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The Interaction of Monetary Policy and Financial Stability: Lessons from the 2007 Crisis

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Introduction

“…the recent financial crisis has made it plain that even in …the United States, significant disruptions of financial intermediation remain a possibility. Understanding such phenomena and the possible policy responses requires the use of a macroeconomic framework in which financial intermediation matters for the allocation of resources.“ M. Woodford (2010)

Introduction (con'd)

- According to the conventional view up to the crisis "there is no general trade-off between monetary policy and financial stability" (Issing, 2003).
- Likewise it was argued that a central bank "that was able to maintain price stability would also incidentally minimize the need for lender-of-last-resort intervention" (A. Schwartz, 2000)

Introduction (con'd)

- **It was natural to view the basic tools of monetary policy as *orthogonal* to the regulatory financial stability tools such as liquidity and bank capital requirements.**

- **The recent crisis demonstrated that financial crisis can occur:**

  - following a long period of world-wide low inflation;

  - where the task of financial stability is separated from the central bank.

Introduction (con'd)

Our paper develops an analytical framework in which:

- **credit risk develops endogenously in the financial system;**
- **interaction between the monetary policy tool and the financial stability tools is laid out;**

Introduction (con'd)

- **We use a general equilibrium model which has two key features:**

  (i) it embeds externalities in the perceived credit risk.

  (ii) it integrates financial frictions in the form of banking financial intermediation into a simple dynamic stochastic general equilibrium model.

- **These features make the systemic risk endogenously determined and give rise to preventive financial stability policy making.**

Main results

I. **The effectiveness of monetary policy (the transmission mechanism) is affected in predicted ways by financial stability tools: capital and reserve requirements.**

II. **Institutional constraints on the ability of banks to obtain funding from the CB strongly affect the way the monetary transmission mechanism operates.**

III. **Policymaking is likely to face a trade-off between price stability and financial stability.**

The Model

- We consider an <u>overlapping generations</u> model in which there exists <u>a storable good</u> that can either be consumed or be stored as capital good.

a. Individuals

- Live two periods. In the first period individual is <u>endowed with w</u> units of the consumption good.
- There are two types of individuals: high w^H and low w^L.

The Model: Individuals

- **Young (first period) individuals can smooth consumption in three ways:**

  (i) through stochastic physical investment: investment of *k* units yields *f*(*k*) units of consumption good next period where

  $$k > k_{\min}$$

  $$f(k_t) = \begin{cases} Ak_t^{\alpha}, 0 < \alpha < 1, & \text{with probabilty } \lambda(k_t) \\ 0 & \text{otherwise} \end{cases}$$

  Use endowment and borrowing to finance investment.

The Model: Externalities

$$\lambda(k_t) = \gamma e^{-\gamma k_t}, \quad 0 < \gamma < 1$$

- **(Diseconomies to scale in the return on the investment).**
- **This process of $\lambda(k_t)$ is not known to individuals and to commercial banks.**

  Thus the perceived λ_t does not depend on k_t.
- **This setup creates externalities that could give rise to the realization of a <u>systemic risk</u>.**

The Model: Individuals (con'd)

(ii) Individuals can hold money balances

(iii) Individuals can deposit at the bank earning an expected gross nominal return

The Model: Banks

- Banks demand individual deposits in a competitive market.
- They grant loans to individuals in an imperfectly competitive market.
- They hold reserves.
- Maintain required capital ratio.

The Model: Banks (con'd)

- **Banks can borrow from the CB a one-period monetary loan which the CB supplies perfectly elastically at a policy rate i_m.**
- **Collateral: the total reserves held at the CB.**

The Model: Central Bank (CB)

c. The Central Bank pursues two goals:

1. **reducing deviations of the inflation expectations from the inflation target.**
2. **maintaining financial stability - aims to prevent the collapse of the banking financial intermediation.**

- **Provides a safety net in the form of partial deposits insurance financed by seigniorage revenues.**

  (Lump-sum taxes/subsidies)

Equilibrium characteristics

a) **Result 1 :We get a *separating equilibrium***

- **Poor individuals use bank deposits and real money balances in their portfolio selection;**
- **Rich individuals use the physical investment and real money balances to smooth consumption.**

Equilibrium characteristics (con'd)

b) **the *pass through* from the monetary policy rate to the market deposit rate.**

$$(1-(1-\theta)q_{t+1})i_{dt} = (1-rr)i_{mt} - rr\kappa + \varphi_{3t}$$

- **The expected deposit interest rate (LHS) is related not only to the monetary policy rate i_m (positively) but also to**

Equilibrium characteristics (con'd)

- **the financial stability policy tools (κ and rr).**
- ***And to*** φ_3 **- the endogenous shadow price of the collateral constraint on monetary loans.**

✦ φ_3 **is negatively related to** i_m **thus reducing the effectiveness of monetary policy.**

Equilibrium characteristics (con'd)

c) **The transmission mechanism to the market lending rate i_L.**

$$\lambda(1+\frac{1}{\eta_t})i_{Lt} = i_{mt} + \kappa + \varphi_{3t} + (1-\lambda)$$

- **Here φ_3 offsets i_m only partially.**

Equilibrium characteristics (con'd)

d) **the equilibrium inflation expectations satisfy**

$$f_{kt} = \frac{1 + i_{Lt}}{p_{t+1} / p_t}$$

where f_k is the (non-stochastic) gross marginal return on the physical investment (real rate).

