



Collateralization, Bank Loan Rates and Monitoring: Evidence from a Natural Experiment

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- Why is collateral important?
 - One of the key features of many debt contracts
 - Usage motivated by its ability to alleviate information asymmetries between borrowers and lenders
 - Arguably relaxes credit constraints by reducing loan rates and increasing credit availability
 - May impact strongly on macro-economy
 - Availability of pledgeable assets influences debt capacity and thereby investment
 - Fluctuations (drops) in asset prices can cause credit cycles

FINANCIAL TIMES

November 28, 2011 7:00 pm

Financial system creaks as loan lubricant dries up

By Tracy Alloway



Whoosh! That's the sound of up to \$5,000bn worth of collateral draining from the financial system. And it is not a reassuring one.

“Collateral is the grease that oils the lending system,” says Richard Comotto of the International Capital Market Association. “If the grease starts to freeze or run out, the loan cogs won't run as well.”

■ What is collateral?

- Inside vs. outside collateral
 - Outside = pledged assets are not owned by the firm
- Inside collateral changes the priority order of creditors in case of a bad credit event
- Credit events that make pledged assets callable can vary by type of collateral
- Different rules for who receives residual value of collateral
- May change behavior of borrower and lender

- What do we know about collateral?
 - I. Aggregate implications
 - II. Means to increase access to - and reduce cost of credit
 - III. Means to influence lender behavior

I. Aggregate implications of collateral

- Fluctuations in collateral values can generate credit cycles
 - Bernanke & Gertler (AER 1989); Kiyotaki & Moore (JPE 1997)
- Collateral affects debt capacity and corporate investment
 - Gan (JFE 2007); Vig (2011); Chaney, Sraer & Thesmar (2009)

II. A means to influence access to and cost of credit

- Collateral is an ex-ante sorting device or means to influence ex-post borrower behavior?
 - Bester (AER 1985); Chan & Thakor (JF 1987); Boot & Thakor (IER 1994)
 - Empirical evidence: Jiménez, Salas & Saurina (JFE 2006); Berger, Frame & Ioannidou (JFE 2010)
- Evidence points to positive relation between collateral and loan rates
 - Brick & Palia (JFI 2007); Bharath, Dahiya, Saunders & Srinivasan (JFE 2007)
 - **Difficult to address simultaneity of rates and collateral posting**
 - These papers capture both *ex ante* and *ex post* effects of collateral

III. A means to influence lender behavior

- Collateral substitutes for screening
 - Manove, Padilla & Pagano (RAND 2001)
- Collateral affects bank monitoring
 - Berglöf & Von Thadden (QJE 1994); Rajan & Winton (JF 1995); Longhofer & Santos (JFI 2000)
 - Empirical evidence: Ono & Uesugi (JMCB 2009)

- This paper deals with questions II and III
 - Collateral and loan contracting:
 - How does pledged collateral influence loan rates and the availability of credit?
 - Collateral and monitoring incentives:
 - How does collateral affect bank monitoring?
- How?
 - Exploit a natural experiment: Change in the law in Sweden that altered the value of the company mortgage, a type of collateral common in Sweden (similar to the UK floating charge)
 - Deal with joint determination of collateral, loan contract terms and bank-internal variables

What do we find ...?

An exogenous reduction in collateral of
e.g., 4 percentage points in coverage ratio
(i.e., collateral / loan exposure with mean = 47 percent)



"was followed by"

Increase in the loan rate by 24 bps
(mean = 6.6 percent)

Two-notch downgrade of the borrower's risk category
(mean = 9; from 0 to 20)

13 percent reduction in borrower's bank-lending limit

Collateral & coverage ratio adjustments
2.5 & 1.2 percentage points reduction in adjustments in values
(mean = 6.0 & 2.9 percent)

83 & 86 days extra between adjustments
(mean = 181 & 155 days)

19 days extra between borrower reviews
(mean = 320 days)

Related Empirical Work

Our findings are consistent with:



- Haselmann, Pistor and Vig (RFS 2010)
 - Strengthening of legal rules designed to protect individual creditors' claims outside bankruptcy increased **bank lending** in transition countries
 - La Porta, Lopez-de-Silanes, Shleifer & Vishny (JF 1997, JPE 1998), Levine (1999), Djankov, La Porta, Lopez-de-Silanes & Shleifer (QJE 2003), Beck, Demirgüç-Kunt & Levine (JF 2005), ...
 - Provide evidence on the importance of the law, its origin and the legal system, for financial arrangements and economic performance.
- Berger, Frame & Ioannidou (JFE 2010)
 - Document that collateral serves primarily as a contractual device to solve moral hazard problems.

