Credit Relationships and Dynamic Credit Constraints

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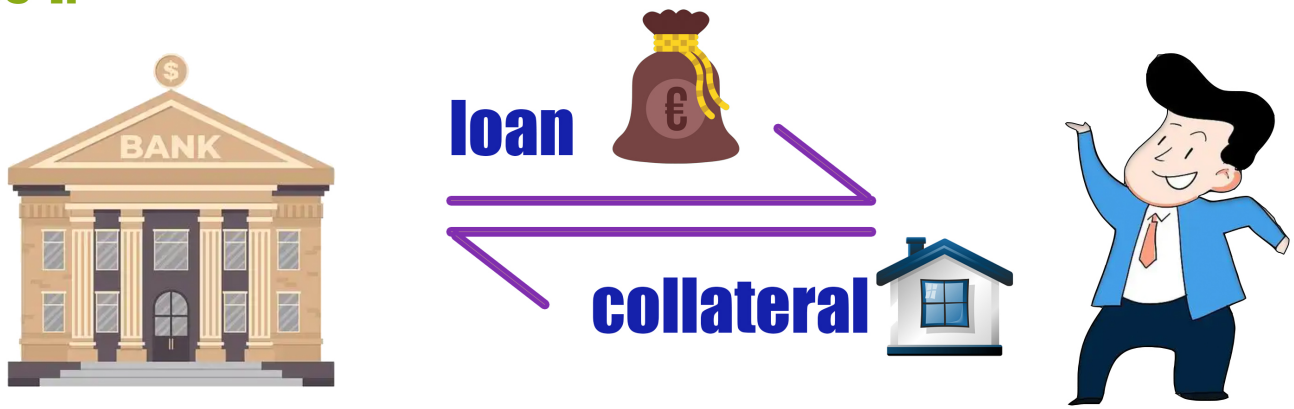
September 2025

Motivation

- Credit constraints are key to
  - corporate investment
  - transmission of macroeconomic shocks
- Credit relationships are known to relax credit constraints
  - Repeated interactions between borrowers and lenders
  - Borrowing conditions relaxed
- Mechanism not fully understood: collateral or covenant?

Motivation

Case 1:



Motivation

Or Case 2:

Motivation

- Credit constraints are key to
  - corporate investment
  - transmission of macroeconomic shocks
- Credit relationships are known to relax credit constraints
  - Repeated interactions between borrowers and lenders
  - Borrowing conditions relaxed
- Mechanism not fully understood: collateral or covenant?
- This paper
  - Relationship-driven increase in covenant incidence
  - Transition from collateral-based to earnings-based borrowing
  - Earnings-based borrowing allows for larger loans

Contributions and Overview

1. A new stylized fact
   - Collateral use negatively correlated with relationship strength
   - Covenant use positively correlated with relationship strength
2. Model of relationship with endogenous contractual device choice
   - Bank learning and belief update in a credit relationship
   - Earnings-based credits replaces collateral-based in relationship
   - Dynamic credit constraint driven by credit relationship
3. Validate model predictions in U.S. loan-level and firm-level data
   - Covenant use $\uparrow$ when relationship strengthens
   - Collateral-covenant substitution
   - Covenant offers larger loans than collateral in relationship

Relevance

- Collateral and covenant both prevalent in loan contracting
- Different natures of credit
  - Collateral-based borrowing: physical assets as collateral
  - Earnings-based borrowing: loan covenants linked to earnings
- Shock transmission
  - Response to investment shocks in opposite directions
  - Covenant amplifies interest rate transmission

▸ Related Literature

New stylized facts

Data Description

- LPC Dealscan: database of detailed terms on $>$ 131,000 loans
  - Covers about 75% of U.S. commercial loans by volume
- Loan sample: U.S. dollar denominated loans incurred by U.S. nonfinancial corporations between 1990 and 2019

Selective Loan Characteristics	Equal-Weighted	Volume-Weighted
Relationship Characteristics		
Repeated Interaction (frequency)	37.47%	58.53%
Contract Features		
Collateral (frequency)	45.33%	36.66%
Covenant (frequency)	31.68%	36.55%
Financial Covenant	30.24%	35.31%
Observations	60322	60322

Summary Statistics by Relationship Strength

Interaction Sort	Full Sample	Low Rel.	Medium Rel.	High Rel.
Loan Amount (mio 2017 USD)	417.61	277.07	485.62	834.05
Spread (drawn spread bps)	193.43	205.68	188.07	156.51
Collateral (frequency)	45.33%	**47.73%**	**45.58%**	**36.67%**
Covenant (frequency)	31.68%	**29.18%**	**34.09%**	**37.82%**
No. of Prev. Int.	0.78	0	1	3.26
Observations	60322	37741	11767	10814

▸ Duration Sort ▸ Volume-Weighted ▸ Loan Type

A model of relationship and contractual device choice

Model Environment

- Discrete time, three periods $t \in \{0, 1, 2\}$
- Two representative risk neutral agents, firm F, and bank B
- One good: capital and consumption good can be exchanged one-for-one
- Two main frictions
  - information asymmetry: firm's productivity is private information
  - limited commitment: firm cannot fully commit to repay
- Credit relationship defined as relationship between F and B in a repeated interaction

