

Financial Cycles with Heterogeneous Intermediaries

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¹The views expressed here are solely those of the author and should not be taken to represent those of the Bank of England.

Some questions at the heart of the policy debate

- ▶ How does the financial sector respond to changes in funding conditions?
- ▶ Do differences in the risk attitude of financial intermediaries matter for the transmission of shocks?
- ▶ Does easing monetary policy increase the aggregate level of risk-taking in an economy?
- ▶ **This paper tries to answer these important questions with a novel modelling approach**

How does it do it?

- ▶ **Ingredients** Continuum of financial intermediaries, heterogeneity in their Value-at-Risk
- ▶ **Mechanism** Moral hazard friction (due to limited liability) that leads to a risk-taking channel
- ▶ **Testable implications** Behavior of leverage (also in the cross-section)
- ▶ Ambitious paper, a big step forward for the analysis of the relation between monetary (macro?) conditions and financial intermediaries

My discussion

1. Monetary policy
2. Model predictions & Empirical evidence
3. The role of uncertainty
4. Lessons for policy

1. Monetary Policy

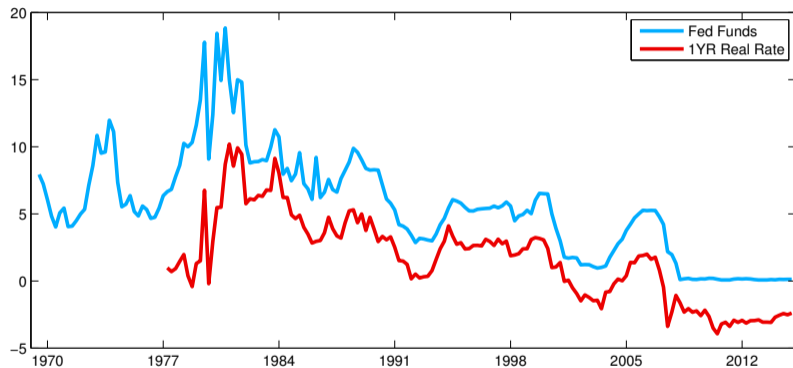
- ▶ Model is real
 - Not a big deal, the mechanism is likely to go through in a richer model with nominal rigidities
- ▶ **Question** What is special about monetary policy for the mechanism uncovered in the paper?
- ▶ It seems that any shock that moves funding costs will create a shift in risk taking behavior
 - Example in the paper: negative productivity shock
 - Fall in funding cost leads increase in risk taking
- ▶ So, why the focus on monetary policy? [More on this later]

2. Model predictions & Empirical evidence

- ▶ The model has some stark predictions about the behavior of leverage (also in the cross-section)
- ▶ When real funding costs fall
 - Aggregate leverage ↑
 - Skewness of leverage in the cross-section ↑
- ▶ Authors provide some time series evidence. Some quibbles.

2. Model predictions & Empirical evidence

(a) Should use real rate (rather than Fed Funds) for consistency with the model

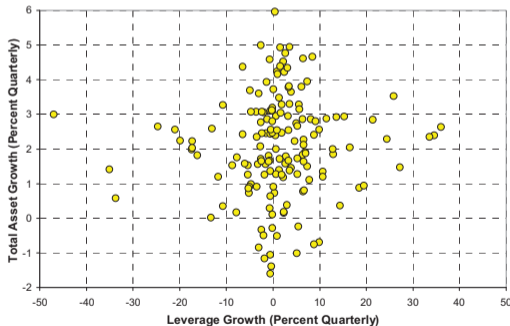


1YR Real Rate is defined as the 1YR Nominal Treasury Yield minus the median expected inflation (1-year ahead) from U. Michigan.