Related Empirical Work

Our findings complement:

■ Vig (2011)

- Reform in India that improved the ability of lenders to access the collateral of the firm
- Corporate secured debt, total debt, debt maturity, and asset growth *declined* and liquidity hoarding *increased*, especially for firms with a higher proportion of tangible (fixed) assets
- Strengthening of creditor rights in India introduces *a liquidation bias* and firms alter their debt structures to contract around it
 - Gennaioli & Rossi (2009): floating charge removes creditors' liquidation bias
 - See also Franks & Sussman (RoF 2005); Djankov, Hart, McLiesh & Shleifer (JPE 2008)

■ Rodano, Serrano-Velarde & Tarantino (2011)

- The 2005/06 reforms of the Italian bankruptcy law that strengthened the firms' rights to renegotiate outstanding deals with creditors
 - Increased the cost of funding for small and medium sized firms, while the law simplifying the procedure of liquidation decreased it

Related Empirical Work

Our Study Focuses:



On the *immediate* bank response
to
a reduction in the value of outstanding company mortgages
in terms of
loan pricing,
borrower ratings,
lending limits, *and*
monitoring activities.

Related Empirical Work

Also using this dataset:



- Degryse, Ioannidou & von Schedvin (2011)
 - Investigate the non-exclusivity of loan contracts

■ Company mortgage

- A special collateral right in Sweden
 - C.f. floating lien (US), floating charge (UK), chattel pledge (AUS)
- Typically constitutes a prioritized collateral claim on “**personal**” (i.e., **moveable**) - as opposed to **real - property** related to a business
 - Assets can be called not only in case of bankruptcy but when other creditor seizes assets
- Pool of underlying assets can **vary** over time, assets remain available for operations of business
- Some classes of assets were excluded from the company mortgage such as:
 - cash, money in bank accounts and assets that that can be mortgaged in other ways (typically real estate and financial assets like stock and bonds)

The company mortgage allows the debtor free use of its “personal” (i.e., moveable) property while its management is doing well, and when management fails, it **crystallizes** to divest them of control even over these assets.

Company Mortgage

1. In case of company bankruptcy
2. Special priority rights (ability to pre-empt other creditors)



“Personal” (i.e., moveable) property related to a business

■ Change in company mortgage law

As of 1 January 2004:

- Special priority rights of old and new company mortgage were weakened and “converted” into *normal* priority rights
 - Assets can now only be claimed in case of bankruptcy
- Share of all assets that could serve as company mortgage collateral was restricted to 55% of their total, but types of assets slightly widened

Official records of the Parliamentary Committee on Civil Law:

“Give stronger incentives for banks to analyse profitability, do ongoing monitoring and supervision”

Our results show the opposite happened.

May also explain near-reversal of change on 2009/1/1.

Lawmakers may also be confused about liquidation bias of the company mortgage.

Company Mortgage

In case of company bankruptcy



- Empirical strategy
 - Exploit the *exogenous and (almost) unambiguous* deterioration in the value of the company mortgage
 - We can assess if indeed it was a deterioration for the bank
 - Treatment group: all firms that pledged a company mortgage to bank before 2004
 - Control group: all other firms
 - Estimate *impact of the reduction in the value of pledged collateral* on:
 - Price and availability of credit
 - Monitoring by bank of collateral and borrower

- First Conjecture
 - There is a deterioration in the value of the company mortgage as assessed by the bank

- Second Conjecture
 - The deterioration in the value of the company mortgage results in:
 - a tightening of the adjustable terms of the outstanding collateralized loans,
 - the only adjustable loan term is the loan interest rate
 - an increase in the firm-specific risk to the bank, and
 - a decrease in the willingness of the bank to lend (credit supply) to the firm.

- Third Conjecture
 - The deterioration in the value of the company mortgage results in:
 - a decrease in the monitoring of this collateral by the bank.
 - Rajan & Winton (JF 1995): collateral can improve lenders' incentives to monitor when the value of the assets pledged is risky

