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 (i.e., charge-offs rate).
- A contractionary monetary policy: \(\uparrow \) interest rate \(\rightarrow\) charge-offs rate.

A Model with Regulatory Collateral Requirements

Two type of households:
- Unconstrained Households
  \[
  \text{maximize } E_{t-1} \pi_t \left( \log(c_{t+1} - b_t c_{t+1}) - \frac{\left(\lambda_t \log(h_t)\right)}{1 + \sigma_t} \right) \tag{0.1}
  \]
  subject to \( \rho_t c_{t+1} + d_t \leq m_{t+1} (1 + \gamma) h_{t-1} \)

- Collateral Constrained Households
  \[
  \text{maximize } E_{t-1} \pi_t \left( \log(c_{t+1} - b_t c_{t+1}) - \frac{\left(\lambda_t \log(h_t)\right)}{1 + \sigma_t} \right) \tag{0.2}
  \]
  subject to \( \rho_t c_{t+1} + d_t + \theta h_{t+1} + \phi h_{t-1} \leq m_{t+1} (1 + \gamma) h_{t-1} + \phi h_{t-1} \)

\( \phi h_{t+1} \geq (1 + \gamma) h_{t-1} \)

Collateral constrained households face
\[ \phi_t \sim F \left( \phi_{t-1}, \lambda_t \right) \]

is a shock that follows an exogeneous process
\[ \phi_t = \rho \phi_{t-1} + (1 - \rho) \sigma_t \lambda_t + z_t \]

Each entrepreneur purchases capital good \( k_{t+1} \) at price \( q_{t+1} \) using loans \( m_{t+1} \) obtained from banks and net worth \( \xi_{t-1} \)

\[ k_{t+1} = \xi_{t-1} = m_{t+1} + b_{t+1} \]

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

We define the collateral constraint
\[ \phi_t (1 + r_t) q_{t+1} k_{t+1} \geq (1 + r_t) m_{t+1} \]

We assume that the collateral requirement
\[ \phi_t - F \left( \phi_{t-1}, \lambda_t \right) \]

is a shock that follows an exogeneous process
\[ \phi_t = \rho \phi_{t-1} + (1 - \rho) \sigma_t \lambda_t + z_t \]

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
  \[ \phi_t \sim F \left( \phi_{t-1} \right) \]

- **Scenario 2:** Regulator does observe the loan charge-off rate.
  Collateral requirement
  \[ \phi_t \sim F \left( \phi_{t-1}, \lambda_t \right) \]

Short and Long-run Effects of MP on Delinquency Rate

**Effects of monetary policy on business loan delinquency rate \( \lambda^b \):**

<table>
<thead>
<tr>
<th>Time</th>
<th>1st Quarter</th>
<th>2nd Quarter</th>
<th>3rd Quarter</th>
<th>4th Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short run</td>
<td>-2.45</td>
<td>1.61</td>
<td>1.60</td>
<td>0.60</td>
</tr>
</tbody>
</table>

**Effects of monetary policy on mortgage loan delinquency rate \( \lambda^h \):**

<table>
<thead>
<tr>
<th>Time</th>
<th>1st Quarter</th>
<th>2nd Quarter</th>
<th>3rd Quarter</th>
<th>4th Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short run</td>
<td>-3.26</td>
<td>-2.12</td>
<td>0.21</td>
<td>0.77</td>
</tr>
</tbody>
</table>

Conclusions

When the condition of the borrowers deteriorates, banks have an incentive to tighten 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.