Discussion of:

"Monetary Policy Implementation in an Interbank Network: Effects on Systemic Risk"

by M. Bluhm, E. Faia and J. P. Krahnen

ECB Workshop on Non-Standard Monetary Policy Measures

Albert Queralto

Federal Reserve Board

March 21-22, 2014

This Paper

- **Question**: what are the effects of monetary policy on systemic risk?

- The paper answers this question within a network model of the interbank market

This Paper

- **Question**: what are the effects of monetary policy on systemic risk?

- The paper answers this question within a network model of the interbank market

- Discussion Outline:

  1. Summary

  2. Comments / Questions

  3. An alternative model of systemic risk

Summary

Model Overview: Key Elements

- N banks maximize (static) profits *s.t.* capital and liquidity requirements

  - Invest in non-liquid asset

  - Heterogeneous in returns to non-liquid assets

  - Trade funds against each other in interbank market

Model Overview: Key Elements

- N banks maximize (static) profits *s.t.* capital and liquidity requirements

  - Invest in non-liquid asset

  - Heterogeneous in returns to non-liquid assets

  - Trade funds against each other in interbank market

- Endogenous Network structure in equilibrium

  - *tâtonnement* process first in interbank market, then in market for non-liquid asset

  - Network determined by *closest matching partner*: bank who wants to borrow is matched with bank who wants to lend the closest amount

Model Overview: Key Elements

- ▶ N banks maximize (static) profits *s.t.* capital and liquidity requirements

  - ▶ Invest in non-liquid asset

  - ▶ Heterogeneous in returns to non-liquid assets

  - ▶ Trade funds against each other in interbank market

- ▶ Endogenous Network structure in equilibrium

  - ▶ *tâtonnement* process first in interbank market, then in market for non-liquid asset

  - ▶ Network determined by *closest matching partner*: bank who wants to borrow is matched with bank who wants to lend the closest amount

- ▶ Central Bank modeled as the $N + 1^{th}$ bank trading funds in the interbank market

  - ▶ Borrows/lends funds until target interest rate is reached

Systemic Risk

Systemic Risk

Figure: Bank i's balance sheet

Systemic Risk (1): Interconnectedness

Figure: Bank i's balance sheet

ASSETS	LIABILITIES
c^i Cash	d^i Deposits
l^i Interbank lending	b^i Interbank borrowing
$p \times e^i$ Non–liquid assets	q^i Equity

$l^i = \sum_{j \neq i} l^{i,j}$

Systemic Risk (1): Interconnectedness

Figure: Bank i's balance sheet

ASSETS	LIABILITIES
c^i Cash	d^i Deposits
l^i Interbank lending	b^i Interbank borrowing
$p \times e^i$ Non–liquid assets	q^i Equity

$l^i = \sum_{j \neq i} l^{i,j}$

If bank j defaults, equity loss for bank i

Systemic Risk (2): Fire sales

Figure: Bank i's balance sheet

ASSETS	LIABILITIES
c^i Cash	d^i Deposits
l^i Interbank lending	b^i Interbank borrowing
$p \times e^i$ Non–liquid assets	q^i Equity

Systemic Risk (2): Fire sales

Figure: Bank i's balance sheet

ASSETS	LIABILITIES
c^i Cash	d^i Deposits
l^i Interbank lending	b^i Interbank borrowing
$p \times e^i$ Non–liquid assets	q^i Equity

other banks sell non–liquid assets $\rightarrow p \downarrow$
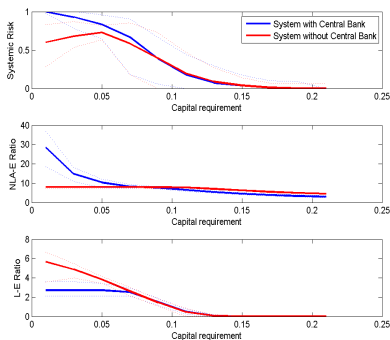
Systemic Risk (2): Fire sales

