411-3 Notes: Financial frictions 3

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1 Procyclical or countercyclical leverage?

- Evidence from Gorton and Metrik

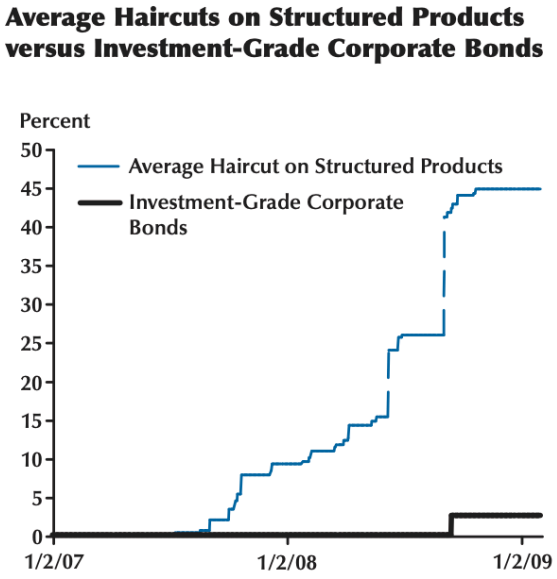

Figure 1:

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- Increase in haircuts in the repo market
- Adrian and Shin

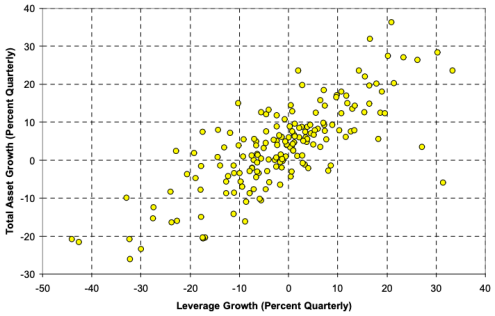

Figure 2.4: Total Assets and Leverage of Security Brokers and Dealers

Figure 2:

Figure 2.1:

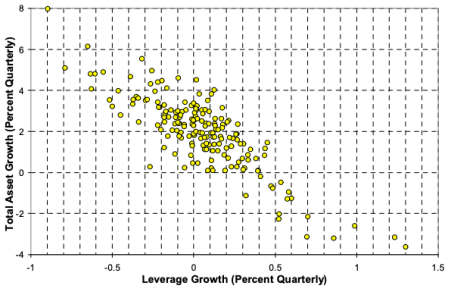

Figure 3:

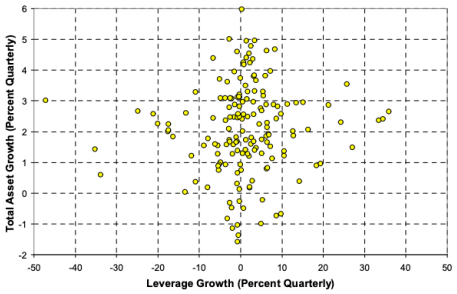

Figure 2.3: Total Assets and Leverage of Commercial Banks

Figure 4:

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- Depends on average leverage vs marginal leverage
- Broker dealers have to refinance very often and are subject to margin calls so marginal and average are very close
- Households have long term loans, so average goes in opposite direction
- Commercial banks have some stable funding sources (deposits), some less (wholesale funding), so intermediate case

2 A model of procyclical leverage

- A model that delivers procyclical leverage
- Collateralized lending with endogenous collateral limits related to risk

2.1 Two period model

- Asset trading in period 1
- Asset payoff in period 2
- State $s \in \{U, D\}$
- Asset pays 1 in good state U, 0.2 in bad state D
- Unit mass of investors with heterogeneous beliefs $h \in [0, 1]$
- h is probability of good state

- Uniform distribution of beliefs on $[0,1]$
- Initial wealth $w(h)$
- Exchange loans with collateral κ_j
- Budget constraint

$$\theta p + \sum q_j b_j - \sum (q_j + \kappa_j p) d_j \leq w$$

$$c(s) = R(s)\theta + \sum \max\{1, \kappa_j R(s)\} b_j - \sum \max\{\kappa_j R(s) - 1, 0\} d_j$$

- Result (in paper): enough to trade only safe bond

$$\theta p + qb \leq w$$

$$c(s) = R(s)\theta + b$$

$$0.2\theta + b \geq 0$$

- Expected utility

$$V(w(h), h) = \max_{\theta, b} h(\theta + b) + (1 - \theta)(0.2 \cdot \theta + b)$$

subject to

$$\theta p + qb \leq w$$

$$0.2\theta + b \geq 0$$

- $q = 1$ (units of wealth)
- Result
  - agents with

$$h + (1 - h)\, 0.2 \geq p$$

    borrow to max, invest all in risky asset and obtains

$$V(w, h) = \frac{h(1 - 0.2)}{p - 0.2} w$$

  - agents with

$$h + (1 - h)\, 0.2 < p$$

    invest in risk free bonds, get

$$V(w, h) = w$$

- Market clearing

$$\frac{1}{p - 0.2} \int_{\hat{h}} w(h)\, dh = 1$$

where cutoff $\hat{h}$ is

$$\hat{h} = \frac{p - 0.2}{1 - 0.2}$$

2.2 Three periods

- Three periods, $t = 0, 1, 2$
- Asset trading in 0 and 1
- Payoff in 2
- In 1 and 2 shocks U or D, agents keep different priors h on realization of U each period
- Payoff of asset in $t = 2$ is: 1 if UU, UD, DU and 0.2 if DD
- Price of asset at end of first period is p_{1s} with $s = U, D$
- Again, sufficient to trade 2 assets, risky asset and riskless bond
- Maximization problem at $t = 0$

$$\max_{\theta,b} hV\left(p_{1U}\theta + b, h\right) + \left(1-\theta\right)V\left(p_{1D}\theta + b, h\right)$$

  subject to

$$p_0\theta + b \leq w_0$$
$$p_{1s}\theta + b \geq 0$$

- Conjecture:
  - in period 0 agents with $h \geq \hat{h}_0$ max leverage on risky asset, all others lend risk free
  - in period 1 if D realized agents with $h \geq \hat{h}_0$ are bankrupt, agents with $h \geq \hat{h}_1$ buy asset (with $\hat{h}_1 < \hat{h}_0$), all others lend risk free
- Find cutoffs and market clearing prices
- In state U, price $p_{1U} = 1$

