Permissible collateral, access to finance, and loan contracts: Evidence from a natural experiment

Bing Xu
Universidad Carlos III de Madrid

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Introduction

- Lack of sufficient collateral is a key obstacle to external finance across countries. (Hart and Moore, 1994; Stiglitz and Weiss, 1982)

- Inadequate legal infrastructure excludes movable assets from permissible collateral class (Campello and Larrian, 2015), while around the world, movable assets comprise half of firms' total assets (Alvaerz de la Campa, 2011)

- Reforms in collateral law generally promotes access to external finance
  - Campello and Larrian (2015): Romania and Eastern European countries.
  - Aretz et al., (2015): Napolenoic Code in France.
  - Love et al., (2015): Collateral registries promote access to finance across countries.
  - Cerqueiro et al., (2015): Swedish collateral reform.

- Excessive reliance on collateral reduces bank's incentives for adequate screening, consequently allowing riskier borrowers to obtain loans and worsening credit allocation efficiency (Manove et al., 2001; Zazzaro, 2005; Jappelli et al., 2005; Assuncao et al., 2014).

Introduction

- China completed Property Law reform in 2007, allowing *movable assets* as permissible collateral for the first time, and bringing secured transactions more in line to international best practices.

- *Doing Business Legal Rights Index* jumps from 4 to 6 following the reform.

- Referred to as " China's next revolution" by *The Economist*.

- Few academic researches have investigated the impact of the Chinese Property Law (e.g. Berkowitz et al., 2013).

- Questions:
  - Does the Property Law reform change firms' debt capacity and maturity structure?
  - Does the reform change firms' reliance on informal financing channel (trade credit)?
  - Does the reform improve credit allocation efficiency?
  - What are the real side implications of the reform, such as firms' asset mix and profitability?
  - How does the reform shape loan contracts?

Institutional background: The 1995 Security Law

- Permissible assets:
  - Fixed assets
  - Equipment and motor vehicles: allowed as non-possessory security interests
  - Inventory is in practice accepted as possessory security interests.
- Non-permissible assets:
  - Account receivables
  - Future acquired properties
  - Any property that can't be fixed in type, quantity, and location
- Secured interest registration
  - Secured interests must be registered to be enforceable
  - No centralized registration system exists
  - Collateral needs to be appraised and certified
- No clear rule on determination of priority among competing claims

Institutional background: The 2007 Property Law

- Additional permissible assets:
  - Account receivables, including but not limited to the following
    - Claims from sale, lease, rendering services, granting loans or other credit.
    - Rights to charge fees from immovable property such as toll roads, bridges, tunnels, ferries, etc.
  - Existing and future production equipments
  - Raw materials and semi-finished goods
  - Inventories
- Simplified registration process and centralized registration system
  - General movable assets: local subset of State Administration of Industry and Commerce; require only basic information such as parties, debt, and the security
  - Account receivables: Credit Reference Centre of People's Bank of China. Publicizing registration information of the pledge of account receivables
- Clear rule on determination of priority among competing claims

Institutional background: Secured transactions snapshot

- Before 2007
  - Secured transactions strongly favor real property as security.
  - World Bank Group (2007):less than 7% of loans in China is secured purely by movables assets, which were mostly inventories and equipments.
- After 2007
  - During 2008-2010, the number of loans backed with movable assets increased by 21% per year, and the value of loans grew by 24% per year.
  - More than 1.7 millions receivable-backed transactions have been recorded by the end of July, 2015, marking a remarkable annual growth of 51%.
  - The registered receivable-backed transactions amount to 57 trillion RMB

  Source: IFC Secured Transactions Advisory Project in China (2011)

Data and key variables

- Data source: Wind Information
- Sample coverage: Listed firms in Shanghai Stock Exchange and Shenzhen Stock Exchange, 2001-2014.
- Non-financial firms that have annual reports both before and after 2007.
- 23,000 firm-year observations from 1,800 firms.
- *Movratio=(Inventory+Account Receivable+Other Receivable)/Asset*

