Regulatory Collateral Requirements and Delinquency Rate in a Two-Agent New Keynesian Model

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Question and Motivation

Question:

- Our goal is to understand the effectiveness of collateral policy within our framework in preventing the default event.
- How does a collateral policy affect the aggregates over time?
- More specifically, the effects of collateral requirement on output, consumption, and debt.

Approach:

- Proposes a model with two agents to estimate the effects collateral requirement have on the economy.
- Uses bank data (FDIC) for the period 1984 to 2021.

Main Findings:

- An active collateral policy amplifies the responses of main aggregates after a monetary policy shock.
- Conducting an active collateral policy can be effective in preventing the risk of crises (↓ charge-offs rate).
  - A contractionary monetary policy: ↑ interest rate → ↓ charge-offs rate.

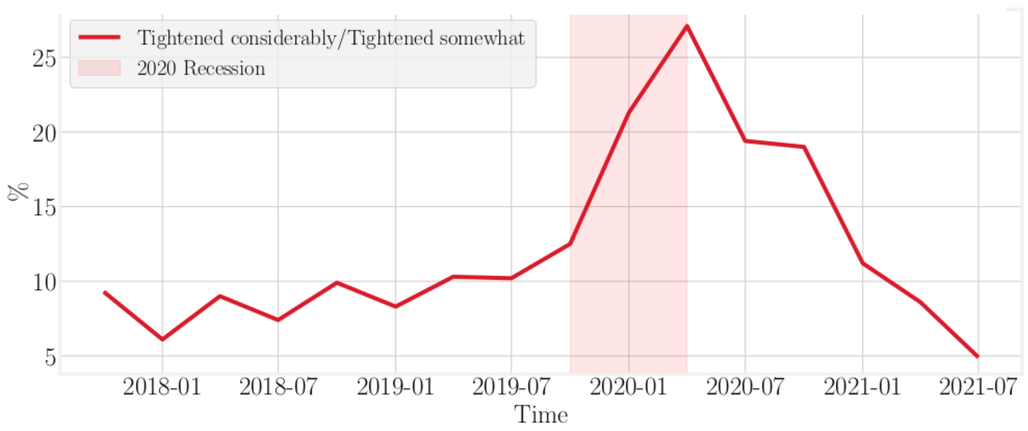


Figure. Percentage of Banks Reporting a Change in Collateral Requirement.

A Model with Regulatory Collateral Requirements

Two type of households:
Unconstrained Households

$$\text{maximize} \quad E_0 \Sigma_{t=0}^{\infty} \beta^t \left\{ \zeta_{c,t} (\log(c_{u,t} - b_u c_{u,t-1})) - \psi_l \frac{(l_{u,t})^{1+\sigma_l}}{1+\sigma_l} \right\} \quad (0.1)$$

$$\text{subject to} \quad p_t c_{u,t} + d_t \leq w_t l_{u,t} + (1+r_t) d_{t-1}$$

Collateral Constrained Households

$$\text{maximize} \quad E_0 \Sigma_{t=0}^{\infty} \beta^t \left\{ \zeta_{c,t} (\log(c_{c,t} - b_c c_{c,t-1})) - \psi_l \frac{(l_{c,t})^{1+\sigma_l}}{1+\sigma_l} + \chi \log(h_t) \right\}$$

$$\text{subject to} \quad p_t c_{c,t} + q_t^h h_t + d_{t-1}^h (1+r_{t-1}^e) \leq w_t l_{c,t} + q_t^h h_{t-1} + d_t^h$$
$$\phi_t^h q_t^h h_t \geq (1+r_t^e) d_t^h \quad (0.2)$$

Collateral constrained households face

$$\phi_t^h \sim F\left(\phi_{t-1}^h, \mathcal{X}_t^h\right)$$

is a shock that follows an exogenous process

$$\phi_t^h = \rho^{\phi h} \phi_{t-1}^h + (1-\rho^{\phi h}) \alpha^h \mathcal{X}_t^h + \epsilon_t^{\phi h}$$

Each entrepreneur purchases capital good k_{t-1} at price q_{t-1}^k using loans m_{t-1} obtained from banks and net worth n_{t-1}^e.

$$k_{t-1} q_{t-1}^k = m_{t-1} + n_{t-1}$$

Entrepreneurs maximize the expected net worth subject to participation constraint and collateral constraint.