Agents

- Firm
  - Production technology $y_t = ak_t^{\alpha}$ in period $t \in \{1, 2\}$
  - Investment k_{t+1} financed by net worth n_t, and borrowing b_{t+1}
  - Consumes only in period 2
- Bank
  - Financial intermediary and no barrier to enter
  - Borrows and lends at rate $r_t \equiv r \ \forall t$
  - Learning: observes firm's private information only in ongoing loan
  - Assume loan can contain either collateral or covenant requirement

▸ Firm ▸ Bank ▸ Timeline

Collateral vs. Covenant

- Collateral
  - Borrowing constraint linked to physical assets, which bank perfectly observes
  - Upon default, bank seizes collateral and liquidates in order to repay depositors
  - Seizure and liquidation incur costs of $(1-\theta^k)$ fraction of collateral
  - Bank lends up to recovery value:

$$\bar{b^k_{t+1}} = (\frac{1}{1+r})\theta^k(1-\delta)k_{t+1} \tag{1}$$

Collateral vs. Covenant

- Covenant
  - Borrowing constraint linked to future cash flow (e.g. Lian & Ma (2021))
  - Breach of covenant leads to technical default, upon which re-negotiation often takes place (Chava & Roberts (2008))
    - Assume outcome of re-negotiation leads to η share of control rights over cash flow being shifted to bank
    - Can be interpreted a positive maximum debt-to-EBITDA ratio before maturity, and zero at maturity
  - Bank lends up to (expected) recovery value:

$$b_{t+1}^{\bar{\pi}} = \left(\frac{1}{1+r}\right)\eta \mathbb{E}_t^B(y_{t+1} \mid \text{default}) \tag{2}$$

Dynamic Borrowing Constraint

- Firm borrowing constraint for period $t \in \{0, 1\}$

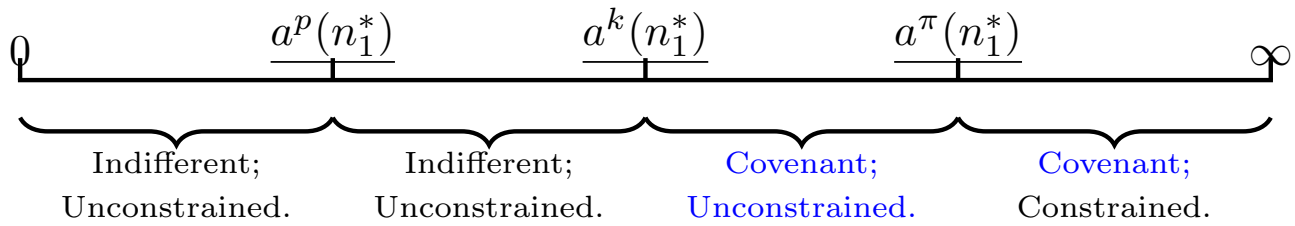
$$\begin{aligned} b_{t+1} &\leq \max\{\bar{b^k_{t+1}}, \bar{b^\pi_{t+1}}\} \\ &= \left(\frac{1}{1+r}\right) \max\left\{\theta^k(1-\delta)k_{t+1}, \eta \mathbb{E}^B_t(y_{t+1} \mid \text{default})\right\} \end{aligned} \tag{3}$$

  - Period 0: non-relationship benchmark, $\mathbb{E}^B_0(a \mid \text{default}) = 0$, only borrowing with collateral is available
    - Info asymmetry + limited commitment = very tight covenant and $b^\pi_{t+1} \approx 0$
  - Period 1: relationship case, $\mathbb{E}^B_1(a \mid \text{default}) = a$, borrowing with either collateral or covenant is available
    - Learning in relationship $\rightarrow$ info asymmetry $\downarrow$ $\rightarrow$ access to earnings-based credits $\uparrow$

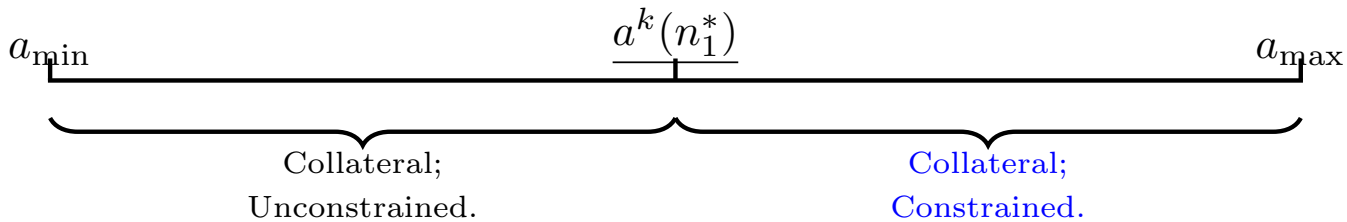
▸ Firm's Problem

Key Results

- Suppose exogenous separation with prob. q in period 1
- Continuing relationship in period 1



- Separation in period 1



- Relationship $\uparrow \rightarrow$ access to earnings-based credit $\uparrow \rightarrow$ credit availability (for constrained firms) $\uparrow$