Company Mortgage



Collateral Monitoring

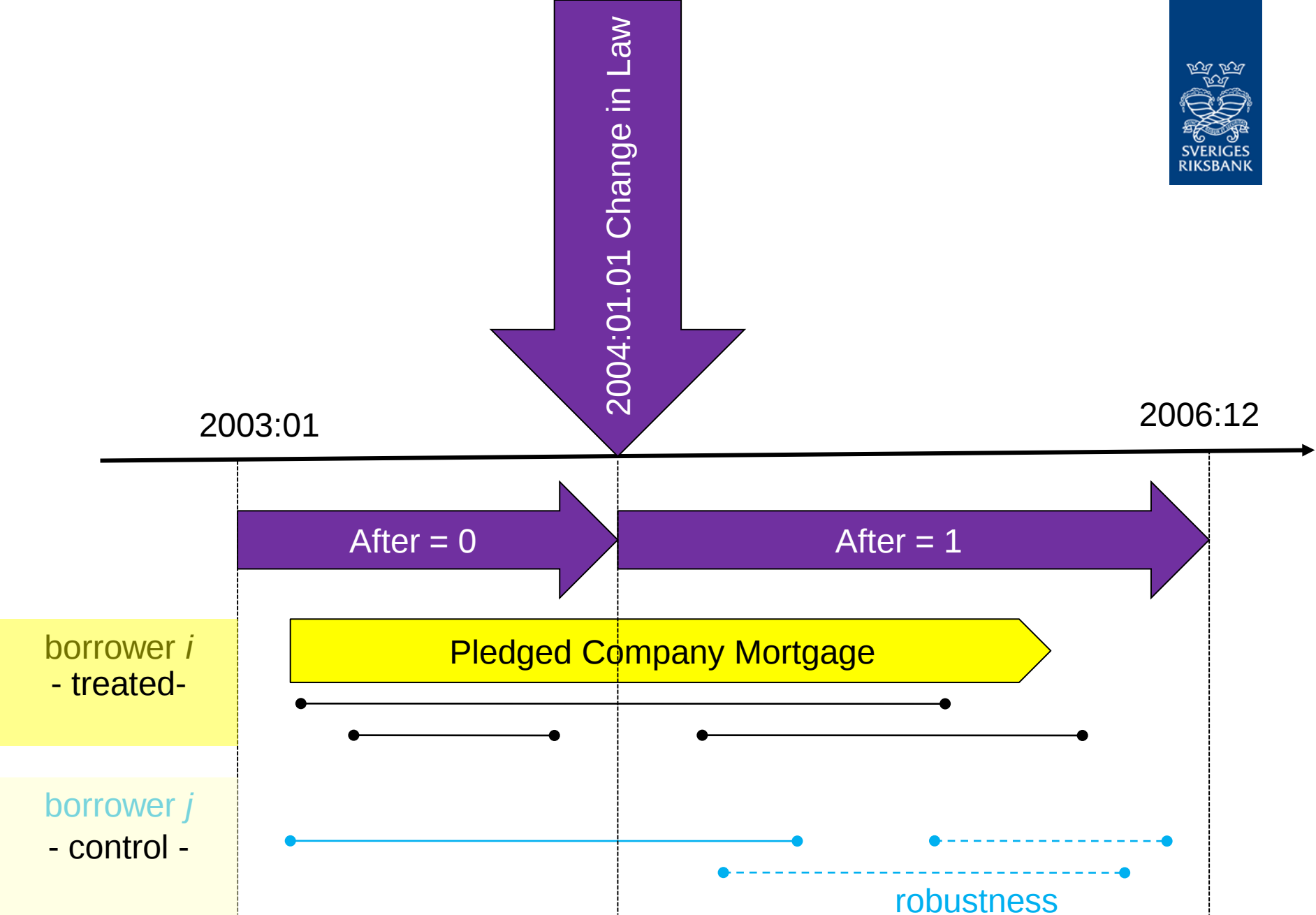
- Third Conjecture
 - The deterioration in the value of the company mortgage results in:
 - a decrease in the monitoring of this collateral by the bank.
 - Rajan and Winton (JF 1995): collateral can improve lenders' incentives to monitor when the value of the assets pledged is risky
 - an ambiguous effect on the monitoring by the bank of the borrower given that:
 - the decrease in monitoring of this collateral,
 - may be more than offset by increased monitoring of borrower operations and cash-flows in general
 - Hence net effect may be negative or positive, but possibly “smaller”?

■ Data

- All corporate accounts of a **large Swedish commercial bank**
 - Bank follows *Internal-Ratings-Based* approach under Basel II
 - All loan files kept by bank for each borrower between 2002:04 and 2006:12
 - monthly frequency
 - Focus on “business loans” (those with a pre-determined quarterly repayment schedule)
 - not secured by standardized collateral such as cars, real estate, etc.
 - but may be secured by company mortgage
 - Loan rates on business loans are adjustable at quarterly basis
 - only contract term that is adjustable (!)
- Matched with official register of pledged company mortgages maintained by **Swedish Companies Registration Office**

■ Descriptive statistics

Variable	Mean	Std. Dev.	Obs.
Loan contract			
Collateral value (€000)	49.95	184.15	108,368
Collateral value / Loan exposure ratio (%)	46.60	46.54	108,368
Loan rate (%)	6.57	1.51	108,368
Borrower			
Internal rating (0-20)	9.29	3.23	56,696
Internal limit (€000)	499.09	2616.09	99,635
Monitoring intensity of collateral			
Change in collateral value (%)	6.05	19.83	107,372
Change in coverage ratio (%)	2.90	13.02	107,372
Monitoring frequency of collateral			
Nr. changes in collateral value (per year)	2.02	3.04	108,368
Nr. changes in coverage ratio (per year)	2.35	3.97	108,368
Monitoring of borrower			
Months to next review	10.42	3.20	94,704



Including: borrower- or loan-, and year*month fixed effects. Cluster: at borrower level.