VARIABLES	Observations	Mean	Ste.Dev.	Min	Max
Panel A:Movable ratio					
Movratio	22854	0.30	0.18	0.01	0.81
$Inventory_t/Asset_t$	23050	0.17	0.15	0.00	0.75
$AccountReceivable_t/Asset_t$	23071	0.10	0.09	0.00	0.42
$OtherReceivable_t/Asset_t$	23319	0.03	0.06	0.00	0.34
$(CurrentAsset_t-Cash_t)/Asset_t$	23343	0.37	0.20	0.02	0.86
Panel B:Debt					
$Debt_t/Asset_{t-1}$	12259	0.31	0.20	0.01	1.21
$LongDebt_t/Debt_t$	13203	0.36	0.28	0.00	0.98
$LongDebt_t/Asset_{t-1}$	12964	0.10	0.12	0.00	0.64
$ShortDebt_t/Asset_{t-1}$	18664	0.17	0.14	0.00	0.75
$Payable_t/Asset_{t-1}$	21423	0.11	0.10	0.00	0.55
$Payable_t/(Debt_t+Payable_t)$	13265	0.28	0.21	0.01	0.95

Identification strategy

- Enactment of the Property Law in 2007 as exogenous shock
  - Timing of the law is unpredicted
  - Berkowitz, Lin, and Ma (2013): the passage of the Property Law was a surprise to the stock market.
- Difference-in-differences framework: The Property Law pertains to movable assets only=>firms with ex-ante high reliance on *movable assets* are affected more by the law change.

$$Y_{ijt} = \alpha_i + \gamma_t + \beta Highmov_i * After_t + \delta X + \varepsilon_{ijt}$$

- *Highmov_i=1 if* pre-reform median movable ratio is higher than *industry* median (Treated firms)
- *Highmov_i=0 if* pre-reform median movable ratio is below or equal to *industry* median (Control firms)
- X includes *Tangibility_{it-1}*, *Liquidity_{it-1}*, *Profitability_{it-1}*, *Sale_{it-1}*, *Age_{it-1}*, *List_{it}*, *Split_{it}*, and *State_{it}*
- Firm size:100 dummies for each percentile of the size distribution (Gopalan et al., 2015)
- *Firm FE, Year FE, Industry-Year FE, Province-Year FE*
- β: pre-post difference in Y_{ijt} of firms with high movable ratio, relative to the pre-post difference of firms with low movable ratio
- Standard errors clustered at firm level (Bertrand et al., 2004)

Results: Debt and debt maturity

1. *Debt$_t$/Asset$_{t-1}$* increases in relative terms for treated firms by 2% more, representing 6.48% of sample average.

2. *LongDebt$_t$/Asset$_{t-1}$* increases in relative terms for treated firms by 2.8% more, representing 27.2% of the sample mean.

3. *ShortDebt$_t$/Asset$_{t-1}$* does not show differential changes for treatment and control group

Dep. Var.	DT/TA	DT/TA	Log(1+DT)	LD/TA	LD/TA	LD/DT	Log(1+LD)	SD/TA	SD/TA	Log(1+SD)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Highmov*After	0.011	0.020**	0.068*	0.028***	0.028***	0.054***	0.215**	-0.013**	-0.009	0.023
	(0.010)	(0.010)	(0.040)	(0.006)	(0.006)	(0.013)	(0.105)	(0.006)	(0.006)	(0.051)
Firm controls	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Size dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Province*Year	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes
Observations	12,215	12,189	12,189	12,919	12,888	12,116	12,888	18,607	18,548	18,548
R-squared	0.103	0.217	0.559	0.101	0.211	0.225	0.183	0.154	0.247	0.345
No. of firms	1,620	1,615	1,615	1,649	1,644	1,595	1,644	1,792	1,787	1,787
Predict changes	3.57%	6.48%	7.04%	27.20%	27.20%	15.05%	23.99%	-7.61%	-5.27%	2.33%

Results: Account payable

- Trade credit as substitute to formal credit (Allen et al., 2005)
- Implication: credit expansion could reduce firms' reliance on trade credit

Findings:

- High movable firms reduces account payable disproportionally more
- Effect stronger among high movable firms that expanded debt capacity after the reform.

