Persistent Liquidity Shocks and Interbank Funding

Marcel Bluhm

Xiamen University (WISE) and Goethe University Frankfurt (CFS)

Manila, 20 September 2016

Interbank Funding: Prologue

- Banks **fund** each other to buffer **liquidity shocks**;

Interbank Funding: Prologue

- Banks **fund** each other to buffer **liquidity shocks**;
- Interbank funding **very sizeable** (around 20% of bank's total assets in Euro-area and U.K.);

Interbank Funding: Prologue

- Banks **fund** each other to buffer **liquidity shocks**;
- Interbank funding **very sizeable** (around 20% of bank's total assets in Euro-area and U.K.);
- **Term segment** plays important role (Bluhm et al (2016), Georg and Gabrieli (2015), Kuo et al. (2014), Hale et al. (2016)).

Overview

Why do banks fund each other long term?

Overview

Why do banks fund each other long term?

Interbank market important for **allocative efficiency**, **financial stability**, and **monetary policy**.

Overview

Why do banks fund each other long term?

Interbank market important for **allocative efficiency**, **financial stability**, and **monetary policy**.

To investigate question

- **develop theory** of persistent liquidity shocks extending theoretical interbank literature with maturity dimension;
- embed theory in **micro-founded network model**.

Overview

Why do banks fund each other long term?

Interbank market important for **allocative efficiency**, **financial stability**, and **monetary policy**.

To investigate question

- **develop theory** of persistent liquidity shocks extending theoretical interbank literature with maturity dimension;
- embed theory in **micro-founded network model**.

Developed framework shows

- persistent liquidity shocks consistent with a term structure on interbank market and several **stylized facts**;
- interbank funding can considerably affect **economic activity**.

Agenda

1. Theory of Persistent Liquidity Shocks
2. Micro-founded Network Analysis
3. Conclusion

Agenda

1. Theory of Persistent Liquidity Shocks
2. Micro-founded Network Analysis
3. Conclusion

Extant Literature Assigns no Role to Maturity Structure

Established **theory** views interbank funding mainly as insurance mechanism for **short term** liquidity shocks (Allen and Gale (2000) etc.) without assigning specific role to maturity.

Extant Literature Assigns no Role to Maturity Structure

Established **theory** views interbank funding mainly as insurance mechanism for **short term** liquidity shocks (Allen and Gale (2000) etc.) without assigning specific role to maturity.

Empirical analyses confirm insurance motive on **short term** interbank market (Cocco et al. (2009) etc.).

Extant Literature Assigns no Role to Maturity Structure

Established **theory** views interbank funding mainly as insurance mechanism for **short term** liquidity shocks (Allen and Gale (2000) etc.) without assigning specific role to maturity.

Empirical analyses confirm insurance motive on **short term** interbank market (Cocco et al. (2009) etc.).

However, Bluhm, Georg and Krahnen (2016) show that interbank exposures are large, persistent, and essentially longer-term which point towards **important role of maturity dimension**.

Extant Literature Assigns no Role to Maturity Structure

Established **theory** views interbank funding mainly as insurance mechanism for **short term** liquidity shocks (Allen and Gale (2000) etc.) without assigning specific role to maturity.

Empirical analyses confirm insurance motive on **short term** interbank market (Cocco et al. (2009) etc.).

However, Bluhm, Georg and Krahnen (2016) show that interbank exposures are large, persistent, and essentially longer-term which point towards **important role of maturity dimension**.

$\rightarrow$ In the following: extend literature on interbank market with maturity dimension using theory of **persistent liquidity shocks**...

Persistent Liquidity Shocks Approach: Summary

Banks:

1. face **persistent** (gradually vanishing) liquidity shocks from (i) **deposit fluctuations**, and (ii) **business loan emission**;

Persistent Liquidity Shocks Approach: Summary

Banks:

1. face **persistent** (gradually vanishing) liquidity shocks from (i) **deposit fluctuations**, and (ii) **business loan emission**;
2. can **insure** each other against **negatively correlated** liquidity shocks;

Persistent Liquidity Shocks Approach: Summary

Banks:

1. face **persistent** (gradually vanishing) liquidity shocks from (i) **deposit fluctuations**, and (ii) **business loan emission**;
2. can **insure** each other against **negatively correlated** liquidity shocks;
3. manage liquidity by limiting maturity gaps ('**liquidity gap analysis**') [BCBS (2008), FDIC(2015)] to minimize investment risks (funding and interest rate risk);

Persistent Liquidity Shocks Approach: Summary

Banks:

1. face **persistent** (gradually vanishing) liquidity shocks from (i) **deposit fluctuations**, and (ii) **business loan emission**;
2. can **insure** each other against **negatively correlated** liquidity shocks;
3. manage liquidity by limiting maturity gaps ('**liquidity gap analysis**') [BCBS (2008), FDIC(2015)] to minimize investment risks (funding and interest rate risk);

Taking into account 1-3 above, banks use the (term) interbank market to match **expected duration** of liquidity shock with maturity segment on interbank market.

$\rightarrow$ In the following, include framework in micro-founded **network model** to investigate importance of and phenomena on interbank market...