3 Evidence: from the financial system to real outcomes

- Important open question: does the trouble in the financial system affects the real economy?
- Several paper work on the channels here
- Banks' balance sheet suffers (due to exposure to MBS market)-> banks' loans supply contracts -> firms invest less, hire less (demand side and supply side effects)
- First channel Ivashina and Sharfstein (2010)

- All channels (focusing on supply side effects) in Chodorow-Reich (2014)
- Combine Dealscan data on syndicated loans (same as in IS) with BLS data on firm-level employment
- Starting point: banking relationships, firms cannot easily switch from lenders they have relation in the past to new lenders
- Design: different banks differently exposed to MBS losses
- Identifying assumption: this different exposure uncorrelated with composition of corporate loan clients
- Regress employment growth during the crisis on a measure of loan supply, the growth in loans made by all banks b that where in the last precrisis loan syndicate and controls
- The loan supply measure may fail to satisfy the identifying assumption, so C-R uses various instruments to capture assumed exogenous exposure to the financial crisis
  - Lehman exposure measure of IS
  - MBS exposure (correlation of bank's stock returns with ABX index)
  - Look at balance sheets directly
- Effects on lending (both extensive and intensive margin)

TABLE VI

THE EFFECT OF BANK HEALTH ON THE LIKELIHOOD OF OBTAINING A LOAN

	(1)	(2)	(3)	(4)	(5)	(6)
	Firm obtains a new loan or positive modification					
	Probit		$\Delta\tilde{L}_{i,s}$ instrumented using			
			Lehman exposure	ABX exposure	Bank statement items	All
Explanatory variables						
%Δ loans to other firms ($\Delta\tilde{L}_{i,s}$)	2.19**	2.00**	3.65**	2.33*	2.28**	2.32**
	(0.79)	(0.53)	(1.28)	(1.12)	(0.64)	(0.63)
2-digit SIC, state, loan year FE	No	Yes	Yes	Yes	Yes	Yes
Bond access/public/private FE	No	Yes	Yes	Yes	Yes	Yes
Additional Dealscan controls	No	Yes	Yes	Yes	Yes	Yes
First stage F-statistic			14.0	8.2	18.2	19.8
J-statistic p-value			.	.	.	0.206
$E[\underline{borrow}]$	0.134	0.134	0.134	0.134	0.134	0.134
$E[\underline{borrow}{:}\Delta\tilde{L}_{p_{90}} - \Delta\tilde{L}_{p_{10}}]$	0.052	0.048	0.087	0.055	0.054	0.055
Lead lender 1 clusters	43	43	43	40	43	40
Lead lender 2 clusters	43	43	43	40	43	40
Observations	4,391	4,391	4,391	4,354	4,391	4,354

Figure 5: Effects on lending (extensive margin)

- Effects on employment

TABLE IX

THE EFFECT OF LENDER CREDIT SUPPLY ON EMPLOYMENT

	(1)	(2)	(3)	(4)	(5)	(6)
	Employment growth rate 2008:3–2009:3					
	OLS		$\Delta\tilde{L}_{i,s}$ instrumented using			
			Lehman exposure	ABX exposure	Bank statement items	All
Explanatory variables						
%Δ loans to other firms ($\Delta\tilde{L}_{i,s}$)	1.17*	1.67**	2.49*	3.17*	2.13*	2.38**
	(0.58)	(0.61)	(1.00)	(1.35)	(0.88)	(0.77)
Lagged employment growth		0.0033	0.0039	0.0045	0.0036	0.0039
		(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Emp. change in firm's county		0.89*	0.85+	0.86+	0.87+	0.89+
		(0.43)	(0.46)	(0.48)	(0.45)	(0.46)
2-digit SIC, state, loan year FE	No	Yes	Yes	Yes	Yes	Yes
Firm size bin FE	No	Yes	Yes	Yes	Yes	Yes
Firm age bin FE	No	Yes	Yes	Yes	Yes	Yes
Bond access/public/private FE	No	Yes	Yes	Yes	Yes	Yes
Additional Dealscan controls	No	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic			15.5	8.5	18.5	23.1
J-statistic p-value			.	.	.	0.190
$E[\hat{g}_j^y]$	−0.092	−0.092	−0.092	−0.093	−0.092	−0.093
$E[\hat{g}_j^y{:}\Delta\tilde{L}_{p_{90}} - \Delta\tilde{L}_{p_{10}}]$	0.027	0.039	0.058	0.074	0.050	0.055
Lead lender 1 clusters	43	43	43	40	43	40
Lead lender 2 clusters	43	43	43	40	43	40
Observations	2,040	2,040	2,040	2,015	2,040	2,015

Figure 6: Effects on lending (extensive margin)

- Magnitude: going from 90th to 10th percentile of lenders leads to additional employment decline of 5.5 percentage points (decline in sample was 9.9%)