- **This is a Fisher equation.**

Monetary policy vs. financial stability

- **i) a negative shock to the return on the physical investment which decreases the inflation expectations.**

$$\frac{p_{t+1}}{p_t} = \frac{1 + i_L}{f_k}$$

- **The CB reacts to the deviation of the inflation expectations, while *ignoring* the effect of the shock on financial stability.**

A shock to the return on the physical investment

Result: ***The CB lowers its i_{mt} rate to increase expected inflation. Real investment rises, banks grant more loans and the actual λ goes down (while the perceived λ remains unchanged).***

According to the simulations the defaulting loans increases by more than the expected profits, thereby raising the probability of systemic risk.

Furthermore we get a small reduction in the seigniorage revenues (mainly due to the reduction in i_m).

- ***Both financial stability indicators deteriorate.***

A shock to the return on the physical investment (con'd)

- ***Conclusion***: **monetary policy aimed at achieving inflation target is likely to negatively affect financial stability.**

A Shock to credit risk

- **ii) a shock to credit risk affecting financial stability.**
- **The CB reacts to the financial stability while *ignoring* the effect of the shock on inflation expectations.**
- **Here we examine the effects of a negative shock to $\lambda(k)$ (an increase in credit risk).**

A shock to credit risk (con'd)

Result:

- ***The CB increases the minimum capital requirement κ just enough to increase i_L such that the demand for investment k_t falls and $\lambda(k_t)$ increases back to its pre-shock level.***
- ***According to our simulations, the expected profits decrease by less then do the defaulting loans, and thus the probability of systemic risk falls.***
- ***Under some conditions the seigniorage revenues increase.***
- ***The inflation expectations fall below the target.***

A shock to credit risk (con'd)

- ***Conclusion*:** **CB policy aimed at achieving financial stability is likely to affect price stability.**

Concluding Remarks

- **We develop a general equilibrium model that allows us to examine the interrelation and reciprocity between the monetary policy - to achieve inflation target, and macro-prudential policy - to maintain and safeguard financial stability.**

- **Policy considerations that are relevant for one policy appear to have an impact on the other. C*oordination* is needed to avoid (possibly) missing some of the policy targets.**

The End

Table 2: Simulation results following a persisting shock to the return on real investment

Endogenous variables	Values prior to the shock	Values after the shock but prior to the monetary policy reaction	Values following the monetary policy reaction
A	6	5.99	5.99
i_{mt}	0.1	0.1	0.075
π_t	0.0811	0.0804	0.0810
$\frac{l_t}{p_t}$	0.0511	0.0490	0.0569
$\frac{d_t}{p_t}$	0.0475	0.0456	0.0529
k_t	0.9159	0.9139	0.9183
$\frac{m_t^1}{p_t}$	0.0327	0.0346	0.0287
φ_{3t}	0.0043	0.0037	0.0255
i_{dt}	0.0764	0.0758	0.0777
i_{Lt}	0.3919	0.3910	0.3864
q_{t+1}			
$E_t \Pi_{t+1}^{1-q}$	0.0034	0.0033	0.0038
$(1-\lambda(k_t))\frac{L_t}{p_t}$	0.0307	0.0295	0.0343
SR_t	0.0934	0.0935	0.0933

Table 3: The simulation results following a persisting negative shock to $\lambda(k_t)$

Endogenous variables	Values prior to the shock	Values following the shock and the policy reaction
γ	0.95	0.90
κ	0.07	0.0755
Perceived λ	0.90	0.90
k_t	0.9159	0.9070
i_{mt}	0.1	0.1
π_t	0.0811	0.0749
$\frac{l_t}{p_t}$	0.0511	0.0353
$\frac{d_t}{p_t}$	0.0475	0.0326
$\frac{m_t^1}{p_t}$	0.0327	0.0485
φ_{3t}	0.0043	0.0008
i_{dt}	0.0764	0.0714
i_{Lt}	0.3919	0.3946
q_{t+1}		
$E_t \Pi_{t+1}^{1-q}$	0.0034	0.0026
$(1-\lambda(k_t))\frac{L_t}{p_t}$	0.0307	0.0213
SR_t	0.0934	0.0937

Equilibrium characteristics (con'd)

- **The expected inflation is determined in a portfolio selection framework (unlike in the Neo-Keynsian Phillips Curve Models).**
- **The transmission of monetary policy to inflation is through the lending rate i_L.**