Banking Conditions and the Effects of Monetary Policy: Evidence from U.S. States

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Banking Conditions and the Effects of Monetary Policy

- Most macroeconomic models abstract from financial intermediation.
    - o Justified if banks are 'Modigliani-Miller' agents.
    - o But MM is a poor description of banking.
    - o Evidence that bank lending depends on the financial condition of banks. (E.g. Hubbard, Kuttner and Palia; Peek and Rosengren; Banking Crises)
- Other theories suggest an important role for financial intermediaries.
    - o Financial imperfections prevent frictionless intermediation.
    - o Effects of monetary policy on real economy may depend on the financial structure of banks.

Banking Conditions and the Effects of Monetary Policy

- Two theories with this implication:
    - Bank lending channel [bank liquidity]
    - Bank capital channel [bank capital]

- This paper documents **if and how monetary policy effects on output depend on the financial conditions of the banking sector.**

- Use state-level data to address key identification issues.

Banking Conditions and the Effects of Monetary Policy

- Key finding: When a state's banking sector starts out with a low capital-asset ratio, its subsequent output growth is more sensitive to changes in the Federal funds rate or other indicators of monetary policy.
- Consistent with bank capital channel and bank lending channel.
- Other evidence favors the capital channel.

Bank Lending Channel Redux

Bernanke and Blinder '88, Kashyap and Stein '95 and '00, Stein '98

Monetary policy tightens →

Outflow of bank **reserves** →

Less reservable deposits due to **reserve requirements** →

Banks reduce lending →

Lower economic activity.

Two necessary conditions:

1. Bank loans are special to some firms.
2. Banks cannot frictionlessly switch to nonreservable liabilities, such as large CDs. (Stein: asymmetric info.)

Key implication: stronger channel for less liquid banks.

(Kashyap and Stein 2000, etc)

Bank Capital Channel Redux

Van den Heuvel 2002, 2009

Monetary policy tightens →

Lower bank profits due to maturity transformation →

Lower bank **capital** →

Banks reduce lending to avoid **capital requirement** →

Lower economic activity.

Two necessary conditions:

1. Bank loans are special to some firms.
2. Banks cannot costlessly issue new equity.

Key implication: stronger channel for low-capital banks

Predictions

Expect stronger monetary policy effects when –

1. Aggregate bank capital is low.

   (Bank capital channel *and* bank lending channel)

2. Aggregate bank liquidity is low.

   (Bank lending channel)

Empirical Model (Bank Capital)

$$\Delta y_{it} = \alpha_i + (\beta_{US} + \delta_{US} c_{it-1})\Delta y_{USt} + (\beta_M + \delta_M c_{it-1})\Delta M_t + \beta_{c1} c_{it-1}$$
$$+ (\beta_{US1} + \delta_{US1} c_{it-2})\Delta y_{USt-1} + (\beta_{M1} + \delta_{M1} c_{it-2})\Delta M_{t-1}$$
$$+ (\beta_{y1} + \delta_{y1} c_{it-2})\Delta y_{it-1} + \beta_{c2} c_{it-2} + \varepsilon_{it}$$

