The Loan Covenant Channel:
How Bank Health Transmits to the Real Economy

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The views expressed herein are those of the authors and not necessarily those of the Federal Reserve System.

Introduction

- Lots of evidence the health of the banking system transmits quickly to nonfinancial firms.
  - Bernanke, 1983; Peek and Rosengren, 2000; Gan, 2007; Campello, Graham, Harvey, 2010; Lin and Paravisni, 2012; Chodorow-Reich, 2014; Benmelech, Bergman, Seru, 2015; Ongena, Peydró, van Horen (2015); Amiti and Weinstein, 2016; Bentolila, Jansen, Jiménez, 2016.
- Why? In U.S., 90% of bank loans have >1 year maturity remaining.
  - Corporate loans and commitments not callable at will by bank.
- **This paper: loan covenant violations allow lenders to contract credit to otherwise insulated borrowers.**

What we do

- New supervisory data set of syndicated loans containing detailed information on covenants and renegotiations.
  - Fact 1: bank credit is long-term.
  - Fact 2: covenant violations pervasive.
- Variation in bank health during the 2008-09 crisis plausibly exogenous to corporate loan portfolio.
- Compare outcomes for loans and borrowers which breach a covenant as a function of their lender's health.
- Quantitatively important: distressed lenders contracting credit to covenant violators account for 11% decline in aggregate credit and commitments outstanding from 2007 to 2009.

Related literature

- Bank health matters to nonfinancial firms: Peek and Rosengren, 2000; Lin and Paravisni, 2012; Chodorow-Reich, 2014; Benmelech, Bergman, Seru, 2015; Gan, 2007; Amiti and Weinstein, 2016; Bentolila, Jansen, Jiménez, 2016.
- Covenant violations matter to nonfinancial firms: Chava and Roberts, 2008; Roberts and Sufi, 2009; Nini, Smith, Sufi, 2012; Falato and Liang, 2016.
- Loan renegotiation and optimal contracting: Hart and Moore, 1988; Aghion and Bolton, 1992; Gârleanu and Zwiebel, 2009; Nini, Smith, Sufi, 2009; Mian and Santos, 2011; Dennis and Wang, 2014; Acharya, Almeida, Ippolito, Perez, 2014; Bradley and Roberts, 2015; Roberts, 2015.
- Financial sector in macroeconomic GE models: Gertler and Kiyotaki, 2010; He and Krishnamurthy, 2013; Brunnermeier and Sannikov, 2014.

Outline

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Share National Credit program (SNC)

- Joint supervisory data set of Federal Reserve, FDIC, and OCC.
- Information on all loans >\$20 million and shared by 3+ supervisees.
- Yearly snap shot on December 31st but information on amendments over course of year.
- Total outstanding+commitments of \$2.8T in 2007. Call Reports comparison
    - \$1.2T outstanding versus \$1.4T in C&I lending at commercial banks.

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- SNC covenant review sample: detailed information on covenant compliance for subset of SNC universe.
- Advantages: large sample and comprehensive coverage of violations.
- Our sample: nonfinancial borrowers, term loans and credit lines, remaining maturity of 1+ years.

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- *Bind*: loan breaches covenant regardless of whether waiver granted.

Lender health

- Measures from Chodorow-Reich (2014) exploit origins of 2008-09 crisis outside of corporate sector:
  - Fraction of syndicated loan portfolio in credit lines where Lehman Brothers had a lead role.
  - Correlation of bank stock return and ABX AAA 2006-H1 index during 2007Q4.
  - Bank balance sheet items: trading revenue/assets, real-estate charge-offs, deposits/assets.

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  - Bank balance sheet items: trading revenue/assets, real-estate charge-offs, deposits/assets.
- *Bad Lender*: first PCA of three measures for lead lender, rank-normalized to lie on unit interval.

IDENTIFICATION

- Identifying assumption: no sorting of borrower quality and lender health as measured by *Bad Lender*:

  1. Chodorow-Reich (2014): borrowers in industries and counties with similar employment declines; balancing on unobservables.
  2. Balancing in SNC: similar propensities to breach covenant; similar ex ante leverage, risk rating.
  3. Similar outcomes among borrowers who do not violate covenants.
  4. Within syndicate evidence: lead share declines.
  5. Placebo exercises.