Dep. Var.	PA/TA	PA/TA	PA/(PA+DT)	Log(1+PA)	PA/TA	
					Δ Debt<=0	Δ Debt>0
	(1)	(2)	(3)	(4)	(5)	(6)
Highmov*After	-0.009***	-0.006*	-0.020**	-0.064**	0.002	-0.009**
	(0.003)	(0.003)	(0.008)	(0.032)	(0.005)	(0.004)
Firm controls	No	Yes	Yes	Yes	Yes	Yes
Size dummies	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	No	Yes	Yes	Yes	Yes	Yes
Province*Year	No	Yes	Yes	Yes	Yes	Yes
F (p-value)					2.90 (0.089)	
Observations	21,364	21,291	12,181	21,291	4,631	16,644
R-squared	0.108	0.208	0.240	0.583	0.155	0.135
No. of firms	1,803	1,798	1,614	1,798	374	1,422
Predict changes	-8.28%	-5.52%	-7.19%	-6.20%	1.84%	-8.28%

Results: Who benefits the most?

- Theories:
  - Collateral is usually associated with low quality borrowers (e.g. Berger and Udell, 1990, 1995; Jimenez, Salas, and Saurina , 2006).
  - Lazy bank: providing collateral may reduce banks' incentive to screen borrowers adequately (Manove, Padilla and Pagano, 2001)

- Implications: The debt expansion effect of Property Law should be more pronounced among *low quality* firms.
  - Divide the firms into subsamples according to *ex-ante* firm quality proxies, and test if coefficients on *Highmov$_i$*After$_t$* are statistically equal in each subsample pairs
  - Firm quality proxies: financially constraints (*Hadlock and Pierce Index*); indebtedness (*Liability Ratio*); Altman's Z-score; return on sale (*ROS*); net profitability (*Netpft*); and return on assets (*ROA*).

Results: Who benefits the most?

- Financially constrained, highly indebted, prone to bankruptcy, and less profitable firms expand the most debt capacity
- Potential credit allocation inefficiency (Mian and Sufi,2009, 2010;Assuncao et al., 2014)

Dep. Var.	DT/TA					
Panel A:	Unconstrained	Constrained	Low Liability	High Liability	High Z-Score	Low Z-score
Highmov*After	-0.005	0.029***	0.017	0.050***	0.012	0.036***
	(0.017)	(0.011)	(0.014)	(0.012)	(0.013)	(0.013)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Size dummies	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F (p-value)	2.76 (0.096)		3.33 (0.068)		1.78 (0.183)	
Observations	4,426	7,763	5,396	6,793	5,660	6,529
R-squared	0.146	0.129	0.085	0.186	0.116	0.153
Number of firms	626	989	744	871	710	905
Panel B:	High ROS	Low ROS	High Profitability	Low Profitability	High ROA	Low ROA
Highmov*After	0.002	0.047***	0.010	0.041***	0.013	0.038***
	(0.013)	(0.013)	(0.013)	(0.014)	(0.012)	(0.015)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Size dummies	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F (p-value)	5.97 (0.015)		2.71 (0.098)		1.78 (0.183)	
Observations	6,120	6,069	6,120	6,069	6,603	5,586
R-squared	0.137	0.147	0.133	0.158	0.131	0.151
Number of firms	849	766	860	755	913	702

Results: Asset structure

- Firms match debt maturity and asset maturity (Myers, 1977; Milbradt and Oehmke, 2014).
- "Credit multiplier" effects (Bernanke et al., 2000; Campello and Hackbarth, 2012).
- Findings: High movable firms increase disproportionally more in fixed assets investments; Credit expansion promotes fixed assets investments.

Dep. Var.	Log(1+TA)	Log(1+TA)	FA/TA	FA/TA	Log(1+FA)	FA/TA	
						Δ Debt<=0	Δ Debt>0
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Highmov*After	0.041***	0.018*	0.065***	0.069***	0.224***	0.048***	0.073***
	(0.011)	(0.011)	(0.007)	(0.006)	(0.034)	(0.012)	(0.007)
Firm controls	No	Yes	No	Yes	Yes	Yes	Yes
Size dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	No	Yes	No	Yes	Yes	Yes	Yes
Province*Year	No	Yes	No	Yes	Yes	Yes	Yes
F (p-value)						3.00 (0.084)	
Observations	21,485	21,410	21,447	21,388	21,388	4,636	16,736
R-squared	0.796	0.828	0.113	0.222	0.537	0.203	0.150
No. of firms	1,804	1,799	1,804	1,799	1,799	374	1,423
Predict changes	4.19%	1.82%	21.43%	22.75%	25.11%	15.82%	24.06%

Results: Post-reform performance

- Does the reform-induced debt expansion improve firm performance?