Δy_{it} real personal income growth in state i, year t

Δy_{USt} US real personal income growth in year t

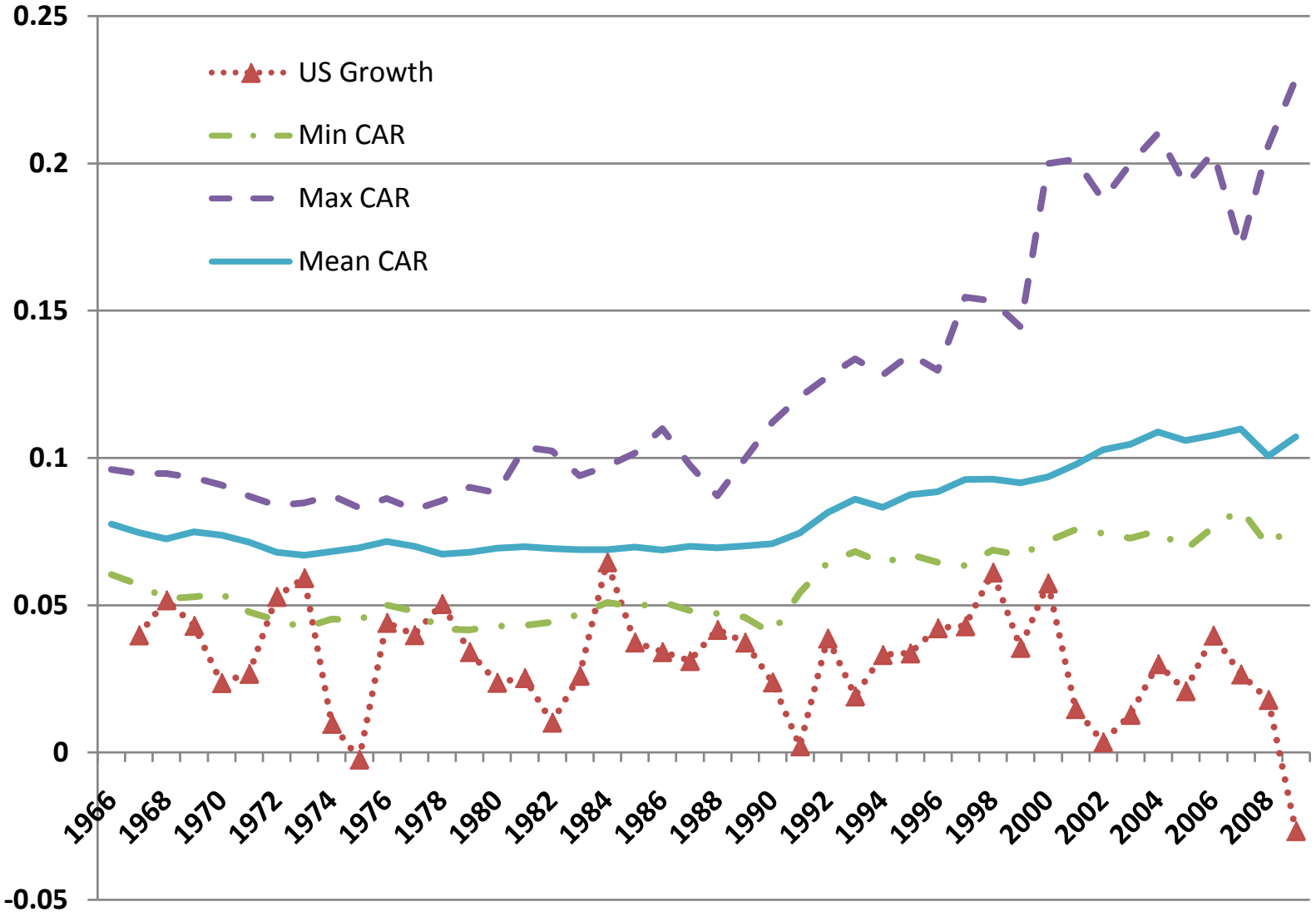
ΔM_t change in monetary policy indicator

C_{it-1} capital ratio of banking sector of state i, end of year t–1

Sample: 1969-1995 (= Riegle-Neal Act allows interstate branching and mergers)

Capital/lending channel: $\delta_M < 0$ and $\delta_{M1} < 0$

Capital Asset Ratios and US Income Growth



Capital Asset Ratio and Federal Funds Rate

Variable:	(a) Capital Asset Ratio: $c_{it} = C_{it}$
$c_{it-1}\Delta M_t$	- 12.10** (4.37)
$c_{it-2}\Delta M_{t-1}$	2.88 (4.64)
$c_{it-1}\Delta y_{USt}$	- 19.50** (6.18)
$c_{it-2}\Delta y_{USt-1}$	- 6.74 (5.66)

- In state-years with *low* inherited bank capital, subsequent output growth is more sensitive to the federal funds rate.
- Also more sensitive to US output growth.
- So true differential impact of monetary policy is larger if $\Delta M_t > 0 \rightarrow \Delta y_{USt} > 0$.

Note: ΔM equals the *negative* of the change in the Federal Funds rate.
Standard errors are in parenthesis.
* indicates significance at the 0.05 level; ** at the 0.01 level.

Capital Asset Ratio and Federal Funds Rate

- Could these results be driven by specific states?
    - E.g. states with more cyclical industries could somehow have banks with lower capital ratios.
- Could these results be driven by specific years?
    - Small upward shift of capital ratios towards end of sample.

