Optimal Monetary and Macroprudential Policies: Gains and Pitfalls in a Model of Financial Intermediation

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The views expressed are the authors, and not those of the Federal Reserve Board

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Overview
Motivation

- The interaction of monetary and macroprudential policy is a key policy question.

- A growing literature explores the potential role of macroprudential policy and its interaction with monetary policy (e.g., Kannan et al (2012)).

- Much of this literature considers small models, employs a calibration strategy, emphasizes housing market frictions/shocks, and focuses on \textit{ad hoc} policy approaches/losses.
Our contribution

- Develop quantitative model in which the financial sector is important for macroeconomic outcomes (building on Kiley and Sim (2014))

- Estimate model (Smets and Wouters (2007) approach)

- Assess the importance of a macroprudential instrument (a leverage tax) for economic performance under both Ramsey and simple approaches to policy
Plan for the presentation

- Present key features of model
- Discuss policy implications of estimated model
- Highlight how the model structure and policy implications compare to insights from other models and approaches
- Consider model uncertainty, building on Guerrieri, Iacoviello, Covas, Driscoll, Jahan-Parvar, Queralto, and Sim (2017) *Macroeconomic Effects of Banking Sector Losses across Structural Models*
The Model
Financial-sector overview

- Risk-averse households invest in risky assets through financial intermediaries
- Several frictions make debt/equity mix of intermediaries important:
  - Maturity/liquidity mismatch between assets and liabilities
  - Limited liability, bankruptcy cost, and tax advantage of debt
  - Raising equity externally dilutes claims of existing shareholders

**Figure:** Sequence of Events

- Aggregate information becomes known at time $t$
- Idiosyncratic returns of intermediaries realize at time $t+1/2$
- Intermediary borrowing/lending and household consumption/saving decisions are made at time $t$
- Default/dividend/equity issuance decisions are made at time $t+1$
Effect of frictions on intertemporal decisions

- Optimality condition for representative household in a standard model,
  \[
  1 = \mathbb{E}_t[M_{t,t+1}^H \cdot R_{X,t+1}^H / \Pi_{t+1}]
  \]

- With intermediation, condition becomes
  \[
  1 = \mathbb{E}_t \left[ M_{t,t+1}^F \cdot \frac{1}{m_t} \left( \frac{R_{t+1}^F}{\Pi_{t+1}} - (1 - m_t) \frac{R_{t+1}^B}{\Pi_{t+1}} \right) \right]
  \]

  - A levered asset-pricing equation
  - Required returns to equity and debt matter
  - Liquidity wedge (Holmstrom and Tirole [2001]): \( M_{t,t+1}^F \neq M_{t,t+1}^H \) and \( M_{t,t+1}^F / M_{t,t+1}^H \) varies for endogenous/exogenous reasons

  \[
  M_{t,t+1}^F \equiv M_{t,t+1}^H \frac{\mathbb{E}_{t+1}[\lambda_{t+1}|\Omega_{t+1}]}{\mathbb{E}_t[\lambda_t|\Omega_t]} \leftarrow \text{liquidity tomorrow}
  \]
  \[
  \leftarrow \text{liquidity today}
  \]
Rest of model

- Consumption and investment
  - Households preferences include habits
  - Investment subject to adjustment costs
  - Consumption and investment Euler equations subject to shocks

- Nominal price rigidity: Creates strong motive for price stability

- Monetary policy follows interest-rate rule, with $\Pi^*$ drift
Estimation approach

- **Stochastic shocks**
  - “Real”: Technology, autonomous demand
  - “Nominal”: Nominal interest rate, inflation target, markup
  - “Financial”: Risk premium, Q, volatility

- **Data (1965-2008)**
  - $\Delta Y, \Delta C, \Delta I, \Delta H, \Delta P, R \& E[\Delta P^{LR}]$
  - Excess bond premium (from Gilchrist and Zakrajsek (2012))

- **Results**
  - Activity driven by risk premium, auto. demand, markup, & Q
  - Excess bond premium primarily driven by volatility and risk premium
  - Nominal variables driven by inflation target
  - Adverse volatility shock leads persistent credit downturn/economic slump
Impulse responses to financial shocks
Policy Analysis
Optimal policies: Ramsey and simple rules

Policy instruments

- Monetary: Nominal interest rate
- Macroprudential: Intermediary leverage tax

Ramsey policy vs simple rules

- **Ramsey policy**: Complex, model-dependent rule responds to exogenous shocks
- **Simple rule**: Policy instrument follows simple rule reacting to endogenous variables
Welfare under alternative policies

**Table:** Welfare Under Alternative Policy Settings

<table>
<thead>
<tr>
<th>Policy Settings</th>
<th>Cons Equiv (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline (no macroprudential policy)</td>
<td>-0.40</td>
</tr>
<tr>
<td>Optimized simple rules</td>
<td></td>
</tr>
<tr>
<td>Instrument: ( r_t ) and ( \tau_t^m )</td>
<td>-0.19</td>
</tr>
<tr>
<td>Instrument: ( r_t )</td>
<td>-0.28</td>
</tr>
<tr>
<td>Ramsey policy with</td>
<td></td>
</tr>
<tr>
<td>Instrument: ( r_t ) and ( \tau_t^m )</td>
<td>-</td>
</tr>
<tr>
<td>Instrument: ( r_t )</td>
<td>-0.22</td>
</tr>
<tr>
<td>Instrument: ( \tau_t^m )</td>
<td>-0.04</td>
</tr>
</tbody>
</table>

Note: Welfare under Ramsey policies were computed with the planner Lagrangian multipliers set equal to their steady state values.
Ramsey Rules: Volatility Shock
Ramsey vs Simple Rules: Welfare Surface for the Macroprudential Rule
Monetary policy for macroprudential aims?
A monetary policy response to the credit/GDP gap: Impulse responses to a technology shock
A monetary policy response to the credit/GDP gap: Welfare surface
Model Uncertainty
### Model features across models:

View from Guerrieri et al (2017)

<table>
<thead>
<tr>
<th>Choices available to banks</th>
<th>Iacoviello</th>
<th>Covas</th>
<th>Kiley Sim</th>
<th>Queralto</th>
<th>Guerrieri Jahan-Parvar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue new equity</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Reduce dividend payments</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Increase operating efficiency</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Raise interest spread</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Increase non-interest income</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>

| Services offered by banks           |            |       |          |          |                        |
| Liquidity provision                 | yes        | yes   | yes      | yes      | yes                    |
| Liquidity transformation             | no         | no    | no       | no       | no                     |

| Other Features of the model         |            |       |          |          |                        |
| Multiple sources of funding(*)      | yes        | yes   | no       | no       | yes                    |
| Nominal rigidities                  | no         | no    | yes      | no       | yes                    |
| Solution Method                     | 1st order  | nonlinear | 1st-2nd order | 1st order | piecewise lin. |

(*): “Multiple sources of funding” refers to the presence of sources of funding other than bank credit.
Responses to losses in banking sector: View from Guerrieri et al (2017)
Key takeaways
Summary

- We have estimated a DSGE model with frictions in financial intermediation.

- Estimation suggests important role for New-Keynesian frictions/shocks and a significant role for financial frictions/intermediation.

- Model implies that it is important for monetary policy to focus on price stability.

- While a Ramsey planner can use monetary policy for macroprudential goals, use of monetary policy for macroprudential purposes can do harm under a simple rule.