Figure: Bank i's balance sheet

ASSETS	LIABILITIES
c^i Cash	d^i Deposits
l^i Interbank lending	b^i Interbank borrowing
$p \times e^i$ Non–liquid assets	q^i Equity

other banks sell non–liquid assets $\rightarrow p \downarrow$

equity loss for bank i

Main Result: Monetary policy increases systemic risk

- When capital requirements are low, interbank interest rates are high
- Given a central bank target rate, central bank lends in the interbank market in the low-capital-requirement region

  $\rightarrow$ higher investment and leverage in the low-capital-requirement region $\rightarrow$ higher systemic risk

Comments / Questions

► Paper studies a fixed central bank target r^{rf} for a range of capital and liquidity requirements

Comments (1): Central Bank Intervention & Dynamics

▶ Paper studies a fixed central bank target r^{rf} for a range of capital and liquidity requirements

▶ Another interesting question is how the results change when considering a range for r^{rf}
  ▶ Are there cases in which the intervention reduces systemic risk? Under what conditions does this happen?

Comments (1): Central Bank Intervention & Dynamics

- ▶ Paper studies a fixed central bank target r^{rf} for a range of capital and liquidity requirements

- ▶ Another interesting question is how the results change when considering a range for r^{rf}
    - ▶ Are there cases in which the intervention reduces systemic risk? Under what conditions does this happen?

- ▶ Further step: what are the *dynamic* effects of a movement in the central bank's target r^{rf}?

- In the model, the price of the non-liquid asset p is determined by market clearing

Comments (2): Endogeneity of p to Monetary Policy

▶ In the model, the price of the non-liquid asset p is determined by market clearing

▶ In reality, p potentially affected by prices of assets like housing or stock

Comments (2): Endogeneity of *p* to Monetary Policy

- In the model, the price of the non-liquid asset *p* is determined by market clearing

- In reality, *p* potentially affected by prices of assets like housing or stock

- These prices likely *rise* in response to monetary easing

    $\rightarrow$ stronger balance sheets, everything else equal

    $\rightarrow$ benign effect on systemic risk

Estimated Effects of Monetary Policy on Real House Prices

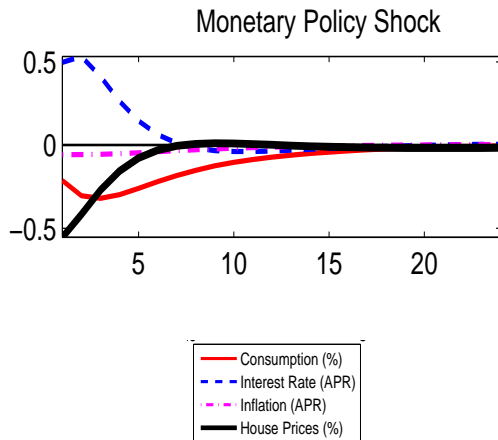(Guerrieri and Iacoviello, 2014)

Figure: Effects of monetary shock in an estimated DSGE model

Estimated Effects of Monetary Policy on Real House Prices
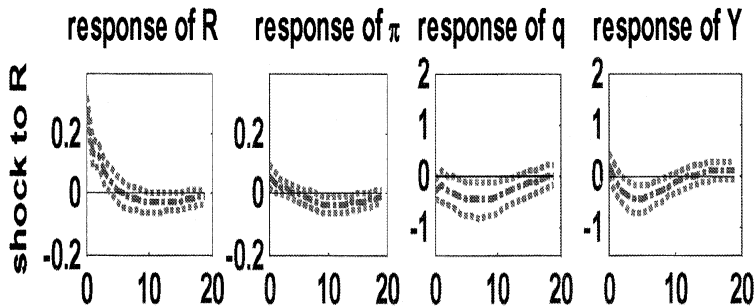
(Iacoviello, 2005)

Figure: Effects of monetary shock in VAR with Choleski ordering R, π, q, Y ($q \equiv$ real house price)

Estimated Effects of Monetary Policy on Stock Prices

(Rigobon and Sack, 2004)