Summary statistics

▸ Other maturity data ▸ Other violations data

	Pre-crisis (2006-07)			Crisis (2008-09)		
Sample:	SNC	COV	C-RF	SNC	COV	C-RF
			Loans of any maturity			
1+ year remaining	0.91	0.92	0.92	0.88	0.88	0.89
			Loans with 1+ year maturity remaining			
Maturity (years)	3.30	3.34	3.36	2.61	2.78	2.75
Log total committed	18.66	18.85	18.95	18.74	18.76	18.91
Credit line	0.61	0.59	0.60	0.51	0.49	0.49
Publicly-traded	0.37	0.38	0.40	0.36	0.37	0.39
$Bind_t$		0.25	0.24		0.34	0.33
$Bind_t$, private		0.27	0.27		0.36	0.34
$Bind_t$, ex. waivers		0.09	0.08		0.11	0.10
$Bind_{t-1:t}$		0.29	0.28		0.39	0.37
Loan-year observations	11,247	2,676	2,478	11,979	4,059	3,420
Borrowers	4,769	1,309	1,166	4,992	1,704	1,409
Committed ($Tr)	2.01	0.55	0.50	2.04	0.72	0.65

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Balancing of covariates with lender health

TABLE IV

Balancing of Covariates in the Sample

	Quantile of lender health 1	2	3	4	Memo: std. dev.
Mean employment change in					
Borrower's industry, 2008:3–2009:3	−0.086	−0.081	−0.085	−0.089	0.083
Borrower's county, 2008:3–2009:3	−0.056	−0.056	−0.056	−0.056	0.009
Share with bond market access	0.455	0.540	0.458	0.236	0.494
Share private, no bond market access	0.418	0.331	0.363	0.525	0.492
Share public, no bond market access	0.127	0.129	0.179	0.239	0.374
Mean all in drawn spread	266	155	156	199	133
Median sales at close ($2005 billions)	0.366	0.837	0.701	0.285	4.146
Mean year of last precrisis loan	2005.83	2005.98	2006.03	2006.05	1.50
Share with loan due during crisis	0.193	0.188	0.183	0.205	0.394

Source: Chodorow-Reich (QJE 2014). ▸ Additional evidence

Balancing in SNC

	All borrowers			$Bind_{t-1:t} = 1$		
Lender health:	Below median	Above median	t-stat.	Below median	Above median	t-stat.
Variable mean:						
$100 \times Bind_{t-1:t}$, crisis	37.96	36.59	0.82			
Log assets, pre-crisis	12.72	12.81	1.17	10.98	11.11	0.35
Leverage, pre-crisis	0.50	0.49	1.21	0.54	0.53	0.93
Rating, pre-crisis	70.04	71.51	0.56	42.20	44.69	0.93
Obs., crisis	1,673	1,747	3,420			
Obs., pre-crisis	1,215	1,263	2,478	358	335	693

- Similar violation propensity.
- Similar ex ante characteristics even within violator sample.
- Covenant violators smaller, more levered, ex ante riskier.

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Outline

Overview

1. Conditional on breaching a covenant during 2008-09, borrower of distressed lender more likely to have credit reduced.
    - Nonparametric and regression evidence.
    - Robust to lender health measure.
    - Specification tests: lead share and placebo exercises.
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3. Reduction in credit substantial and no substitution.
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Binary outcomes

Difference-in-difference linear probability model regression:

$$Y_{l,b,f,t} = \beta_0 + \beta_1[Bad\ Lender_b] + \beta_2\,[Bind_{l,t-1:t}] + \beta_3[Bad\ Lender_b \times Bind_{l,t-1:t}] \\ + \gamma' X_{l,f,t} + \varepsilon_{l,b,f,t}.$$

- Sample: outcomes in 2008 and 2009.
- Outcome:
  - *Credit reduced*: loan terminated or limit reduced.

Non-parametric representation

	Fraction *Credit reduced* $= 1$		
	$Bind_{t-1:t} = 0$	$Bind_{t-1:t} = 1$	Difference
Healthiest lenders (*Bad Lender* <P25)	0.316	0.369	0.053
Least healthy lenders (*Bad Lender* >P75)	0.320	0.506	0.186
Difference	0.004	0.137	0.133
Observations	1018	684	

Reduction in credit available

	Dep. var.: *Credit reduced*			
Bad Lender	−4.1	−3.0	−3.2	−0.8
	(5.8)	(5.6)	(5.7)	(5.2)
Bind	6.1**	4.6	4.2	5.2**
	(2.6)	(3.1)	(2.9)	(2.6)
Bad Lender × *Bind*	23.9***	25.2***	25.1***	23.7***
	(6.4)	(6.5)	(6.5)	(6.3)
Dep. var. mean	0.38	0.38	0.38	0.38
Year, Industry FE	No	Yes	Yes	Yes
Borrower controls	No	No	Yes	Yes
Loan controls	No	No	No	Yes
R^2	0.066	0.085	0.087	0.116
Observations	3,420	3,420	3,420	3,420

Borrower controls: log assets, leverage, risk rating. Loan controls: purpose, type.