▸ Optimality conditions

Main Predictions

- *Prediction 1*: Conditional on initial assets, the incidence of earnings-based borrowing increases with relationship strength
  - Covenant use increasing in relationship
- *Prediction 2*: Conditional on relationship strength, the incidence of earnings-based borrowing decreases with initial assets
  - Covenant use decreasing in pledgeable assets
- *Prediction 3*: Earnings-based borrowing replaces collateral-based borrowing as a relationship progresses
  - Covenant vs. collateral substitution
- *Prediction 4*: Conditional on initial assets and relationship strength, the size of loans increases with the incidence of earnings-based borrowing
  - Covenant use relaxes credit constraints by more

Validating model predictions in U.S. loan-level and firm-level data

Data Description

- Merged Compustat-DealScan dataset following Chava & Roberts (2008)
- Loan sample: U.S. dollar denominated loans incurred by U.S. nonfinancial corporations between 1990 and 2019
- Deflator: NIPA's nonresidential fixed investment goods deflator from BEA (base year = 2017)
- Relationship status: relationship formation between a borrower and lead lender(s) in the syndication process

▸ Relationship formation

Specification: Effects on Incidence of Covenant

- Test specification for incidence of covenant in relationship (Predictions 1&2):

$$COV_{i,t} = \mu_i + \mu_t + \sum_j \mu_{i,j,t} + \beta_{Rel} Rel_{i,t} + \beta_k K_{i,t-1} + \beta_D D_{i,t} + \beta_X X_{i,t-1} + \epsilon_{i,t}, \tag{4}$$

where

- COV: covenant use dummy
- Rel: measure of relationship strength, proxied by:
  - max no. of interactions between any pair in a deal
  - years since earliest interaction among any lender in a deal
- K: proxy of initial investable/pledgeable assets
- D and X: deal- and firm-level controls
- μ: firm i, time t, and lead lender j fixed effects

IV: Effects on Incidence of Covenant

- Potential endogeneity: omitted factors causing relationship formation and covenant incidence simultaneously
- Proposed instrument for relationship measure: a dummy variable $= 1$ for first loan incurred since 2007Q4 if a most recent lender failed, or was exposed to a failed institution before the Great Recession
  - Relevance: failure of most recent lenders, or exposure to failed lenders likely to cause separation
  - Exclusion restriction: financial health of previous lender unlikely to affect contractual choice of current deal
- IV estimation on subsample 2004Q4-2009Q3 (around the Great Recession)

▸ AlternativeIV

IV Results: Effects on Incidence of Covenant

Dep. Var.: Covenant	Relationship strength measured by			
	log(Relation)		log(Duration)	
	1st stage	2nd stage	1st stage	2nd stage
Prev.LL Failed/Exposed	-0.1626***		-0.1236**	
	(-4.26)		(-2.47)	
log(Relation)		0.4194**		
		(1.96)		
log(Duration)				0.5517*
				(1.67)
log(Total Assets)		-0.2048***		-0.1904***
		(-3.22)		(-2.77)
Deal controls	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes
Lead lender(s) effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Observations	3100	3100	3100	3100
Cragg-Donald F		31.06		11.44
Kleibergen-Paap rk F		18.16		6.11
Stock-Yogo (2005) crit.		16.38		16.38

Dependent variable in 2nd stage is covenant use dummy. t-statistics adjusted for heteroskedasticity and firm-level clustering are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Specifications: Consequences of Incidence of Covenant

- Test for covenant-collateral substitution (Prediction 3):

$$COL_{i,t} = \mu_i + \mu_t + \sum_j \mu_{i,j,t} + + \beta_{COV} \widehat{COV_{i,t}} + \beta_D D_{i,t} + \beta_X X_{i,t-1} + \epsilon_{i,t}, \tag{5}$$

  where COL is collateral use dummy, and $\widehat{COV_{i,t}}$ is obtained from IV estimation of specification (4). This specification is run on a subsample of constrained firms

- $\widehat{COV_{i,t}}$ is the variation in covenant incidence due to exogenous separation shock
- β_{COV} captures the effect of such exogenous variation on collateral incidence

Results: Covenant-Collateral Substitution

Dep. Var.: Collateral	Relationship strength measured by	
	log(Relation)	log(Duration)
$\widehat{\text{Covenant}}$	-0.1089**	-0.0723**
	(-2.33)	(-2.53)
Deal controls	Yes	Yes
Firm controls	Yes	Yes
Firm effects	Yes	Yes
Lead lender(s) effects	Yes	Yes
Year effects	Yes	Yes
Industry effects	Yes	Yes
Constrained sample	Yes	Yes
Observations	2325	2325
Adj. R-squared	0.8442	0.8444

Dependent variable is collateral use dummy. t-statistics adjusted for heteroskedasticity and firm-level clustering are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Specifications: Consequences of Incidence of Covenant

- OLS estimation of credit availability on contractual device (Prediction 4) in relationship subsample:

$$Loan\ Amount_{i,t} = \mu_i + \mu_t + \sum_j \mu_{i,j,t} + \beta_{Rel} Rel_{i,t} + \beta_{COV} COV_{i,t}$$
$$+ \beta_{COL} COL_{i,t} + \beta_{C\times C} COV_{i,t} \times COL_{i,t} + \beta_D D_{i,t} + \beta_X X_{i,t-1} + \epsilon_{i,t} \quad (6)$$