$$Y_{ijt} = \alpha_i + \gamma_t + \beta_1 Highmov_i * After_t * Lev_{change} + \beta_2 Highmov_i * After_t + \beta_3 Lev_{change} * After_t + \delta X + \varepsilon_{ijt}$$

- Firms expanded debt capacity after reform: Lev_{change}
  - *Lev_inc*: indicator variable equals one if the average yearly changes in debt to asset ratio for the pre-reform period is lower than that of the post-reform period
  - *Switcher*: indicator variable equals one if firm's average debt to asset ratio moves from the 25% percentile in the pre-reform period, to 75% percentile in post-reform period.
- $\beta_1 > 0$ if debt expansion improves performance
- Performance measures: profitability (*Netprofits_t/TA*), EBIT/Sale, profit growth ((*Netprofits_t-Netprofits_{t-1}*)/ *Netprofits_{t-1}*), and *Distress* (equals one if firm's interest coverage ratio is less than one).

Results: Post-reform performance

- Performance does not improve for high movable firms that expanded debt capacity.

Dep. Var.	Netprofit/ TA	EBIT/Sale	Profit Growth	Distress	Netprofit/ TA	EBIT/Sale	Profit Growth	Distress
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Highmov*After	0.017***	0.026***	0.650**	-0.081***	0.012***	0.017***	0.233	-0.052***
	(0.004)	(0.008)	(0.267)	(0.020)	(0.003)	(0.006)	(0.158)	(0.014)
Highmov*After*Lev_inc	-0.012*	-0.031**	-0.722*	0.064**				
	(0.006)	(0.012)	(0.393)	(0.030)				
Highmov*After*Switcher					-0.028*	-0.090**	-1.868**	0.065
					(0.016)	(0.041)	(0.887)	(0.077)
After*Lev_inc	-0.000	0.004	0.177	0.019				
	(0.005)	(0.008)	(0.284)	(0.022)				
After*Switcher					0.007	0.055*	0.491	0.010
					(0.012)	(0.031)	(0.502)	(0.050)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,096	12,082	11,134	11,284	15,126	15,097	15,124	13,667
R-squared	0.277	0.132	0.128	0.151	0.270	0.112	0.090	0.130
Number of firms	961	961	961	960	1,228	1,227	1,228	1,225

Results: Pre-trends, reverse causality and dynamic effects

- Validate assumptions of DID framework
  - Trends in the outcome variables must be similar *before* the reform
  - Property Law must be exogenous to firms' financial decisions (Berkowitz, Lin, and Ma, 2013)

- Dynamics of the outcome variables *after* the legal reform: lead-lag model.

$$Y_{ijt} = \alpha_i + \gamma_t + \sum_{\tau=-6}^{7} \beta_\tau \, Highmov_i * D_\tau + \delta X + \varepsilon_{ijt}$$

- D_τ =1 in the τth year *before (after)* the Property Law reform and 0 otherwise.

- The coefficients β_τ compare the level of the dependent variable τ years *before (after)* the Property Law, to the year immediately before the enactment of the Property Law.