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Robustness to lender health measure

	Dependent variable: *Credit reduced*		
Lender health based on:	June 2007 lead	Crisis syndicate-weighted mean	Crisis syndicate-weighted median
Bad Lender	−9.8	−4.7	−2.2
	(6.3)	(9.7)	(7.2)
Bind	8.2**	1.9	5.9
	(3.3)	(4.4)	(4.2)
Bad Lender × *Bind*	27.3***	27.2***	19.0**
	(5.1)	(9.5)	(8.6)
Impute non-bank using lead	n.a.	Yes	Yes
Year, Industry FE	Yes	Yes	Yes
Borrower, Loan Controls	Yes	Yes	Yes
Observations	2,844	3,420	3,420

Specification tests

Dependent variable:	Change in lead lender share	*Credit reduced* in 2006-07 (Placebo exercises)	
Lender health based on:	Crisis lead	Crisis lead	2006/2007 lead
Bad Lender	1.2	3.5	−2.2
	(2.5)	(3.9)	(6.4)
Bind	−4.1*	13.9**	16.1***
	(2.4)	(5.7)	(5.3)
Bad Lender × *Bind*	−10.9**	2.9	10.3
	(5.2)	(10.5)	(11.5)
Year, Industry FE	Yes	Yes	Yes
Borrower, Loan Controls	Yes	Yes	Yes
Observations	2,289	2,047	2,478

Heterogeneity

	Dependent variable: *Credit reduced*			
Interaction variable I:	Credit line	High lead share	Small syndicate	Concentrate syndicate
$Bad\ Lender \times Bind$	17.4***	14.8*	8.4	10.2
	(4.2)	(8.4)	(11.7)	(9.8)
$Bad\ Lender \times Bind \times I$	16.6**	25.7**	27.5**	23.9**
	(5.4)	(11.6)	(11.3)	(10.2)
Main effects	Yes	Yes	Yes	Yes
Main effects$\times I$	Yes	Yes	Yes	Yes
Year, Industry FE	Yes	Yes	Yes	Yes
Year, Industry FE $\times I$	Yes	Yes	Yes	Yes
Borrower, Loan Controls	Yes	Yes	Yes	Yes
Borrower, Loan Controls $\times I$	Yes	Yes	Yes	Yes
Observations	3,420	3,420	3,420	3,420

Total credit available

Dependent variable:	$\%\Delta$(Total committed)			$\Delta\frac{\text{Other debt}}{\text{Assets}}$	$\Delta\frac{\text{Issuance}}{\text{Assets}}$
Aggregation:	Loan intensive margin	Loan all margins	Firm	Firm	Firm
Bad Lender	1.1	0.2	12.4	−0.3	1.3
	(2.0)	(4.4)	(9.4)	(6.3)	(1.5)
Bind	−2.6**	−3.2	−8.1***	4.4	0.1
	(1.1)	(4.0)	(2.5)	(3.7)	0.5
Bad Lender × *Bind*	−13.2***	−22.9***	−26.0***	−8.8	−4.5**
	(3.2)	(7.5)	(8.9)	(9.1)	(2.0)
Year, Industry FE	Yes	Yes	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes	Yes	Yes
Loan controls	Yes	Yes	No	No	No
Frequency	Annual	Annual	Annual	Annual	Long-diff.
Dep. var. source	SNC	SNC	SNC	SNC	Compustat
Observations	2,289	3,420	1,803	1,525	376

Financial and real adjustment

Dependent variable:	Credit utilization	Δ Cash/ Assets	Δ Capex/ Assets	Employment growth
Bad Lender	−0.023	0.021	0.028	0.010
	(0.030)	(0.036)	(0.020)	(0.070)
Bind	−0.006	0.015	−0.037	−0.008
	(0.009)	(0.016)	(0.030)	(0.047)
Bad Lender × *Bind*	0.086***	−0.071**	−0.077**	−0.112**
	(0.025)	(0.030)	(0.037)	(0.050)
Industry FE	Yes	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes	Yes
Frequency	Annual	Long-diff.	Long-diff.	Long-diff.
Dep. var. source	SNC	Compustat	Compustat	Compustat
Observations	1,525	376	376	376

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Partial equilibrium counterfactual

Suppose all borrowers received same treatment as borrowers of healthiest lender upon violating a covenant. How much less would aggregate credit have declined?