Results: Credit Availability

Dep. Var.: log(Loan Amount)	Relationship strength measured by	
	log(Relation)	log(Duration)
log(Relation)	0.0546*	
	(1.91)	
log(Duration)		0.0407*
		(1.69)
Collateral	0.0296	0.0250
	(0.63)	(0.52)
Covenant	0.2809***	0.2825***
	(8.85)	(8.78)
Collateral × Covenant	0.1091**	0.1091**
	(2.10)	(2.07)
Deal controls	Yes	Yes
Firm controls	Yes	Yes
Firm effects	Yes	Yes
Lead lender(s) effects	Yes	Yes
Year effects	Yes	Yes
Industry effects	Yes	Yes
Relationship sample	Yes	Yes
Observations	8862	8627
Adj. R-squared	0.8229	0.8195

Dependent variable is log(Loan Amount). t-statistics adjusted for heteroskedasticity and firm-level clustering are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table Description

Does Lender Learn?

- Learning hard to observe in empirical data
- Indirect test: whether information matters for the effects of relationship strength on the incidence of covenant
  - Smaller borrowers are usually informationally opaque, have no rating, and less alternative access to credit
- Augmenting specification (4) to include interaction:

$$COV_{i,t} = \mu_i + \mu_t + \sum_j \mu_{i,j,t} + \beta_{Rel} Rel_{i,t} + \beta_{RxS} Rel_{i,t} \times Small_{i,t} + \beta_k K_{i,t-1} + \beta_D D_{i,t} + \beta_X X_{i,t-1} + \epsilon_{i,t} \quad (7)$$

- *Small*: $= 1$ if firm size below yearly median of all borrowers
- Two instruments: fail/exposed dummy, and its interaction with *Small*

Does Lender Learn?

Dep. Var.: Covenant	Relationship strength measured by	
	log(Relation)	log(Duration)
log(Relation)	-0.1411	
	(-0.97)	
log(Relation) ×Small	0.2448*	
	(1.71)	
log(Duration)		-0.0701
		(-0.45)
log(Relation) ×Small		0.1493*
		(1.67)
Deal controls	Yes	Yes
Firm controls	Yes	Yes
Firm effects	Yes	Yes
Lead lender(s) effects	Yes	Yes
Year effects	Yes	Yes
Industry effects	Yes	Yes
Constrained sample	Yes	Yes
Observations	2166	2166
Cragg-Donald F	17.81	9.87
Kleibergen-Paap rk F	17.11	5.98
Stock-Yogo (2005) crit.	7.03	7.03

Dependent variable is covenant dummy. t-statistics adjusted for heteroskedasticity and firm-level clustering are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Small borrower sample refers to borrowers with total assets below median of all borrowers in the same year.

Conclusion

Conclusion

- Microeconomic evidence shows that covenant replaces collateral requirement in loan contracting in a credit relationship
- Develop a mechanism for how credit relationships increase credit availability through improving access to earnings-based credits
- Covenant-collateral substitution in relationship is empirically relevant for increasing credit availability
- Prevalence of relationships highlights the need to model relationship-driven dynamics of credit constraints in macroeconomic research

Thank you!

Appendix slides

Related Literature

- Financial frictions and aggregate fluctuations

  Bernanke & Gertler (1989), Kehoe & Levine (1993), Kiyotaki & Moore (1997)

  → Dynamic interplay between frictions in a credit relationship
- Bank-firm relationships

  Petersen & Rajan (1994), Berger & Udell (1995), Harhoff & Körting (1998), D'Auria et al. (1999), Bharath et al. (2007), Bharath et al. (2011), Prilmeier (2017)

  → Credit availability ↑ due to covenant-collateral substitution
- Covenants and earnings-based credits

  Rajan & Winton (1995), Park (2000), Chava & Roberts (2008), Nini et al. (2012), Lian & Ma (2021), Chodorow-Reich & Falato (2022), Drechsel (2023)

  → Earnings-based credit access in credit relationship
- Dynamic borrowing constraint

  Amberg et al. (2023)

  → Dynamics driven by learning in relationship

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Firm

- Period-0 productivity draw a from $\Phi(a)$ and initial net worth n_0
- Produces $y_t = ak_t^{\alpha}$ in period $t \in \{1, 2\}$, subject to depreciation at rate δ
- Can borrow one-period loan b_{t+1} in period $t \in \{0, 1\}$ to finance capital stock k_{t+1} for next-period production
- Consumes only in period 2 (from dividends d_2)
- Objective is to maximize $U^F(d_2) = d_2$, subject to budget constraints in $t \in \{0, 1, 2\}$, and borrowing constraints in $t \in \{0, 1\}$

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Bank

- Acts as a financial intermediary, borrows from exogenous depositors at rate $r_t \equiv r \ \forall t$
- No barrier to enter, bank breaks even, lends to F at rate $R_t = r_t \equiv r \ \forall t$
- Has technology to observe firm's private information during an ongoing loan
- Sets contracts and requirements such that:
  - firm willing to borrow (FPC)
  - firm willing to repay (FIC)
  - bank breaks even (BPC)
- Assume loan can contain either collateral or covenant requirement

