Monetary and macroprudential policies: Interaction and complementarity

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The financial crisis: lessons and sequels

- Reassessment of the macroeconomic policy framework:
  - Price stability no longer thought of as a sufficient condition for financial stability.
  - Microprudential supervision ill-equipped to cope with systemic-wide risks associated to the financial sector.
- Policy makers required to take immediate actions to mitigate the sources of systemic risks:
  - Introduction of macroprudential policy as a "*new policy domain*".
- However, despite some early antecedents, in general:
  - The toolkit for policy analysis (i.e. standard models) did not provide adequate setups to answer arising questions.
  - Lack of formal scrutiny of the granularity of these new policies before they were implemented.

The financial crisis: lessons and sequels (contd.)

- Analytical frameworks supporting the introduction of macroprudential policies surged ever since. Yet, general consensus still far from being reached.
- Some challenges:
  - What is the correct macroeconomic framework to study financial stability issues?
  - Macroprudential policies may be country specific. Generalizations are difficult.
  - Relatively short history to find robust empirical results of their efficiency.
- Some strands of research:
  - Effectiveness of macroprudential tools to mitigate systemic risk (Lim et al., 2011; Korinek, 2010; Bianchi, 2010).
  - Coordination between the central bank and the macroprudential authority (Angelini et al., 2012).
  - Great literature reviews: Hanson et al.,2011; Smets, 2013 & Galati and Moessner, 2013.

In this paper

- We study the relationship between macroprudential and monetary policy tools focusing on their interaction and complementarity.
- In particular, we analyze the conditions under which the introduction of a macroprudential authority allows for gains for the monetary authority.

In this paper (contd.)

- To do so:
  - Policy objectives:
    * Monetary policy: price stability $\Rightarrow$ loss function penalizing inflation and output volatility.
    * Macroprudential policy: financial stability $\Rightarrow$ loss function penalizing financial variables' volatility.
  - We use a standard reduced-form macroeconomic model with financial linkages.
  - Choose a macroprudential policy tool: dynamic provisioning.
  - We analyze three cases of interaction:
    1. Baseline case: monetary policy & no macroprudential policy.
    2. Coordinated case: monetary policy & macroprudential policy set simultaneously, certain participation constraints must be considered.
    3. Uncoordinated case: monetary policy & macroprudential policy set independently.

Our results

- **A policy arrangement through which the monetary and macroprudential authorities coordinate provides room for welfare gains:**
    - Nontrivial result since monetary authority faces trade-offs while interacting with macroprudential authority.
    - A significantly high weight needs to be placed on the traditional objectives of the monetary authority (as opposed to the ones of the macroprudential authority), so that the latter has Pareto-improvements.
    - Source of welfare gains: macroprudential policy provides a "protective shield" that mitigates shocks arising in the financial sector into the real sector (Sámano, 2011).

Our results (contd.)

- Within our model, results are robust to:

  i) sources of shocks hitting the economy, and

  ii) central bank's preferences for inflation relative to output stabilization.

- No canonical model to think of these issues:

  $\Rightarrow$ **Results are suggestive since they are model dependent**.

Outline

- The model.
- Description of policy environments.
- Results.
- Final remarks.

Setup

- No common conceptual framework to study these issues.Our approach: simple, reduced-form model accounting for the interaction between standard macroeconomic setup and some financial variables (following Sámano ,2011; in the spirit of Woodford, 2012).
  - Append a macroeconomic financial block to a SOE New Keynesian model.
  - The model features macro-financial linkages that allow for the propagation of shocks into the financial sector and viceversa.
- The elements of the financial block include semi-structural equations by credit sector of the following variables:
  - Interest rate lending spreads.
  - Delinquency indexes.
  - Credit growth rates.
  - A coverage ratio (ratio of loan-loss reserves to non-performing loans) $\longrightarrow$ policy instrument when macroprudential authority is active.