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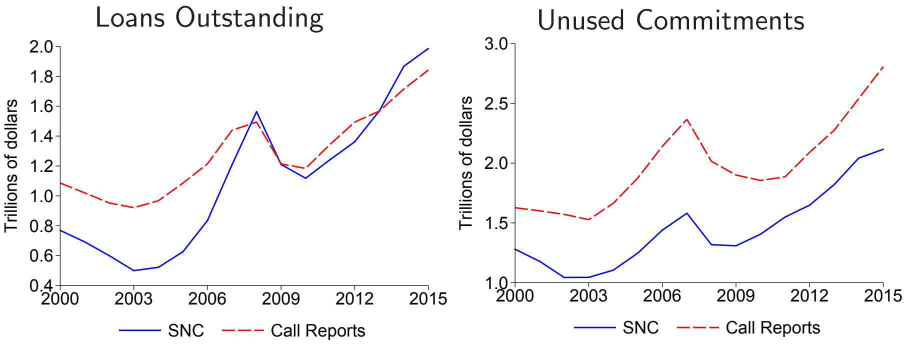
	2008	2009
SNC covenant sample decline due to interaction	5.8%	5.9%

β_3 from total credit available regression, loan level, intensive and extensive margins.

Aggregate credit



- SNC loans outstanding and unused commitments decline 9.7% from 2007 to 2009.
- Compare to 11.4% decline due to covenant channel.

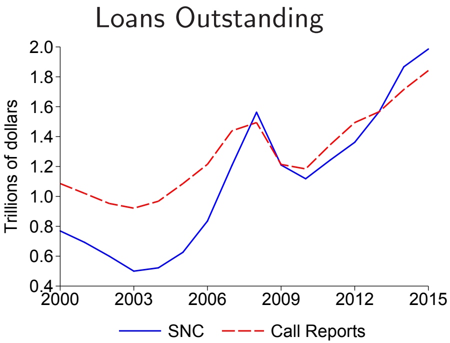
Outline

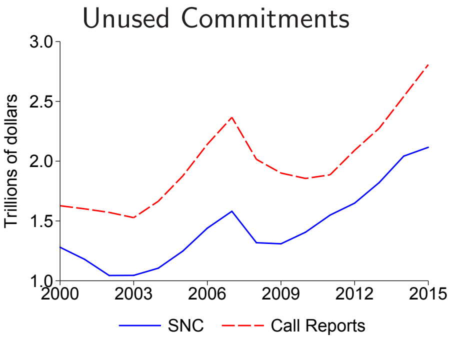
Takeaways

1. Covenant violations occur routinely.
2. Response depends on financial condition of lender.
3. Implied option shortens effective maturity of bank lending.
4. Quantitatively important channel through which lender health transmits to firms.

Appendix slides

Comparison of SNC to call report data ‣ Return





Other sources of loan maturity

▸ Return

- Survey of Terms of Business Lending (E.2):
  - Weighted-average maturity at origination of C&I loans about 22 months.
  - But loans undergo frequent renegotiation and refinancing (Roberts and Sufi, 2009; Mian and Santos, 2011; Denis and Wang, 2014; Roberts, 2015).
- Compustat:
  - Of firms with positive long-term debt, median amount due in less than one year $< 5\%$ and 75th percentile $< 20\%$.
  - Median Compustat firm has maturing long-term debt of $< 0.2\%$ of assets, 75th percentile firm has maturing long-term debt of $< 2\%$ of assets.

Other covenant violation frequency

Return

- Nini, Smith, Sufi (RFS 2012) scrape 10-Q and 10-K filings for mention of covenant violation.
- SEC reg. S-X: "any breach of covenant which existed at the date of the most recent balance sheet being filed and which has not been subsequently cured, shall be stated in the notes to the financial statements."
- Firms do not have to report covenant waivers.
- Cross-tabulation of SNC and Nini, Smith, Sufi:

SNC:	No violation	Violation	Total
Nini et al.:			
No violation	346	140	486
Violation	26	89	115
Total	372	229	601

Lender health and lending (Chodorow-Reich (QJE 2014))

	Bank change in lending	Lehman exposure	ABX
Lehman exposure	0.41***		
	[0.008]		
ABX exposure	0.39**	0.29*	
	[0.01]	[0.07]	
Bank statement items	0.52***	0.53***	0.33**
	[0.0004]	[0.0004]	[0.04]