Table 2
The response of stock prices to monetary policy (1 percent increase in SR interest rate)
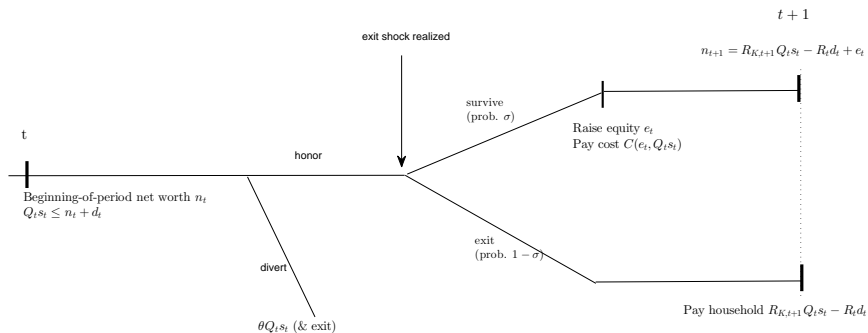
	Estimator: $\widehat{\alpha}_{\text{het}}^{i}$		Estimator: $\widehat{\alpha}_{\text{het}}^{\text{gmm}}$		Estimator: $\widehat{\alpha}_{\text{es}}$	
	Point	Std dev	Point	Std dev	Point	Std dev
SP500	−6.81	2.83	−7.19	1.82	−5.78	1.98
WIL5000	−6.50	2.77	−6.91	1.77	−5.61	1.94
NASDAQ	−9.42	5.01	−10.06	2.92	−6.64	3.53
DJIA	−4.85	2.82	−5.39	1.97	−5.16	1.91

	Significance
Test of O.I. rest.: $\widehat{\delta}_{\text{oir}}$	0.997
Test of E.S. rest.: $\widehat{\delta}_{\text{es,iv}}$	0.721
Test of E.S. rest.: $\widehat{\delta}_{\text{es,gmm}}$	0.455

An Alternative Model of Systemic Risk

Akinci and Queralto (2014)

- A macroeconomic model with banks, as in Gertler and Karadi (2009)

  - Banks' incentive constraint occasionally binding $\rightarrow$ captures systemic risk

  - Banks can issue equity as well as short-term debt $\rightarrow$ captures banks' precautionary behavior

- Banking sector integrated into standard small open economy

Banks: Period-t Timeline

exit shock realized

$t + 1$

$n_{t+1} = R_{K,t+1} Q_t s_t - R_t d_t + e_t$

survive
(prob. σ)

Raise equity e_t
Pay cost $C(e_t, Q_t s_t)$

t

honor

Beginning-of-period net worth n_t
$Q_t s_t \leq n_t + d_t$

divert

exit
(prob. $1 - \sigma$)

$\theta Q_t s_t$ (& exit)

Pay household $R_{K,t+1} Q_t s_t - R_t d_t$

Banks: Balance Sheet and Net Worth

- Balance Sheet

$$Q_t s_t \leq n_t + d_t$$

where
$$d_t = b_t + b_t^*$$

- Evolution of Net worth

  - Surviving Banks: $n_t = R_{K,t} Q_{t-1} s_{t-1} - R_{t-1} d_{t-1} + e_{t-1}$

 - Exiting Banks: $\quad n_t = R_{K,t} Q_{t-1} s_{t-1} - R_{t-1} d_{t-1}$

Banks: Agency Problem & Equity Issuance

- Banks' incentive constraint: $V_t(n_t) \geq \theta Q_t s_t$
  - When the constraint binds, systemic financial crisis
 - Can compute ex-ante probability of crisis

Banks: Agency Problem & Equity Issuance

- Banks' incentive constraint: $V_t(n_t) \geq \theta Q_t s_t$
    - When the constraint binds, systemic financial crisis
    - Can compute ex-ante probability of crisis

- Banks' optimal equity issuance:

$$\underbrace{C_1(e_t, Q_t s_t)}_{\text{Marginal Cost}} = \underbrace{\mathbb{E}_t \left\{ \Lambda_{t,t+1} \left[V'_{t+1}(n_{t+1}) - 1 \right] \right\}}_{\text{Marginal Benefit}}$$

