Financial crises and systemic bank runs in a dynamic model of banking

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Outline

Introduction

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Introduction and motivation

- US: Great Depression, 2008 financial crisis
- Banking crises: runs and insolvency
  - this paper: panics (multiplicity of equilibria)
- Flight to liquidity: private sector willing to hold more liquid assets
  - Friedman-Schwartz hypothesis: Fed did not increase money supply in the ’30s $\Rightarrow$ great depression
  - 2008: Fed injected liquidity $\Rightarrow$ mitigated the crisis
- What are the effects of monetary injections?
  
  Can the central bank rule out self-fulfilling panics?
Money and models of bank runs

- Diamond-Dybvig (1983): monetary injections?

- Bank runs with money [Diamond-Rajan, 06; Allen et al, 13]
  Exogenous shocks to money demand

- This paper:
  - money, endogenous money demand
    (flight to liquidity driven by a panic: not policy invariant)
  - infinite-horizon: problem of banks is dynamic [Gertler-Kiyotaki, 13]
    (pre-existing conditions)
  - asymmetric information about the balance sheet of banks
    (Gorton, 2008: uncertainty about identity of bad banks)
Money and models of bank runs

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• Framework for other policy study and for quantitative analysis
Results

- Multiplicity of equilibria (computed using full non-linear model):
  - one good equilibrium
  - (up to) two bad equilibria (depending on parameters)

- Monetary injections
  - positive effect: improve conditions of bad banks
  - but: amplify/reduce the flight to liquidity (depending on parameters)

- Can the central bank *rule out* self-fulfilling expectations of a crisis? (under some restrictions)
  - asset purchases: NO
  - loans to banks: YES
  - central bank takes losses on loans to a bank that goes bankrupt
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Timing: day and night

$t$ to $t+1$
Model: overview

- Two assets in fixed supply: money $M$ and capital $K$.
- Households, liquidity risk $\Rightarrow$ precautionary demand for liquid assets.
  Banks offer demand-deposits contract to pool liquidity risk.
- One-time (unanticipated) shock:
  - beginning of the day
  - “weak banks” and “strong banks”
  (the shock “destroys” a fraction of assets owned by some banks)
- Information:
  - day: households cannot tell apart “weak” and “strong” banks
  - night: perfect information
- Deposits: nominal terms
Multiplicty of equilibria

- Good equilibrium: nominal price of capital $Q_t = Q^*$
- Bad equilibrium: nominal price of capital $Q_t < Q^*$
Runs and unspent money

- Withdrawals at night (perfect information)

- Optimal withdrawals decision:
  - depositors of a solvent bank: dominant strategy is “not run” (no Diamond-Dybvig type runs)
  - depositors of an insolvent bank: dominant strategy is “run”

- This model: insolvency is generated by drop in prices
  panic generates systemic crisis/runs

- Fear of runs ⇒ flight to money (precautionary motive)
  Unspent money depresses nominal prices
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- Money supply: $M_t = \overline{M} (1 + \mu_t)$

- Central bank cannot “inflate away” the crisis
  - $\mu_t$ such that $Q_t \leq Q^*$
    (price of capital, bad equilibrium $\leq$ price of capital, good equilibrium)
  - $M_{t+1} = \overline{M}$
Monetary policy

- Monetary injections increase nominal prices
  price of capital $Q_t \uparrow \Rightarrow$ condition of bad banks improves

- Central bank offers loans to banks
  loans from central bank have the same seniority as deposits
  - insolvent banks have pre-existing losses
  - losses of banks are beared by depositors AND by central bank
    $\Rightarrow$ private sector is more willing to use financial intermediaries
  - moderate monetary injection rule out crisis

- Asset purchases: bad equilibrium can arise
Monetary policy and flight to liquidity

- Money injections can amplify the flight to liquidity
  - demand of capital ↑
  - supply of capital is constant

⇒ price of capital $Q_t \uparrow$, return on capital $1 + R^K_t = \frac{Q^* + Zp_t}{Q_t} \downarrow$

- Two counteracting effects:
  - $Q_t \uparrow \Rightarrow$ losses of insolvent banks $\downarrow \Rightarrow$ deposits $\uparrow$
  - $R^K_t \downarrow \Rightarrow$ market return on deposits $\Rightarrow$ deposits $\downarrow$

Total effect on deposits is uncertain
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Conclusions

• Model: framework to analyze policy during financial crises
  • money injections amplify/reduce the flight to liquidity
  • loans to banks rule out self-fulfilling crisis
    (central bank: legal ability to take losses)
  • future work: capital requirements, equity injections, quantitative analysis

• Open question:
  • if some failures due to panics, other to fundamentals (Lehman?):
    Does Central Bank have to take losses on fundamentally insolvent banks to show that it can counteract a panic-based crisis?

“the only thing we have to fear is fear itself”

... and a “weak” central bank