Source: Chodorow-Reich (QJE 2014). Return

Balancing of covariates with lender health

TABLE IV

Balancing of Covariates in the Sample

	Quantile of lender health				Memo: std. dev.
	1	2	3	4	
Mean employment change in					
Borrower's industry, 2008:3–2009:3	−0.086	−0.081	−0.085	−0.089	0.083
Borrower's county, 2008:3–2009:3	−0.056	−0.056	−0.056	−0.056	0.009
Share with bond market access	0.455	0.540	0.458	0.236	0.494
Share private, no bond market access	0.418	0.331	0.363	0.525	0.492
Share public, no bond market access	0.127	0.129	0.179	0.239	0.374
Mean all in drawn spread	266	155	156	199	133
Median sales at close ($2005 billions)	0.366	0.837	0.701	0.285	4.146
Mean year of last precrisis loan	2005.83	2005.98	2006.03	2006.05	1.50
Share with loan due during crisis	0.193	0.188	0.183	0.205	0.394

Source: Chodorow-Reich (QJE 2014). Return

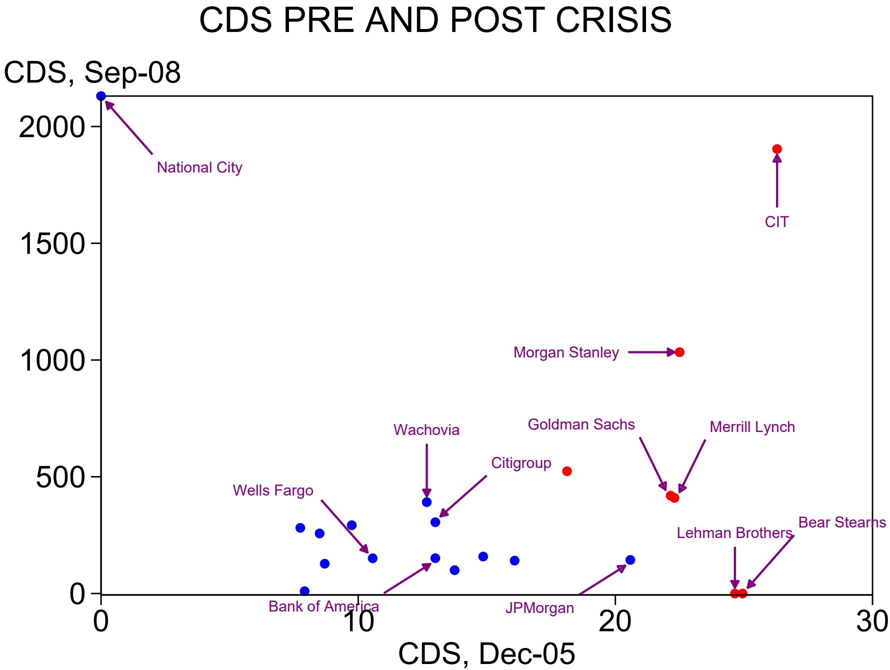
Unobserved characteristics and lender health

TABLE V

Testing for Unobserved Characteristics of Borrowers

	(1)	(2)
	Δ Log (lending in borrower-lender pair)	
Explanatory variables		
%Δ loans to other borrowers ($\Delta\tilde{L}_i$)	1.05**	1.07**
	(0.33)	(0.32)
1-digit SIC, loan year FE	No	Yes
Bond market access/public/private FE	No	Yes
Additional Dealscan controls	No	Yes
Borrower FE	Yes	No
R^2	0.423	0.088
Borrowers	432	432
Banks	43	43
Observations	2,005	2,005

Source: Chodorow-Reich (QJE 2014). Return



CDS PRE AND POST CRISIS
CDS, Sep-08
2000
1500
1000
500
0
0
10
20
30
CDS, Dec-05
National City
CIT
Morgan Stanley
Goldman Sachs
Merrill Lynch
Wachovia
Citigroup
Wells Fargo
Bank of America
JPMorgan
Lehman Brothers
Bear Stearns

Non-parametric representation ▸ Return

	Fraction *Credit reduced* $= 1$		
	$Bind_{t-1:t} = 0$	$Bind_{t-1:t} = 1$	Difference
Healthier lenders	0.371	0.404	0.032
(*Bad Lender* <25th percentile)	[N=389]	[N=251]	
Less healthy lenders	0.336	0.511	0.175
(*Bad Lender* >75th percentile)	[N=360]	[N=280]	
Difference	−0.035	0.107	0.143