Results: Pre-trends, reverse causality and dynamic effects

Panel A: Debt structure and trade credit
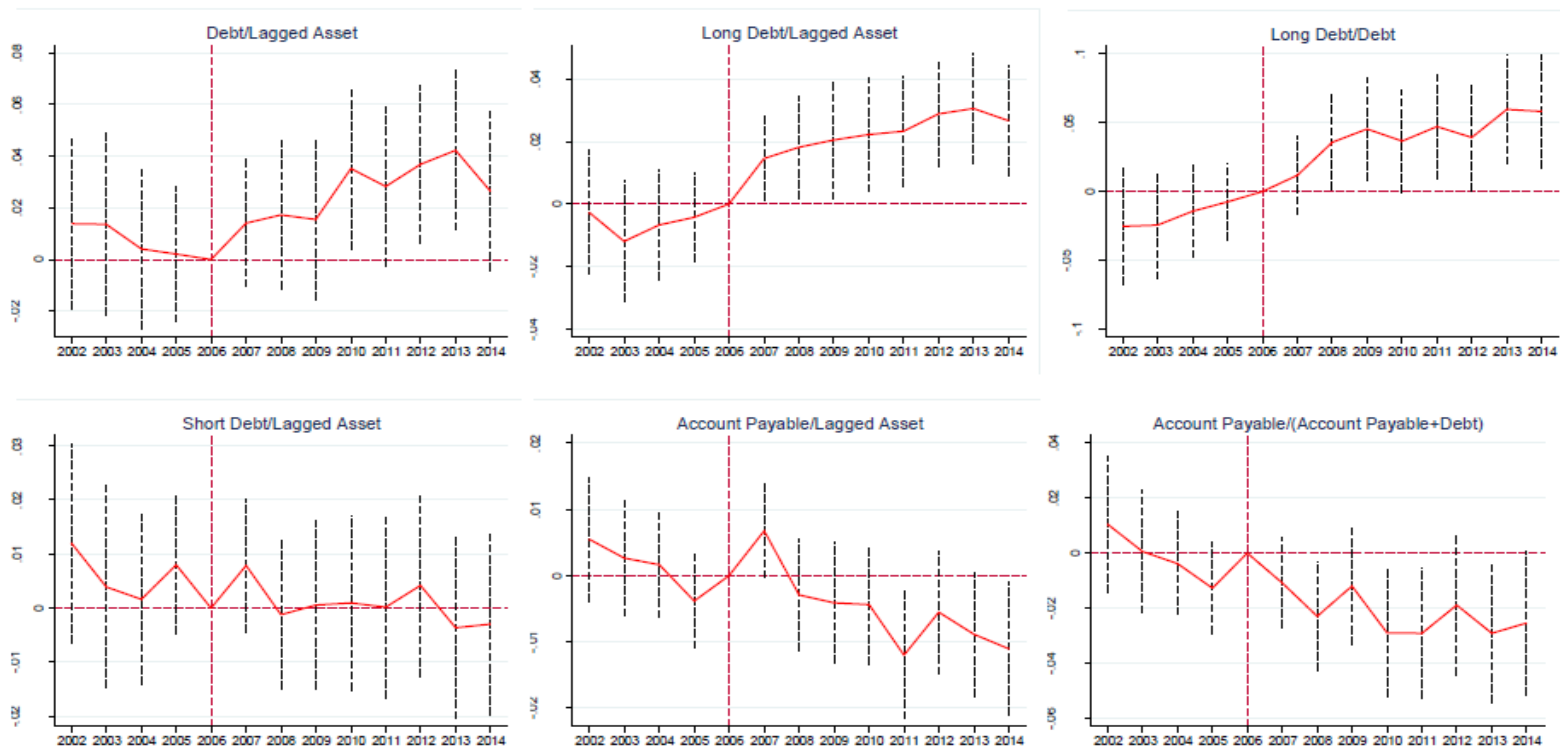
Panel B: Asset structure and real outcomes

Robustness tests

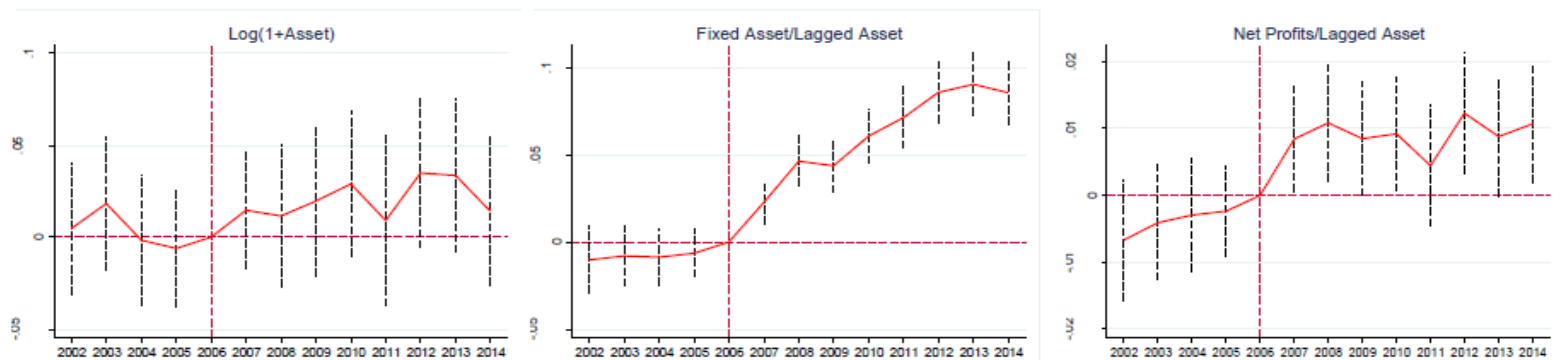- First set of tests: other aspects of Property Law
  - Creditor rights protection
  - Property rights protection