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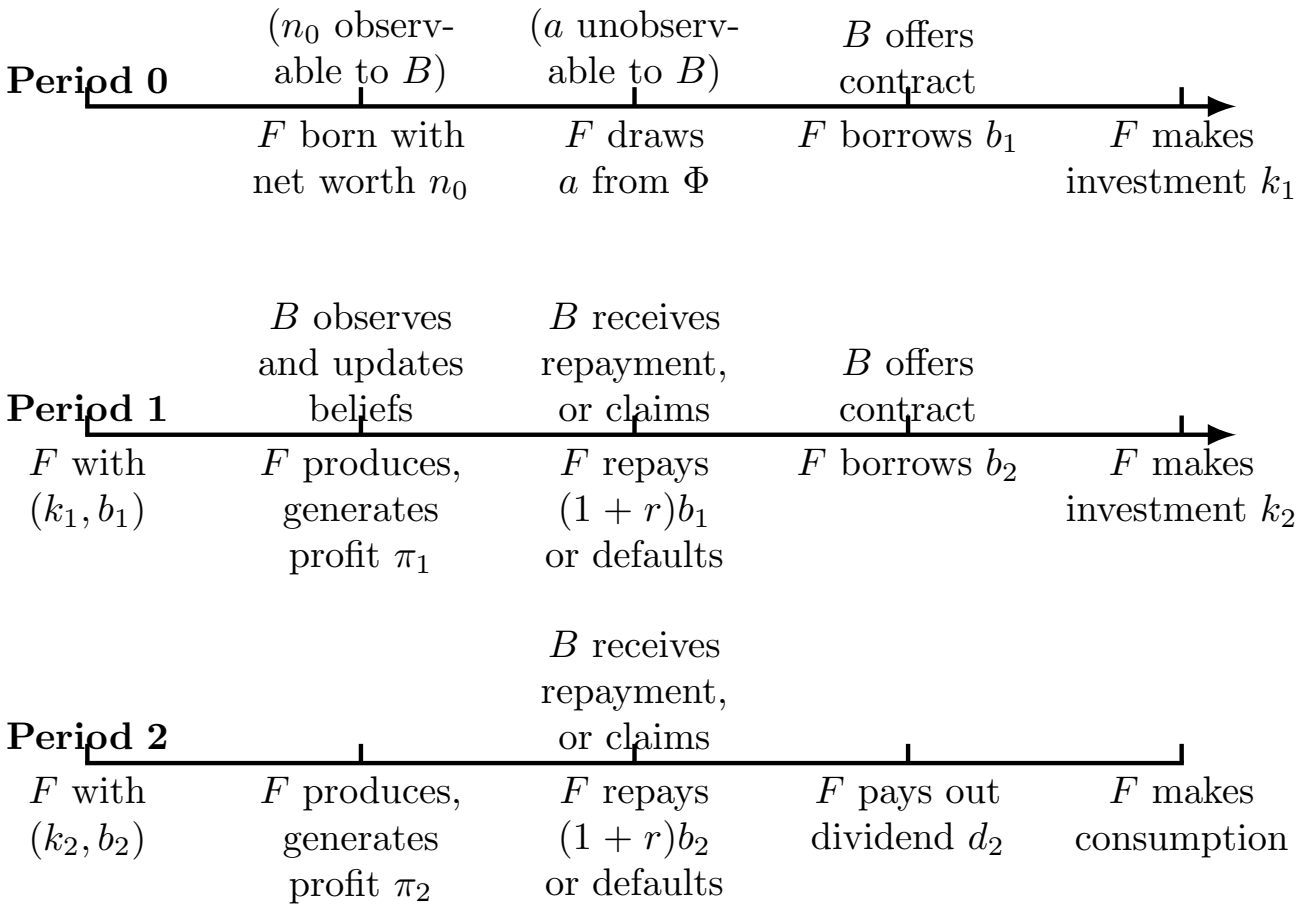
Timeline



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Summary Statistics by Duration

Duration Sort	Full Sample	Low Rel.	Medium Rel.	High Rel.
Loan Amount (mio 2017 USD)	417.61	280.79	473.61	867.59
Maturity (months)	42.37	42.45	40.85	43.82
Spread (drawn spread bps)	193.43	206.33	171.39	169.78
Collateral (frequency)	45.33%	47.93%	43.68%	37.40%
Covenant (frequency)	31.68%	29.25%	33.97%	38.25%
Duration (years)	1.36	0	1.46	6.36
Observations	60322	38525	11518	10279

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Summary Statistics by Relationship: Volume-Weighted

Interaction Sort	Full Sample	Low Rel.	Medium Rel.	High Rel.
Loan Amount (mio 2017 USD)	417.61	277.07	485.62	834.05
Maturity (months)	43.11	44.67	43.45	41.10
Spread (drawn spread bps)	165.39	185.20	173.07	137.57
Collateral (frequency)	36.66%	41.59%	38.97%	29.48%
Covenant (frequency)	36.55%	33.73%	37.43%	39.27%
No. of Prev. Int.	1.59	0	1	3.82
Observations	60322	37741	11767	10814

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Summary Statistics by Relationship: Volume-Weighted

Duration Sort	Full Sample	Low Rel.	Medium Rel.	High Rel.
Loan Amount (mio 2017 USD)	417.61	280.79	473.61	867.59
Maturity (months)	43.11	44.88	41.78	41.78
Spread (drawn spread bps)	165.39	187.07	149.36	148.91
Collateral (frequency)	36.66%	42.09%	36.68%	30.06%
Covenant (frequency)	36.55%	34.03%	36.81%	39.46%
Duration (years)	3.09	0	1.51	7.82
Observations	60322	38525	11518	10279