Figure: Decrease in Country Interest Rate ($x \equiv \frac{e}{Qs}$)
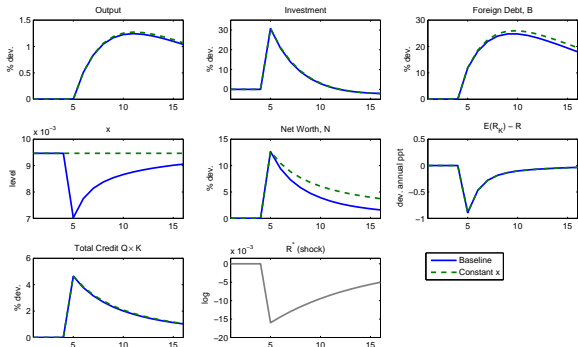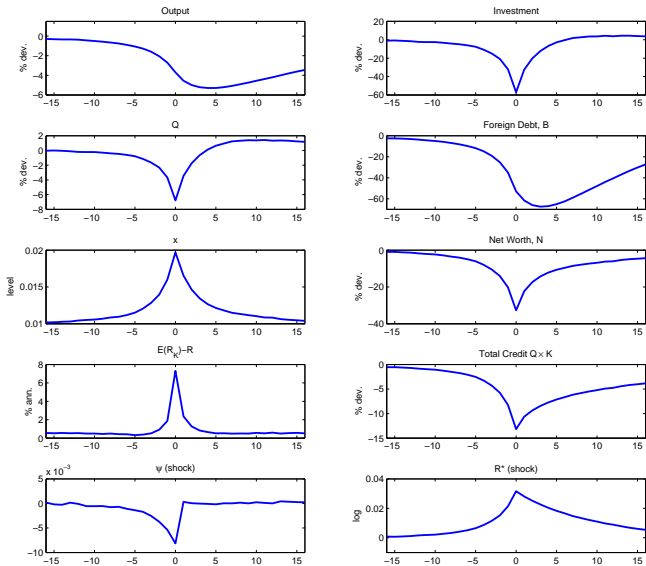
Crisis Probabilities:
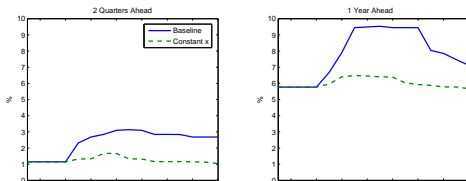
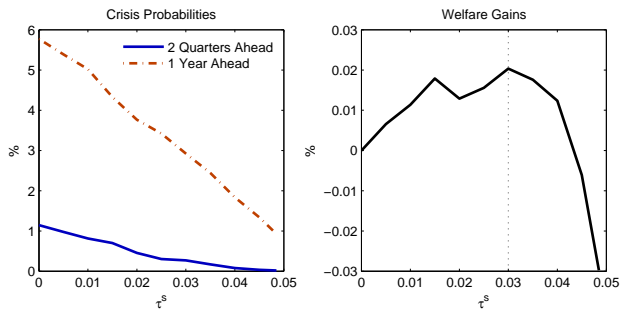Figure: Average Systemic Financial Crisis

Government Policy

Figure: Subsidy of τ^s per unit of equity issued (financed by tax on bank assets)

Comparing Approaches

Advantages of the authors' approach:

- ▶ Very empirically accurate account of the interbank market

- ▶ Captures systemic risk via (endogenous) interconnectedness of the financial system, a salient real-world phenomenon

- ▶ Natural framework to analyze liquidity provision by the Central Bank

Advantages of our approach:

- ▶ Explicit agency friction leading to financial crises and systemic risk

- ▶ Captures banks' precautionary behavior

- ▶ More easily integrated into a macro model

Final Comments

- Great paper!

- It represents a micro approach to systemic risk, based on (endogenous) networks in interbank markets

- The model I outlined represents a macro approach to systemic risk, with a stylized banking sector embedded into a NDSGE

- An interesting research agenda is to combine the two approaches