We define the collateral constraint

$$\phi_t^e (1+r_t^k) q_{t-1}^k k_{t-1} \geq (1+r_t^e) m_{t-1}^e$$

We assume that the collateral requirement

$$\phi_t^e \sim F\left(\phi_{t-1}^e, \mathcal{X}_t^e\right)$$

is a shock that follows an exogenous process

$$\phi_t^e = \rho^{\phi e} \phi_{t-1}^e + (1-\rho^{\phi e}) \alpha^e \mathcal{X}_t^e + \epsilon_t^{\phi e}$$

A Contractionary Monetary Policy

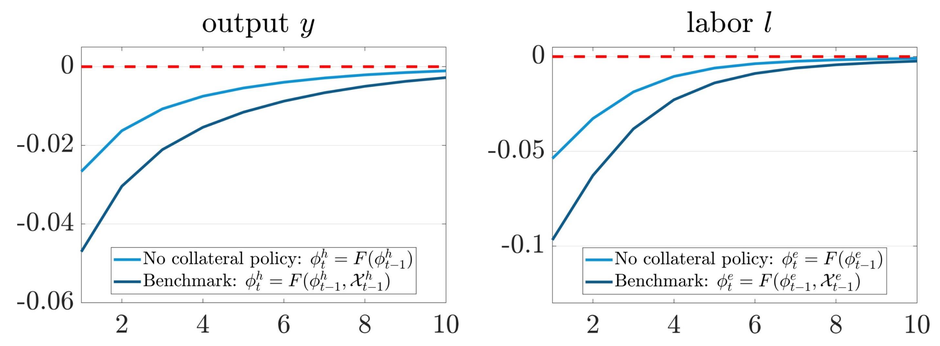
We compare the impulse responses to monetary policy under two scenarios:

- Scenario 1: Regulator does not observe the loan charge-off rate. Collateral requirement

$$\phi_t^h \sim F\left(\phi_{t-1}^h\right)$$

- Scenario 2: Regulator does observe the loan charge-off rate. Collateral requirement

$$\phi_t^h \sim F\left(\phi_{t-1}^h, \mathcal{X}_t^h\right)$$



Short and Long-run Effects of MP on Delinquency Rate

Effects of monetary policy on business loan delinquency rate $\mathcal{X}^e$

	Time			
Effects in %	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Short run	-2.45	1.61	1.03	0.68
	8th Quarter	12th Quarter	16th Quarter	20th Quarter
Long run	0.06	0.02	0.01	0.01

Effects of monetary policy on mortgage loan delinquency rate $\mathcal{X}^h$

	Time			
Effects in %	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Short run	-3.20	-2.12	0.21	0.77
	8th Quarter	12th Quarter	16th Quarter	20th Quarter
Long run	0.75	0.28	0.09	0.03

Conclusions

When the condition of the borrowers deteriorates, banks have an incentive to tight their collateral requirement

A macroprudential policy (collateral policy) that adjusts mechanically to the level of delinquency rate can amplify the monetary policy shock and contain the charge-offs rate.

- In the presence of a collateral channel, a contractionary monetary policy can be effective in preventing the risk of crises (↓ charge-offs rate).
- An active collateral policy amplifies the responses of main aggregates after a monetary policy shock.

Bottom Line:

- Banks should adjust their collateral requirement policies to take account of changes in the severity of the borrower's condition.
- A mix of macroprudential collateral policy and monetary policy emerges as a potential tool to prevent the risk of delinquency.

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