Core macro model

1) **Inflation:**

$$\pi_t = \omega_c \pi_t^c + \omega_{nc} \pi_t^{nc}$$

2) **Core Inflation:**

$$\pi_t^c = a_1 \pi_{t-1}^c + a_2 E_t[\pi_{t+1}^c] + a_3 x_t + a_4(\Delta e_t + \pi_t^{us}) + \varepsilon_{\pi^c,t}$$

3) **RER:**

$$rer_t = c_0 rer_{t-1} + c_1(E_t[rer_{t+1}] + (r_t^{us} - r_t)) + \varepsilon_{rer,t}$$

4) **IS:**

$$x_t = b_0 + b_1 x_{t-1} + b_2 E_t x_{t+1} + b_3 r_{t-1} + b_4 x_{t-1}^{US} + b_5 \ln(rer_t) + \varepsilon_{x,t}$$

5) **Interest rate rule:**

$$i = f(monetary\ authority's\ loss\ funtion,\ the\ rest\ of\ the\ economy)$$

Financial block

- **Interest rate spreads:**

$$5)\quad spread_t^j = \beta_0^j + \beta_1^j spread_{t-1}^j + \beta_2^j delin_t^j + \beta_3^j CRR_t + \varepsilon_{spread,t}^j$$

- **Delinquency indexes:**

$$6)\quad delin_t^j = \alpha_0^j + \alpha_1^j delin_{t-1}^j + \alpha_2^j x_t + \varepsilon_{delin,t}^j$$

- **Credit growth rates** (residual variable):

$$7)\quad \Delta cr_t^j = \gamma_0^j + \sum_{i=1}^{2} \gamma_{1,i}^j \Delta cr_{t-i}^j + \gamma_2^j x_t + \gamma_3^j spread_t^j + \varepsilon_{\Delta cr,t}^j$$

  - where w_j for $j = \{corporate, consumption, mortages\}$ is the weight accounting for the proportion of sector's j credit from total credit.

Financial block (contd.)

- The financial block is closed with a coverage ratio rule: a dynamic provisioning instrument aimed at reducing financial system procyclicality.
  - Allows for the build-up of reserves in good times that serve as buffers in bad times.
  - Smooths credit growth throughout the business cycle.
  - Shields the real economy from shocks originated in the financial sector.
  - Optimal CRR when macroprudential authority is active:

$$CRR = f(macroprudential\ authority's\ loss\ funtion,\ the\ rest\ of\ the\ economy)$$

  - AR(1) when it is assumed to be inactive:

$$CRR = \rho_{CRR} CRR_{t-1} + \varepsilon_{CRR,t}$$

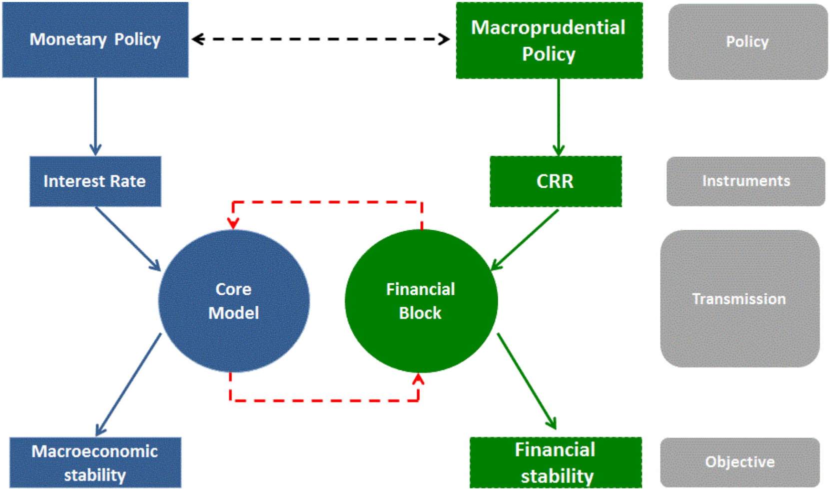
Financial block (contd.)

- Key mechanism: commercial banking sector adjusts its interest rate spreads in reaction to coverage ratio provisions and delinquency indexes so as to maintain profits roughly constant.

- The financial block affects the output gap of the core model through interest rate spreads:
  - An increase in the aggregate interest rate spread reduces economic activity (following Sámano, 2011 and MAG, 2010).
  - Modified IS equation:

$$x_t = b_0 + b_1 x_{t-1} + b_2 E_t x_{t+1} + b_3 r_{t-1} + b_4 x_{t-1}^{US} + b_5 \ln\left(rer_t\right) + b_6 spread_{t-1} + \varepsilon_{x,t}$$

Monetary and macroprudential policy interaction (from Smets, 2013)



Policy objectives

- The stabilization of macroeconomic and financial fluctuations implies the minimization of certain loss functions.
  - Loss function associated to monetary authority:

$$L_m \equiv \alpha_x \sigma_x^2 + \alpha_\pi \sigma_\pi^2 + \alpha_{\Delta i} \sigma_{\Delta i}^2$$