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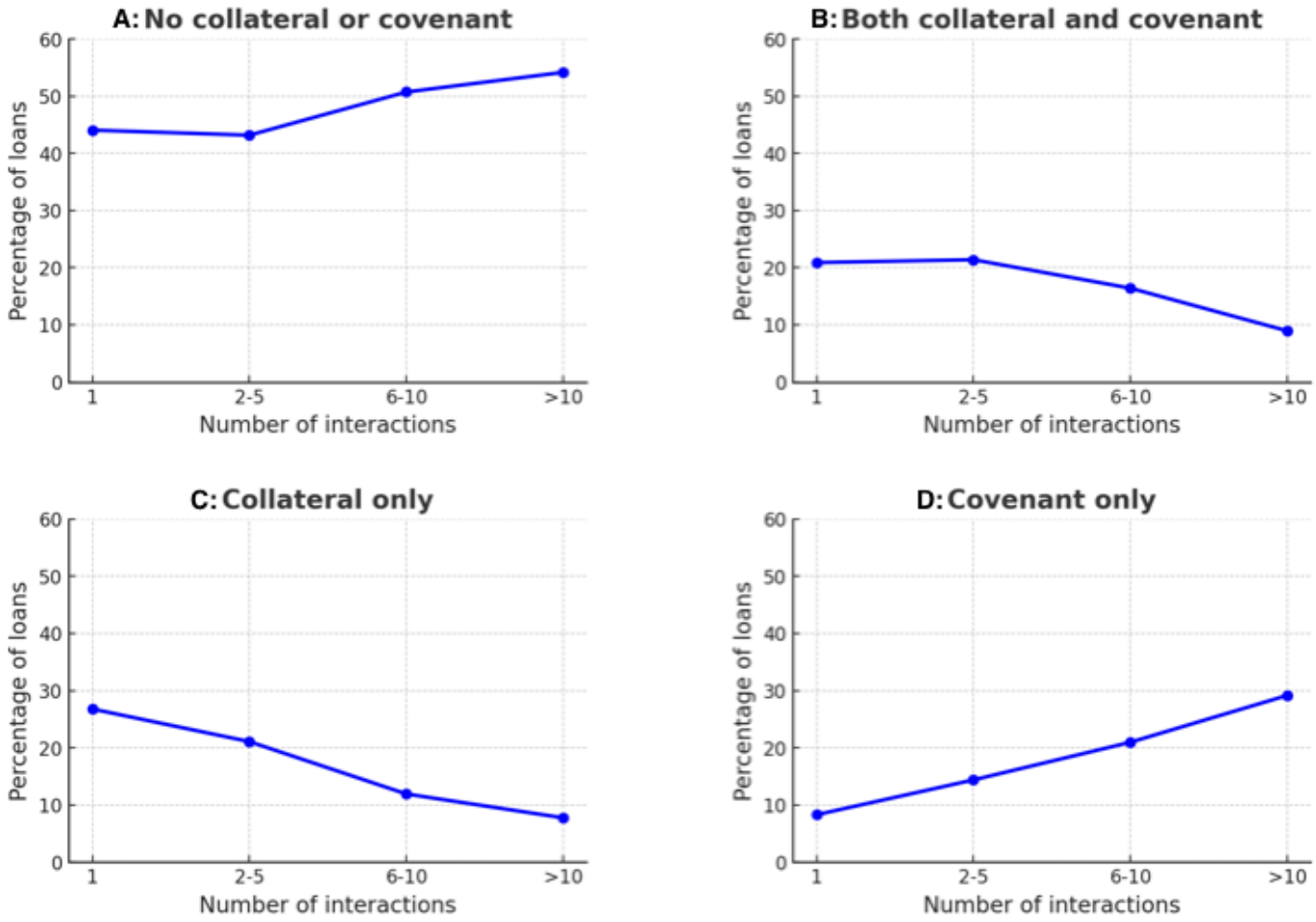
Covenant vs. Collateral in Credit Relationship



Intensity by loan type in each relationship category.

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Firm's Problem

- Firm's optimization problem is characterized by:

$$\max_{b_1,k_1,b_2,k_2,d_2} \quad U^F(d_2) = d_2 \tag{8}$$

subject to borrowing constraints:

$$b_{t+1} \leq \frac{1}{1+r} \max\{\theta^k(1-\delta)k_{t+1}, \eta \mathbb{E}_t^B(\pi_{t+1} \mid \text{default}\}, \tag{9}$$

and budget constraints:

$$k_1 = b_1 + n_0; \tag{10}$$

$$k_2 + (1+r)b_1 = b_2 + af(k_1) + (1-\delta)k_1; \tag{11}$$

$$d_2 + (1+r)b_2 = af(k_2) + (1-\delta)k. \tag{12}$$

Model details | Back to Main

Model Details: Bank's Problem

- Bank chooses b^i_{t+1}, $i \in \{k, \pi\}$, such that bank breaks even:

$$\begin{aligned}\mathbb{E}^B_t(\pi^B_{t+1}) = 0 = \Pr(\text{no default}) \left\{ b^i_{t+1}(r - r) \right\} \\ + \Pr(\text{default}) \left\{ \mathbb{E}^B_t(\text{recovery value} \mid \text{default}) - (1 + r) b^i_{t+1} \right\}\end{aligned} \tag{13}$$

