line access

	Category	Rating	Obs.	Limit Cut	Draws
Income	Highest decile	Pass	1,386	-10%	0%
	Above median		5,504	-3%	-4%
	Below median		5,113	1%	-9%
	Lowest decile		952	9%	-12%
	Highest decile	SM	12	9%	-14%
	Above median		101	18%	-26%
	Below median		290	21%	-32%
	Lowest decile		183	29%	-34%
	Highest decile	Classified	32	22%	-37%
	Above median		118	34%	-49%
	Below median		320	41%	-58%
	Lowest decile		297	54%	-66%
Financial Covenants	No Violation	Pass	10,645	-2%	-3%
	Violation		864	11%	-21%
	No Violation	SM	313	21%	-24%
	Violation		195	29%	-38%
	No Violation	Classified	296	37%	-44%
	Violation		347	52%	-68%

Joint impact of ratings, use and credit cycle

Public firms - interacted model regression coefficients with all controls							
Variable	Obs	Limit Cut			Additional draws		
		Credit Cycle			Credit Cycle		
		Expansion	Contraction	Bottom	Expansion	Contraction	Bottom
Pass							
Unused	4,038	-	0.03	0.10***	-	0.06***	0.03**
Used	1,358	-0.03	0.05**	0.11***	-0.16***	-0.13***	-0.32***
SM							
Unused	113	-0.05	0.15	0.05	0.06	0.17*	0.11
Used	310	0.25***	0.24***	0.24***	-0.38***	-0.40***	-0.58***
Classified							
Unused	66	0.29**	0.14	0.38***	0.06	0.13	0.01
Used	301	0.43***	0.38***	0.43***	-0.74***	-0.58***	-0.75***

- Pass and SM firms with unused lines do not face limit cuts in general
- During contractions, even Classified firms with unused lines do not face limit cuts
- Draws increase during contractions, especially for firms with unused lines across rating types

Why is use higher for riskier firms?

- So far, we have not explained why riskier firms have higher utilization rate, given that banks do cut limits and restrict draws to SM and C firms

Rating	Variable	Public firms	
		Mean	Median
Pass	Limit (\$ mn)	568	250
	Balance (\$ mn)	101	25
	Use	27%	15%
SM	Limit (\$ mn)	323	150
	Balance (\$ mn)	119	43
	Use	44%	46%
Classified	Limit (\$ mn)	395	125
	Balance (\$ mn)	234	62
	Use	63%	72%

- We see that SM and C firms have higher balances in absolute terms and relative to assets, showing that higher use is not only because of lower limits
- This suggests that firms act in advance of restrictions on line access
- Next, we study the impact of future downgrades on bank and firm action today

Precautionary draws in advance of downgrade

Future downgrades	Public firms			All firms		
	Limit Cut	Addl. Draws	Usage	Limit Cut	Addl. Draws	Usage
Rating: Pass, no downgrade is the omitted category						
Rating: Pass, downgrade	0.169*** [0.021]	0.098*** [0.030]	0.186*** [0.013]	0.161*** [0.010]	0.088*** [0.017]	0.174*** [0.007]
Rating: SM, no downgrade	0.153*** [0.028]	-0.105** [0.037]	0.012 [0.015]	0.182*** [0.015]	-0.139*** [0.023]	0.027** [0.010]
Rating: SM, downgrade	0.226*** [0.036]	0.031 [0.068]	0.221*** [0.026]	0.312*** [0.022]	-0.04 [0.039]	0.199*** [0.015]
Rating: Classified	0.445*** [0.032]	-0.195*** [0.050]	0.168*** [0.020]	0.460*** [0.015]	-0.312*** [0.026]	0.139*** [0.011]

- Firms that will get downgraded next year draw more today, even though they face some limit cuts
- In the paper, we show that firms that will get downgraded 2 years later, not only draw more today, but banks actually increase their limits
- Our evidence suggests that riskier firms build up balances over time, whereas banks only act when distress is imminent

Why don't banks react earlier to firm draws?

Cases of covenant violation at time t

t\t+1	PD Bucket 1	PD Bucket 2	PD Bucket 3	PD Bucket 4
PD Bucket 1 (0% to 0.1%)	181	62	10	0
PD Bucket 2 (0.1% to 2%)	107	234	73	32
PD Bucket 3 (2% to 20%)	10	100	89	60
PD Bucket 4 (>20%)	0	13	38	66

Cases of high usage (>70%) at time t

t\t+1	PD Bucket 1	PD Bucket 2	PD Bucket 3	PD Bucket 4
PD Bucket 1 (0% to 0.1%)	517	174	18	2
PD Bucket 2 (0.1% to 2%)	229	441	130	34
PD Bucket 3 (2% to 20%)	10	127	109	64
PD Bucket 4 (>20%)	0	14	44	68

Cases of moderate usage (0-70%) at time t

t\t+1	PD Bucket 1	PD Bucket 2	PD Bucket 3	PD Bucket 4
PD Bucket 1 (0% to 0.1%)	4154	1029	70	3
PD Bucket 2 (0.1% to 2%)	1162	1716	342	68
PD Bucket 3 (2% to 20%)	25	289	188	85
PD Bucket 4 (>20%)	0	15	43	41

- Firm behavior is not necessarily a good predictor of future risk
- Banks must balance liquidity provision and credit risk management objectives (similar to the classic Type I versus Type II error trade off)
- Thus firms that eventually end up defaulting can have high balances at default

We have confirmed that our results are very robust

- Alternative ways of specifying variables
 - Risk rating – 5 levels based on regulatory scale, or using PD risk buckets
 - Line usage – Alternative use thresholds or continuous term and square term
 - Credit cycle – Continuous level variable (classification rate or credit standard index) interacted with indicator trend variable, or year dummies
- Sub-samples of data
 - Excluding either crisis or controls for specific crisis
 - Varying data samples such as all firms, private firms and different public firm samples, based on data availability, as well as revolvers alone
- Different model specifications
 - Ordered probit models with discretized dependent variables, with and without selection
 - Panel data models, with and without selection
- Including other controls such as bank dummies, purpose and line type controls

Conclusions and Implications

- We show that bank commitments are fairly binding, and existing credit lines provide considerable amount of liquidity to firms
- Both firm credit risk and aggregate credit conditions impact line access:
 - Banks do not cut limits or restrict draws significantly unless firms breach banks' credit quality thresholds or line use becomes very high
 - Firms that anticipate future deterioration act in advance of such restrictions on line access by drawing down their lines
 - During contractions, unused liquidity lines ensure line access for all firms
 - Our results apply to all firms, but private firms do face more limit cuts than comparable public firms and use more of their lines at all times
- Our findings have additional policy implications for banks' risk management, capital modeling, and liquidity management, and these deserve further study.