  - Loss function associated to macroprudential authority:

$$L_{mp} \equiv \alpha_{delin} \sigma_{delin}^2 + \alpha_{spread} \sigma_{spread}^2 + \alpha_{\Delta CRR} \sigma_{\Delta CRR}^2$$

Interaction of monetary and macroprudential policy

- Three scenarios to analyze the interaction of monetary and macroprudential policies are considered:
    1. Baseline case: monetary policy & no macroprudential policy.
    2. Coordinated case (policy committee case): monetary policy & macroprudential policy set jointly to stabilize the economic system as a whole. Participation of both authorities is conditioned to meet certain participation constraints.
    3. Uncoordinated policy case: monetary policy & macroprudential policy set independently to meet their own objectives.
- Monetary policy is the incumbent.

Baseline Case

- Represents a pre-crisis policy environment where the central bank stabilizes "traditional" macroeconomic variables, while the financial sector is let alone from any stabilization effort (i.e. macroprudential policy is inactive).

$$\underset{i_t}{Min}\left\{L_m \equiv \alpha_x \sigma_x^2 + \alpha_\pi \sigma_\pi^2 + \alpha_{\Delta i} \sigma_{\Delta i}^2\right\}$$

s.t. equations (1) to (10)

$$CRR_t = \rho_{CRR} CRR_{t-1} + \varepsilon_{CRR,t}$$

Policy Committee Case

- Joint stabilization plan put in place by the policy:

$$\underset{i_t, CRR_t, \Omega \epsilon [0,1]}{Min} \quad \{\Omega L_m + (1-\Omega) L_{mp}\}$$

$$\text{s.t.} \quad \text{equations (1) to (10)}$$

$$L_{mp} \leq \overline{\overline{L}}_{mp}$$

$$L_m \leq \overline{\overline{L}}_m$$

- $\overline{\overline{L}}_m$ and $\overline{\overline{L}}_{mp}$ denote the values of L_m and L_{mp} in the baseline case.
- $\Omega \epsilon [0, 1]$ is the weight assigned to the monetary authority's objectives versus the ones of macroprudential authority.

Uncoordinated Policy Case

- Both authorities simultaneously choose their optimal policy instrument taking into account the best response of the other authority (i.e a Nash equilibrium).

$$
\begin{aligned}
CRR_t^* &= Arg \min_{CRR_t} \quad \left\{ L_{mp} \equiv \alpha_{delin}\sigma^2_{delin} + \alpha_{spread}\sigma^2_{spread} + \alpha_{\Delta CRR}\sigma^2_{\Delta CRR} \right\} \\
\text{s.t.} & \quad \text{equations (1) to (10)} \\
& \quad \text{given } i_t^*
\end{aligned}
$$

$$
\begin{aligned}
i_t^* &= Arg\min_{i_t} \quad \left\{ L_m \equiv \alpha_x\sigma^2_x + \alpha_\pi\sigma^2_\pi + \alpha_{\Delta i}\sigma^2_{\Delta i} \right\} \\
\text{s.t.} & \quad \text{equations (1) to (10)} \\
& \quad \text{given } CRR_t^*
\end{aligned}
$$

Baseline vs uncoordinated policy case

- As in Sámano, 2011, the model is estimated for the Mexican economy using SUR.
- Uncoordinated policy case Pareto-improves the baseline case.
- Results hold under different assumptions about the type of shocks disturbing the economic environment and central bank's preferences for inflation relative to output stabilization.