- Since bank makes zero profit if no default, it can only lend up to recovery value
- FPC determined by r and δ relative to MPK of the firm
- FIC satisfied if BPC satisfied

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Model Details: Covenant

- Contract with covenant not offered in period 0
  - Suppose that bank's belief is one such that $\mathbb{E}_0^B(a \mid \text{default}) \equiv \tilde{\mu} > 0$.
  - Suppose for a given level of n_0, there exist a value of productivity $\underline{\hat{a}}$ and hence $\hat{b_1^\pi}$ such that it is indifferent between a contract with collateral requirement and one with covenant requirement, assuming bank had perfect information on productivity: $(1+r)\hat{b_1^\pi} \equiv \eta \underline{\hat{a}} f(k_1) = (1+r)b_1^k$.
  - If bank's initial belief is one such that $\tilde{\mu} < \underline{\hat{a}}$, no firm will pledge control right as $b_1^\pi < b_1^k$. Bank should update its belief and $\mathbb{E}_0^B(a \mid \text{default}) \to 0$. If initial $\tilde{\mu} \geq \underline{\hat{a}}$, any firm will choose to pledge control right as $b_1^\pi \geq b_1^k$. However, any firm with $a < \tilde{\mu}$ has incentive to voluntarily default, as a firm retains more if it defaults than what it has to repay in period 1: $(1+r)b_1^\pi = \eta \mathbb{E}_0^B(a \mid \text{default}) f(k_1) > \eta a f(k_1)$.
  - Bank will have to update its belief and eventually $\mathbb{E}_0^B(a \mid \text{default}) = \mathbb{E}_0^B(a \mid a < \tilde{\mu}) \to 0$.
  - The analysis is repeated for any level of n_0 and same result applies. Resulting borrowing constraint under loan contract with covenant requirement becomes $b_1^\pi \leq 0$.

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Model Details: Optimality Conditions

- Firm's optimality conditions are given by:

$$b_1^* = \min\left\{\left(\frac{\alpha a}{r+\delta}\right)^{\frac{1}{1-\alpha}} - n_0, \frac{\theta(1-\delta)}{(1+r)-\theta(1-\delta)} n_0\right\}, \tag{14}$$

$$k_1^* = \min\left\{\left(\frac{\alpha a}{r+\delta}\right)^{\frac{1}{1-\alpha}}, \frac{1}{(1+r)-\theta(1-\delta)} n_0\right\}, \tag{15}$$

$$b_2^* = \min\left\{\left(\frac{\alpha a}{r+\delta}\right)^{\frac{1}{1-\alpha}} - n_1^*, \max\left\{\frac{\theta(1-\delta)}{(1+r)-\theta(1-\delta)} n_1^*, b_2^\pi(n_1^*)\right\}\right\}, \tag{16}$$

$$k_2^* = \min\left\{\left(\frac{\alpha a}{r+\delta}\right)^{\frac{1}{1-\alpha}}, \max\left\{\frac{1+r}{(1+r)-\theta(1-\delta)} n_1^*, b_2^\pi(n_1^*) + n_1^*\right\}\right\}, \tag{17}$$

$$d_2^* = n_2^*, \tag{18}$$

where $n_t^* \equiv a f(k_t^*) + (1-\delta)k_t^* - (1+r)b_t^* \ \forall t \in \{1,2\}$