Capital Asset Ratio and Federal Funds Rate

Variable:	(a) Capital Asset Ratio: $c_{it} = C_{it}$	(b) Deviation from state mean: $c_{it} = C_{it} - \overline{C}_i$	(c) Dev. from state and time mean: $c_{it} = C_{it} - \overline{C}_i - \overline{C}_t + \overline{\overline{C}}$
$c_{it-1}\Delta M_t$	- 12.10**	- 26.30**	-30.81**
	(4.37)	(6.74)	(7.96)
$c_{it-2}\Delta M_{t-1}$	2.88	14.48*	7.41
	(4.64)	(6.77)	(7.96)
$c_{it-1}\Delta y_{USt}$	- 19.50**	- 30.15**	-28.04**
	(6.18)	(8.73)	(9.89)
$c_{it-2}\Delta y_{USt-1}$	- 6.74	- 12.34	-22.56**
	(5.66)	(7.53)	(8.67)

Note: ΔM equals the *negative* of the change in the Federal Funds rate.
Standard errors are in parenthesis. * indicates significance at the 0.05 level; ** at the 0.01 level.

- Results are stronger.

Capital Asset Ratio and Federal Funds Rate

Economic Significance: Difference in output effect between states with the lowest and highest capital ratios, following a 1 standard deviation increase in the federal funds rate (240bps):

1 year:	- 2.5 %
2 years:	- 1.9 %

Capital Asset Ratio and Bernanke Mihov Indicator

Variable:	(a) Capital Asset Ratio: $c_{it} = C_{it}$	(b) Deviation from state mean: $c_{it} = C_{it} - \overline{C}_i$	(c) Dev. from state and time mean: $c_{it} = C_{it} - \overline{C}_i - \overline{C}_t + \overline{\overline{C}}$
$c_{it-1}\Delta M_t$	-3.96	-6.53*	-9.39*
	(2.24)	(2.97)	(3.82)
$c_{it-2}\Delta M_{t-1}$	1.75	1.12	-0.27
	(2.16)	(2.75)	(3.41)
$c_{it-1}\Delta y_{USt}$	-16.25**	-16.12*	-20.16*
	(5.81)	(8.19)	(9.74)
$c_{it-2}\Delta y_{USt-1}$	-4.09	-13.73	-20.82*
	(5.98)	(7.80)	(9.09)

Note: ΔM equals the change in the Bernanke Mihov indicator.
Standard errors are in parenthesis. * indicates significance at the 0.05 level; ** at the 0.01 level.

- Results are similar.

Liquidity Ratio and Bernanke Mihov Indicator

Variable:	(a) Capital Asset Ratio: $s_{it} = S_{it}$	(b) Deviation from state mean: $s_{it} = S_{it} - \overline{S}_i$	(c) Dev. from state and time mean: $s_{it} = S_{it} - \overline{S}_i - \overline{S}_t + \overline{\overline{S}}$
$s_{it-1}\Delta M_t$	-0.33	0.03	0.28
	(0.38)	(0.59)	(0.71)
$s_{it-2}\Delta M_{t-1}$	1.11**	1.34*	0.79
	(0.36)	(0.55)	(0.65)
$s_{it-1}\Delta y_{USt}$	0.43	2.81	2.30
	(0.94)	(1.50)	(1.79)
$s_{it-2}\Delta y_{USt-1}$	3.21**	3.68*	2.12
	(1.02)	(1.58)	(1.85)

Note: ΔM equals the change in the Bernanke Mihov indicator.
Standard errors are in parenthesis. * indicates significance at the 0.05 level; ** at the 0.01 level.

- Liquidity interactions are either insignificant, or have the 'wrong' sign.
- Including capital alongside liquidity does not alter these results.

Local Business Cycles

- Findings consistent with a bank capital channel, while support for the lending channel is more mixed.
- Bank capital reflects local business cycle conditions.
- As alternative interpretation: Could the results reflect nonlinearities in local business cycle dynamics?
- Include lagged state income growth alongside bank capital in the interactions.
    - o Estimated effects of bank capital little changed.
    - o State-years with high lagged growth are more sensitive to changes in US growth and the monetary policy indicators.

Conclusion

- When a state's banking sector starts out with a low capital-asset ratio, its subsequent output growth is more sensitive to changes in the Federal funds rate.

- This is consistent with a bank capital channel, whereby monetary policy affects lending in part through its effects on bank capital.