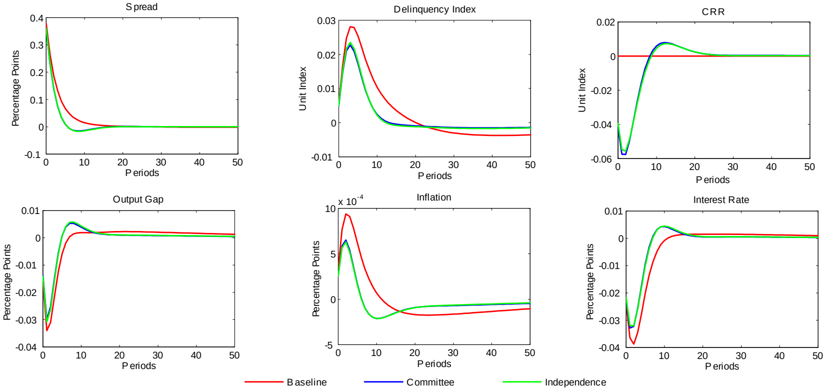
	$\alpha_\pi = \alpha_x$.			$\alpha_\pi > \alpha_x$.			$\alpha_x > \alpha_\pi$.		
	Baseline case		Uncoordinated Case	Baseline case		Uncoordinated Case	Baseline case		Uncoordinated Case
Macro and Financial Shocks									
L_m	212.64	>	209.99	254.24	>	251.64	159.67	>	157.67
L_{mp}	113.86	>	69.54	174.12	>	102.62	63.50	>	40.89
Macro Shocks									
L_m	213.45	>	210.80	255.26	>	252.66	160.26	>	158.26
L_{mp}	109.25	>	66.89	169.84	>	100.20	58.60	>	38.01
Financial Shocks									
L_m	201.7	>	199.3	242.39	>	240.07	150.51	>	148.72
L_{mp}	98.7	>	60.2	150.69	>	88.79	55.28	>	35.54

Baseline vs policy committee case

- $L_m < \overline{L}_m$ when $\Omega > 0.91$
- $L_{mp} < \overline{L}_{mp}$ when $\Omega < 0.98$
- Policy committee case Pareto-improves the baseline case when $\Omega \in [0.92, 0.97]$
  - Results hold under different assumptions about the type of shock disturbing the economy.
  - The main driver of the benefits for the monetary authority is the stabilization of the output gap.
  - Case with $\alpha_\pi = \alpha_x$.

	Baseline Case	Policy Committee Case Ω									
		0.99	**0.98**	**0.97**	**0.96**	**0.95**	**0.94**	**0.93**	**0.92**	**0.91**	**0.90**
L_m	212.64	201.79	205.83	207.69	208.92	209.89	210.73	211.51	212.25	212.97	213.68
L_{mp}	113.86	342.52	145.65	99.51	80.42	69.89	62.97	57.86	53.79	50.37	47.41

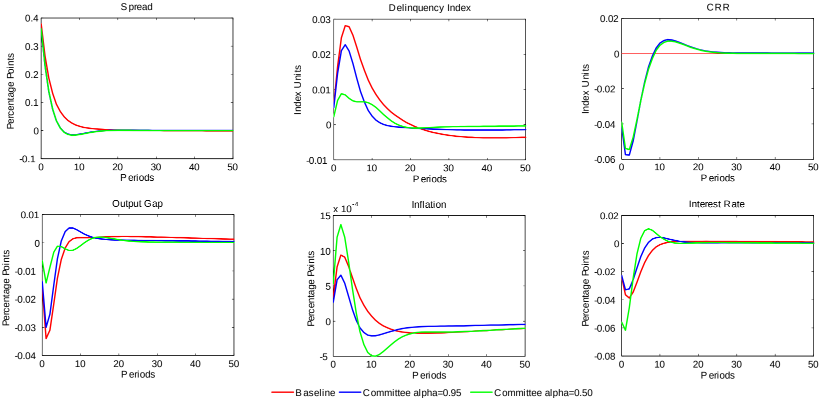
IRF: lending spreads shock



The source of the gains

- The range for Ω that ensures Pareto-improvements changes when the monetary authority places a different weight to inflation relative to output stabilization (i.e. $\alpha_\pi \neq \alpha_x$):
  - When $\alpha_\pi > \alpha_x$, the range shrinks and shifts upwards, $\Omega \in [0.94, 0.98]$.
  - When $\alpha_x > \alpha_\pi$, the range widens and shifts downwards, $\Omega \in [0.90, 0.96]$.
  - A monetary authority more intolerant to output fluctuations finds relatively higher benefits from being complemented by a macroprudential authority.

IRF: lending spreads shock



Conclusions

- We analyze the interaction and complementarity between monetary and macroprudential policy.
- In our model:
  - A policy committee through which both the monetary and macroprudential authorities coordinate and in which Ω is high is Pareto-improving versus a situation in which the monetary policy is the only instrument used to stabilized the economy. In this cases their complementarity improves the outcome.
  - If Ω is low enough the stabilization of financial variables would occur at the expense of higher inflation volatility from a stressed effort to stabilize the output gap which would generate losses for the monetary authority.
- Results are suggestive since they are model dependent. Further work must be done to generalize our findings.