Mean collateral value = 49,950 euros
Standard deviation: 184,150 euros

$$\text{Exp}(\ln(49,950) - 0.75) = 23,595 \text{ euros}$$

■ Impact on credit terms

Dependent Variable	Ln(Collateral)	Coverage ratio	Loan rate
Treated x After	-0.75*** (-11.39)	-4.15*** (-6.73)	0.24*** (18.37)
Loan fixed effects	Yes	Yes	Yes
Borrower fixed effects	No	No	No
Year*month fixed effects	Yes	Yes	Yes
R-squared	0.03	0.01	0.25
Number of loans	3,537	3,537	3,537

Mean collateral ratio = 46.60 %
Standard deviation: 46.54 %

$$46.60 - 4.15 = 42.45 \%$$

108,368

Mean loan rate = 6.57 %
Standard deviation: 1.51 %

$$6.57 + 0.24 = 6.81 \%$$

■ Interpretation

- For the same loan, for every percentage point decrease in collateral coverage (mean = 46.6 percent), the bank charges 6 bps extra in loan rate (mean = 6.6 percent)
- Robustness: control for riskiness of borrower (limit, rating)
 - effect on loan rate slightly reduced

Table 4		Dependent Variable			
		Loan rate			
Borrower Risk		Ln(Internal limit)		Internal rating	
Independent Variables		(I)	(II)	(I)	(II)
Treated×After		0.19***	0.18***	0.39***	0.33***
		(12.42)	(11.68)	(20.76)	(17.66)
Borrower Risk			-0.09***		-0.03***
			(-19.26)		(-21.87)
Loan fixed effects		Yes	Yes	Yes	Yes
Year*month fixed effects		Yes	Yes	Yes	Yes
R-squared (%)		0.24	0.24	0.33	0.34
Number of loans		3,491	3,491	2,083	2,083
Number of observations		99,635	99,635	56,696	56,696

■ Robustness

not all yet in current draft; holds for all estimates

- Placebo test: redo for lease contracts; no effect found
- Lease contracts as control group
- Differential trends (before and after)
- Non-linear effect over time of treatment
- After-treatment period restricted to December 31st, 2004

Mean internal limit= 499,090 euros

Standard deviation: 2,616,090 euros

$\text{Exp}(\ln(499,090) - 0.13) = 438,238$ euros

■ Impact on borrower

Dependent Variable	Ln(Internal limit)	Internal rating
Treated x After	-0.13*** (-12.12)	-1.84*** (-32.28)
Loan fixed effects	No	No
Borrower fixed effects	Yes	Yes
Year*month fixed effects	Yes	Yes
R-squared	0.06	0.05
Number of loans	3,515	2,155
	99,635	56,696

Mean internal rating [0, 20] = 9.29

Standard deviation: 3.23

$9.29 - 1.84 = 7.45$

Mean number = 2.02
Standard deviation: 3.04

$$2.02 - 0.64 = 1.38$$

Mean number = 2.35
Standard deviation: 3.97

$$2.35 - 0.84 = 1.51$$

months, and β is the
t-statistics (standard
deviation).
respectively.

Time to next review

Change in value

Number of changes

Time to next review

Dependent variable

Ln(Collateral)

Coverage ratio

Ln(Collateral)

Coverage ratio

Time to next review

Treated x After

-2.52***

-1.22***

-0.64***

-0.84***

0.62***

Mean time = 10.42 months
Standard deviation: 3.20 months

(-13.75)

(-15.14)

(6.48)

$$10.42 + 0.62 = 11.04 \text{ months}$$

Yes

Yes

No

No

No

Yes

Borrower fixed effects

No

No

Year*month fixed effects

Yes

Yes

Yes

Yes

Yes

Mean change = 6.05 %
Standard deviation: 19.83 %

$$6.05 - 2.52 = 3.53 \%$$

Mean change = 2.90 %
Standard deviation: 13.02 %

$$2.90 - 1.22 = 1.68 \%$$

0.08

3,406

94,704

■ Tentative Conclusions

- We use a change in law in Sweden that exogenously reduced the value of company mortgages
- Collateral is valuable for lender and borrower
- Decrease in collateral value leads to:
 - Increase in loan rates
 - Reduction in credit supply (i.e., bank internal, confidential credit limit)
 - Reduction in borrower rating
 - Reduction in bank monitoring effort
 - most for collateral-specific, less so for borrower-specific monitoring
- Results suggest
 - Collateral and interest rates are “substitutes”
 - Collateral and monitoring are seemingly “complementary (on net)” in this case