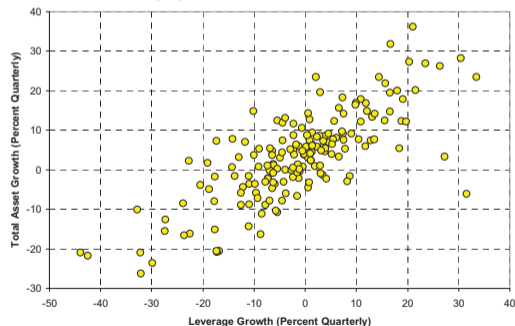
2. Model predictions & Empirical evidence

- (b) What leverage? Not clear from the text, but very important as leverage can widely differ for different intermediaries [[Adrian and Shin, 2010](#)]

(a) Commercial Banks



(b) Broker dealers



2. Model predictions & Empirical evidence

- (c) Correlation between R and *broker-dealer* leverage is negative (in line with the model)

<i>Correlation</i>	LEV^{BD}	$dLEV^{BD}$	LEV^{FDIC}	$dLEV^{FDIC}$
Fed Funds	-0.34			
Δ Fed Funds	-0.06			
1YR Nom. Rate	-0.35			
Δ 1YR Nom. Rate	-0.08			
1YR Real Rate	-0.28			
Δ 1YR Real Rate	-0.07			
VIX	-0.12			
Δ VIX	0.04			

LEV^{BD} is leverage of the US broker dealer sector from the US Flow of Funds (see Bruno and Shin, 2015).

LEV^{FDIC} is leverage of FDIC insured institutions. See <https://www.fdic.gov/bank/analytical/qbp/>.

Sample period is 1985Q1–2012Q4.

2. Model predictions & Empirical evidence

- (c) Correlation between R and *broker-dealer* leverage is negative: but trend may be confounding?

<i>Correlation</i>	LEV^{BD}	$dLEV^{BD}$	LEV^{FDIC}	$dLEV^{FDIC}$
Fed Funds	-0.34			
Δ Fed Funds	-0.06			
1YR Nom. Rate	-0.35			
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2. Model predictions & Empirical evidence

- (c) Correlation between ΔR and changes in *broker-dealer* leverage is positive (counterfactual)

<i>Correlation</i>	LEV^{BD}	$dLEV^{BD}$	LEV^{FDIC}	$dLEV^{FDIC}$
Fed Funds	-0.34	0.13		
Δ Fed Funds	-0.06	0.06		
1YR Nom. Rate	-0.35	0.16		
Δ 1YR Nom. Rate	-0.08	0.12		
1YR Real Rate	-0.28	0.15		
Δ 1YR Real Rate	-0.07	0.05		
VIX	-0.12	-0.24		
Δ VIX	0.04	-0.10		

LEV^{BD} is leverage of the US broker dealer sector from the US Flow of Funds (see Bruno and Shin, 2015).

LEV^{FDIC} is leverage of FDIC insured institutions. See <https://www.fdic.gov/bank/analytical/qbp/>.

Sample period is 1985Q1–2012Q4.

2. Model predictions & Empirical evidence

- (d) Correlation between ΔR and changes in *FDIC insured institutions* leverage is positive (counterfactual)

<i>Correlation</i>	LEV^{BD}	$dLEV^{BD}$	LEV^{FDIC}	$dLEV^{FDIC}$
Fed Funds	-0.34	0.13	0.79	0.01
Δ Fed Funds	-0.06	0.06	-0.02	-0.10
1YR Nom. Rate	-0.35	0.16	0.79	0.01
Δ 1YR Nom. Rate	-0.08	0.12	0.02	0.06
1YR Real Rate	-0.28	0.15	0.78	-0.03
Δ 1YR Real Rate	-0.07	0.05	0.01	0.05
VIX	-0.12	-0.24	0.00	0.08
Δ VIX	0.04	-0.10	0.02	0.32