Agenda

1. Theory of Persistent Liquidity Shocks
2. Micro-founded Network Analysis
3. Conclusion

Micro-Founded Network Model: Overview

Model extends Cifuentes et al. (2005) and Bluhm and Krahnen (2014) with micro-foundations;

Micro-Founded Network Model: Overview

Model extends Cifuentes et al. (2005) and Bluhm and Krahnen (2014) with micro-foundations;

Banks determine optimal portfolio via **profit maximization**;

Micro-Founded Network Model: Overview

Model extends Cifuentes et al. (2005) and Bluhm and Krahnen (2014) with micro-foundations;

Banks determine optimal portfolio via **profit maximization**;

Central bank transmits monetary policy decisions via interbank market;

Micro-Founded Network Model: Overview

Model extends Cifuentes et al. (2005) and Bluhm and Krahnen (2014) with micro-foundations;

Banks determine optimal portfolio via **profit maximization**;

Central bank transmits monetary policy decisions via interbank market;

Households carry out random economic transactions and **firms** demand credit;

Micro-Founded Network Model: Overview

Model extends Cifuentes et al. (2005) and Bluhm and Krahnen (2014) with micro-foundations;

Banks determine optimal portfolio via **profit maximization**;

Central bank transmits monetary policy decisions via interbank market;

Households carry out random economic transactions and **firms** demand credit;

Persistent liquidity shocks drive model's OTC interbank market.

Micro-Founded Network Model: Overview

Model extends Cifuentes et al. (2005) and Bluhm and Krahnen (2014) with micro-foundations;

Banks determine optimal portfolio via **profit maximization**;

Central bank transmits monetary policy decisions via interbank market;

Households carry out random economic transactions and **firms** demand credit;

Persistent liquidity shocks drive model's OTC interbank market.

Economic activity determined in trade-off between credit supply and financial fragility.

Micro-Founded Network Model: Overview

Model extends Cifuentes et al. (2005) and Bluhm and Krahnen (2014) with micro-foundations;

Banks determine optimal portfolio via **profit maximization**;

Central bank transmits monetary policy decisions via interbank market;

Households carry out random economic transactions and **firms** demand credit;

Persistent liquidity shocks drive model's OTC interbank market.

Economic activity determined in trade-off between credit supply and financial fragility.

Simulation analyses show that interbank market and lender of last resort make financial system **more efficient** resulting in considerable possible **welfare gains**.

Agenda

1. Theory of Persistent Liquidity Shocks
2. Micro-founded Network Analysis
3. Conclusion

Conclusion

Question: Why do banks fund each other long-term?

Conclusion

Question: Why do banks fund each other long-term?

Answer: Subject to persistent liquidity shocks, liquidity management aiming at minimizing investment risks drives interbank lending across multiple maturity segments.

Conclusion

Question: Why do banks fund each other long-term?

Answer: Subject to persistent liquidity shocks, liquidity management aiming at minimizing investment risks drives interbank lending across multiple maturity segments.

Embedded in novel **micro-founded network model** realistic financial system structures emerge which can be used for policy analysis.

Model features **numerous extensions** with respect to extant literature (endogenous money formation, OTC interbank trading, network formation).

In the model, an interbank market in stable financial system leads to considerable **welfare gains**.

References

Allen and Gale, 2000. Financial contagion. Journal of Political Economy 108, 1(33).

Basel Committee on Banking Supervision, 2008. Principles for sound liquidity risk management and supervision.

Bluhm and Krahnen, 2014. Systemic risk in an interconnected banking system with endogenous asset markets. Journal of Financial Stability 13, 75(94).

Bluhm, Georg, and Krahnen, 2016. Interbank Intermediation. Deutsche Bundesbank Discussion Paper Series, 16-2016.

Cifuentes, Ferrucci, and Shin, 2005. Liquidity risk and contagion. Journal of the European Economic Association 3, 556(566).

Cocco, Gomes, and Martins, 2009. Lending relationships in the interbank market. Journal of Financial Intermediation 18, 24(48).

Federal Deposit Insurance Corporation, 2015. Risk Management Manual of Examination Policies.

Georg, C., Gabrieli, S., 2014. A network view on interbank market freezes. Deutsche Bundesbank Discussion Paper 44/2014.

Hale, G., Kapan, T., Minoiu, C., 2016. Crisis transmission in the global banking network. IMF Working Paper 16.

Kuo, D., Skeie, D., Vickery, J., Youle, T., 2014. Identifying term interbank loans from fedwire payments data. Federal Reserve Bank of New York Staff Reports 603.

Micro-Founded Network Model: Overview

1. N banks determine their **optimal** 'target' balance sheet allocations for given parameters;[1]
2. Banks **emit business loans** and exchange funds on capital market;
3. Several random **deposit fluctuations** lead banks to lend and borrow across different maturities to fulfill liquidity requirement;
4. Assess **systemic risk** and **real activity**.

[1] Equity^i, branch share^i, interest rate, liquidity requirement, capital requirement, PD^i, LGD^i.

Model Setup (Step 1): N Banks' Optimal Portfolios

Table: Stylized bank balance sheet

Assets	Liabilities
Reserves	Deposits
Interbank lending	Interbank borrowing
Loans	Equity

For given endowments of (i) equity and (ii) **branch share**, as well as interbank interest rate, each bank determines portfolio via maximizing expected profit subject to constraints (**parameters** for regulatory requirements).

$$E(\pi^i) = \text{revenue from interbank lending} + \text{revenue from emitting loans}$$
$$\text{- cost of interbank borrowing - cost of deposits}$$

$\rightarrow$ After Step 1, N heterogenous optimal portfolio allocations determined...

Micro-Founded Network Model: Network and Welfare Analysis

Simulation analysis results in:

- replicating empirically observed **interbank phenomena** (large, and persistent interbank market);
- **network characteristics** similar to those found in financial systems.

Micro-Founded Network Model: Network and Welfare Analysis

Simulation analysis results in:

- replicating empirically observed **interbank phenomena** (large, and persistent interbank market);
- **network characteristics** similar to those found in financial systems.

Welfare analysis shows that:

- Economic activity influenced by **loan demand/supply** and **financial fragility**;
- **Optimal policy rate** maximizes sustainable economic activity;
- Interbank market and central bank render financial system **more efficient** if policymaker chooses optimal policy rate.

Micro-Founded Network Model: Welfare Analysis