- Second set of tests: contemporary reforms that may have differential impacts on firms with varying level of movable assets.
  - 2005/2006: Related party transaction (Tunneling)
  - 2005/2007: Split-share reform
  - 2008: Unification of corporate tax

- Third set of tests: macroeconomics shocks that may have differential impacts on firms with varying level of movable assets.
  - Credit condition
  - Stimulus package
  - Global financial crisis
  - Collateral value

Robustness tests

- Fourth set of tests: differences in observables other than movable assets.
  - Matched sample: treatment and control firms are as similar as possible, except movable ratio.
  - Controls explicitly the differential reactions to Property Law as function of pre-reform firm characteristics *Z: Tangibility*, *Liquidity*, *Age*, *Profitability*, *Sale*, and *Leverage*.

- Fifth set of tests: variations in the exposure to treatment
  - Pledgibility of difference classes of movable assets
  - Availability of movable assets:

- Sixth set of tests: alternative definitions and samples
  - Alternative definition of treatment and control group
  - Alternative definition of movable assets
  - Balanced sample
  - Listed throughout sample period
  - Firms never changed ownership

Loan contracts

- Question 1: Do banks issue loans at better terms to high movable firms after the reform?

- Question 2: Do pledging collateral after the reform improves other loan contract terms?

- Data:
  - Hand-collected loan level data from firms listed in Shenzhen Stock Exchange
  - 2004-2013, in total more than 10,000 loans
  - Remove firms that borrowed only before or only after the reform=> left with more than 4,000 loans
  - Information on:
    - Loan size, interest rate, maturity and collateral.
    - Dates of loan origination, borrower characteristics.
    - Name bank, name office.

Results: Loan contracts

- Lending spread of high movable firms decreases by 46 basis points more. (15% of average).

- Maturity increases for high movable firms by 2 months more.

- Likelihood of pledging collateral increases for high movable firms by 15%.

- Lending spread for secured long-term loans decreases by 33 basis points more than unsecured long-term loans

- Secured loans become larger, but mainly for long-term loans.

Dep.Var.	Spread	Maturity	Collateral	Spread			Loan Size		
				All	Short	Long	All	Short	Long
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Highmov*After	-0.462**	0.640***	0.151**						
	(0.204)	(0.108)	(0.065)						
Collateral*After				-0.116	0.097	-0.328***	0.333**	0.019	0.482***
				(0.109)	(0.151)	(0.123)	(0.136)	(0.233)	(0.178)
Collateral	-0.028	-0.055		0.043	-0.171	0.192**	-0.148	0.019	-0.226
	(0.059)	(0.048)		(0.088)	(0.152)	(0.095)	(0.129)	(0.212)	(0.187)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,473	4,473	4,473	4,473	1,365	3,108	4,473	1,365	3,108
R-squared	0.377	0.363	0.276	0.374	0.383	0.386	0.276	0.201	0.308
No. of firms	149	149	149	149	70	142	149	70	142

Conclusion

- Debt capacity and maturity:
  - Reform expands debt capacity and prolongs debt maturity.
- Informal financing channel:
  - The reform induced debt expansion reduces firms' reliance on informal credit such as account payables.
- Credit allocation:
  - Reform allows financially constrained, highly indebted, prone to bankruptcy, and less profitable firms to take on most extra debt=> credit allocation inefficiency.
- Real-side effects:
  - Debt expansion leads to more investment in fixed asset.
  - Expanding debt capacity does not improve high movable firms' performance.
- Loan contracts:
  - Lending rates drop, loan maturity increases, and likelihood of pledging collateral increases for high movable firms.
  - Secured loans become larger and cheaper.

Policy implications

- Collateral improves debt capacity, but it may also decrease banks' screening incentives and allow riskier borrowers to take extra credit, and consequently, increases systematic risks (e.g.Manove et al., 2001; Zazzaro, 2005; Jappelli et al., 2005).

- Credit expansion may have also caused over-leverage or overcapacity, which could lower profitability for firms in those industries and damage overall economic balancing.

- Highlight the importance of accompanying collateral law reform with other structural reforms to improve overall efficiency of credit allocation.