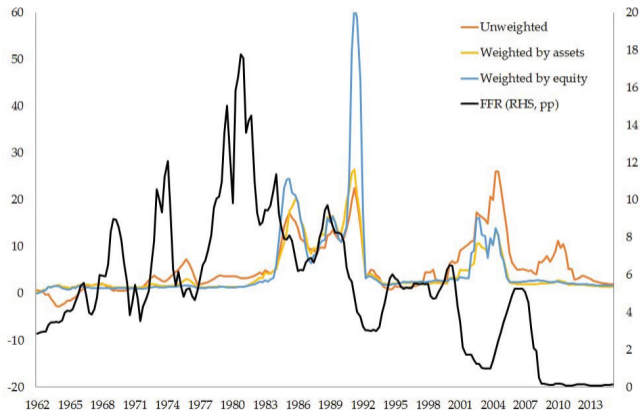
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Sample period is 1985Q1–2012Q4.

2. Model predictions & Empirical evidence

(e) At the ZLB skewness has similar value to its average over 1960-1985 period (counterfactual)



Cross-sectional skewness of leverage and Effective Fed Funds Rate

2. Model predictions & Empirical evidence

- ▶ **Suggestion** Address the implications of the model more formally
- ▶ Compute unconditional correlations from the model (is leverage procyclical?)
- ▶ Compare them with the data (use different leverage definitions, different percentiles, etc...)
- ▶ Compare model IRFs with conditional correlations in the data (e.g., on monetary policy shocks using nonlinear VARs / Local Projections?)

3. The role of uncertainty

- ▶ Uncertainty, a missing ingredient?
- ▶ Affects the option value of default (intermediaries benefit from the upside, but are insulated from the downside)
- ▶ Affects tightness of VaR constraint:

$$\Pr \left[\varepsilon_{t+1} \leq \log \left(\frac{K_t^{1-\theta}}{q_t \theta Z_t^e} \left(1 - \frac{\omega}{k_{it}} (1 - q_t) - q_t (1 - \delta) \right) \right) \right] \leq \alpha^i$$

3. The role of uncertainty

- ▶ Uncertainty can have first moment implications in this framework
- ▶ An increase in the variance of TFP shifts down the distribution of leverage for active intermediaries

$$\frac{k_{it}}{\omega} = \frac{1/q_t - 1}{1/q_t - (1 - \delta) - \theta Z_t^e K^{\theta-1} \exp(F^{-1}(\alpha^i))}$$



- ▶ [Not sure about α^L]
- ▶ **Question** Is the model consistent with empirical evidence?
 - Could link back to monetary policy, risk aversion and uncertainty [Bekaert et al, 2013]

4. Lessons for policy

- ▶ Monetary policy mandate is to keep inflation at target \sim keeping the real rate close enough to the natural rate
- ▶ Natural rate is moved around by many shocks that will also affect funding costs
- ▶ As shown in this paper, this generates time-variation in systemic risk
- ▶ **Personal reading** Monetary policy can do its job as long as regulation takes care of time-variation in systemic risk
 - E.g., set a cap for k/ω as a function of a^L
- ▶ Focus on time-varying financial sector risk-taking and cyclical regulatory policies (rather than monetary policy)?

Summing up

- ▶ Exciting work in progress
- ▶ Possible extensions: nominal rigidities, role for uncertainty,...
- ▶ Clarify the what type of intermediaries
- ▶ Some work to do on the empirics
- ▶ **Very innovative, interesting paper. Look forward to seeing new versions**

-  Adrian, Tobias and Hyun Song Shin (2010) “Liquidity and Leverage,” *Journal of Financial Intermediation*, 19, 418-437
-  Bekaert, Geert & Hoerova, Marie & Lo Duca, Marco, 2013. “Risk, uncertainty and monetary policy,” *Journal of Monetary Economics*, Elsevier, vol. 60(7), pages 771-788.
-  Valentina Bruno & Hyun Song Shin, 2015. “Cross-Border Banking and Global Liquidity,” *Review of Economic Studies*, Oxford University Press, vol. 82(2), pages 535-564.