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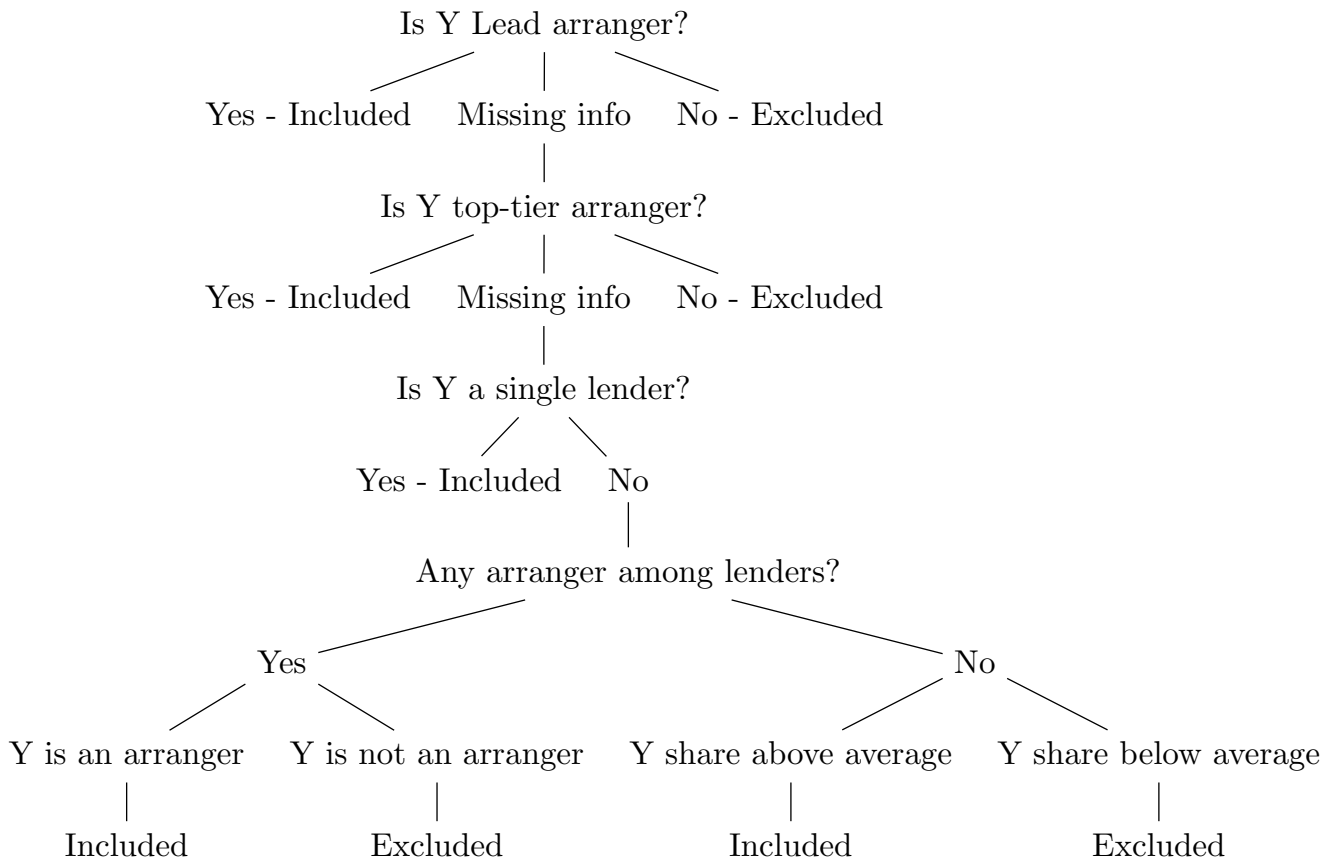
Relationship Formation

For a loan-level observation of borrower X and lender Y:



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Description: Table 1

This table shows OLS regressions of covenant use on relationship intensity, firm's pledgeable assets and control variables for a sample of U.S. Dollar denominated loans taken out by US nonfinancial corporations from 1990–2019. Covenant use is measured as a dummy variable that equals one if at least one covenant is included in a loan contract between a lender and a borrowing firm and zero otherwise. *Relation* is a measure of relationship intensity, captured by the number of interactions between the borrower-lender pair in a loan deal that has interacted most since the start date of the dataset. *Total Assets*, *Current Assets*, *Net PP&E*, and *Working Capital* are proxies for borrowing firm's pledgeable assets, where *Net PP&E* is the net property, plant, and equiment of the firm, and *Working Capital* is firm's current assets minus current liabilities. *Loan Amount* is the total amount of the deal. All dollar amounts are in millions and deflated using NIPA's nonresidential fixed investment goods deflator (base year = 2017). *Tangibility* is the ratio of net PP&E to total assets. *Leverage* is the ratio of firm's book value of debt to total assets. *Market-to-Book* is ratio of market value of the firm's shares outstanding plus the book value of debt and preferred stock divided by the book value of assets. *Current Ratio* is the ratio of current assets to current liabilities and *Coverage Ratio* is calculated as EBITDA divided by interest expense. *Rating* is a variable that equals zero if the firm has no S&P long-term issuer credit rating, 1, 2, 3, 4, if the rating is AAA, AA+, AA, AA-, respectively, and so on. *No Rating* is a dummy variable that equals one if the firm has no S&P rating. *Maturity* and *Spread* are the weighted average maturity and yield spread over base reference rate for each dollar drawn on the loan respectively. All specifications control for borrowing firm fixed effects, lead lender(s) fixed effects, year fixed effects at the loan's origination date, and industry fixed effects at the one-digit SIC level.

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Alternative IV

- Alternative instrument: most recent lender's exposure to mortgage-back securities (work in progress)
  - Follow Chodorow-Reich (2014)'s measure of bank's exposure to ABX assets: inferred from correlation of daily stock return with return on ABX AAA 2006-H1 index
- Relevance: lenders with more exposure to toxic assets more likely to reduce credit supply during financial crisis, and borrowers more likely to separate from relationships with them
- Exclusion restriction: financial health of previous lender unlikely to affect contractual choice of current deal

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Description: Table 2

This table shows OLS regressions of covenant use on collateral use, and credit availability on covenant use on a sample of U.S. Dollar denominated loans incurred by US non-financial corporations from 1990–2019. *Collateral* is a dummy variable that equals one if at least a tranche of the loan deal is secured. *Covenant* × *Collateral* is the interaction of *Covenant* dummy and *Collateral* dummy. All other variables are defined in Table 1. Specification 1 is run on a subsample of loans with covenant and/or collateral (constrained firm sample), and specification 2 is run on a subsample of loans in which a borrower-lender pair has interacted more than once since the start date of the dataset. Both specifications control for borrowing firm fixed effects, lead lender(s) fixed effects, year fixed effects at the loan's origination date, and industry fixed effects at the one-digit SIC level.

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