Bank regulation, monetary policy and banks' supply of liquidity services

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Banks make loans and supply liquidity

- costly to transform financial assets into means of payment
  - banks offer deposits for which this cost is virtually zero
- banks get significant revenue from liquidity provision
  - convenient to use deposits for payments
  - banks know that and offer low yield on deposits
  - e.g., US depositors had $42bn forgone interest in Q3 2022
- deposits are a cheap funding source for banks
  - banks use them to fund loans
  - and also (safe) bonds, to diversify balance sheet

Some recent policies

- microprudential regulator
  - "banks should have more equity capital and more safe assets"
- macroprudential regulator
  - "banks should have even more equity capital"
- monetary policy authority
  - "act aggressively against economic downturns"

$\Rightarrow$ net effect on economic and financial stability (welfare)?

This paper

- DSGE with liquidity provision and endogenous financial crises
- channel: microprudential bank regulation has effect on deposit supply
  - larger banks need more funding
- channel: monetary policy has effect on deposit demand
  - expansive monetary policy is alternative source of liquidity
- both channels affect price of deposits (banks' funding costs)
- either may conflict with objective of macroprudential bank regulation

  $\Rightarrow$ need coordination

Coordination of prudential policies

- inefficient bank risk management during normal times:
  1. not enough equity capital
     - private cost of capital exceeds public costs (eg, resolution)
  2. too much "diversification" with bonds
     - balance sheets are too large
     - supply of deposits is excessive, banks' funding cost too high

- complementarity during normal times:
  1. higher (macroprudential) capital requirement
  2. encourage banks to hold fewer (safe) bonds
     - for example, tightening of SLR or loosening of LCR
     - smaller balance sheet, reduce deposit supply and funding cost

  $\Rightarrow$ compensate banks for holding more costly equity capital

- more stable supply of loans and deposits over financial cycle

Coordination of monetary and macroprudential policies

- avoid unintended adverse consequences of monetary policy (MP)
  - MP should be less accommodating during financial crises
  - to not hurt banks' margins while they rebuild equity capital
- complementarity during financial crisis times:
  1. reduce capital requirement temporarily
     - to make sure capital regulation not procyclical
  2. make MP stance relatively tighter, leave small labor gap
- focus on stabilizing labor income rather than just employment
  - wages depend on loan supply through firms' physical capital stock

Benchmark model (without monetary policy)

- firms borrow K from banks to produce $zK^{\alpha} + (1-\delta)K$
  - aggregate uncertainty: $z \in \{z_L, z_H\}$ with $Pr(z_L) = \rho$
- households get wages $(1-\alpha)zK^{\alpha}$, dividends D; discount β
  - get liquidity shocks, random time of consumption need
  - pay transaction cost g to liquidate bonds, no cost for deposits
- banks get loan repayments $\alpha zK^{\alpha} + (1-\delta)K$, hold bonds B
  - discount dividend payouts with $\gamma < \beta$ (bank capital costly)
  - banks' future value determines access to funding market:

$$\gamma E(V') \geq \theta_1 K + \theta_2 q^b B$$

Deposit price q

- households risk neutral
  - some of them never receive liquidity shocks (long-term investors)
  - bond price is $q^b = \beta$
- households' bond transaction costs:

$$g = \eta \exp(-\chi),$$

  decreasing in aggregate deposits χ

- households' optimal bond-deposit portfolio choice:

$$q_{t+1} = \frac{\beta}{1 - g_{t+1}} = \frac{\beta}{1 - \eta \exp\left(-\chi_{t+1}\right)}$$

  $\Rightarrow$ deposit price decreasing in aggregate deposits

Calibrate model in competitive equilibrium

parameter	value	target
β	0.94	return on savings
γ	0.91	financial crisis frequency
δ	0.10	average replacement investment
α	0.40	capital income share
θ_1	0.10	bank leverage
θ_2	0.03	bank balance sheet composition
η	0.35	banks' net interest margin
(z_L, z_H, ρ)	(0.8,1.05,0.2)	bank loss from one shock

- relevant for welfare measure:

  sum of households' financial assets and deposits, ω

No regulation in model

- why?? because we want to study optimal regulation
  - not enough to optimize over policy parameters
  - e.g., a capital requirements of $x\%$ can mean all kinds of things
- in practice financial regulators have lots of discretion
  - to impose new types of regulations (often during crises)
    - ad-hoc dividend restrictions during covid
  - in applying existing regulation
    - relax regulatory reporting requirements (forbearance) during covid
    - higher capital buffer requirements following covid
- we can formulate an objective for the regulator
  - Basel III: mitigate economic fluctuations from financial cycles
  - here: maximize welfare (present value of GDP and liquidity services)
- then focus on constrained efficiency in model economy

Constrained-efficient allocation

$$W(A,V) = \max_{\{D,B,K,\chi,V_L,V_H\}} \{D - \omega g + \beta\rho\,[z_L(1-\alpha)K^\alpha + W(A_L,V_L)] + \beta(1-\rho)\,[z_H(1-\alpha)K^\alpha + W(A_H,V_H)]\}$$

subject to

$$D + K + \frac{\beta}{1-g}\chi \leq A + \beta B, \qquad \text{(bank budget constraint)}$$

$$D \geq 0, \qquad \text{(dividend non-negativity)}$$

$$\gamma\,[\rho V_L + (1-\rho)V_H] \geq \theta_1 K + \theta_2 \beta B, \qquad \text{(no-default bank)}$$

$$V_j \geq A_j,\ j = L,H, \qquad \text{(participation bank)}$$

$$D + \gamma\,[\rho V_L + (1-\rho)V_H] \geq V, \qquad \text{(promise keeping regulator)}$$

where

$$A_j = z_j \alpha K^\alpha + (1-\delta)K + B - \chi,\ j = L,H, \qquad \text{(next period's bank equity)}$$

$$g = \eta \exp(-\chi). \qquad \text{(households' bond transaction costs)}$$

Bank balance sheets during normal times

- suppose a long history of $z_t = z_H$

	competitive equilibrium	second best
Assets		
loans	98.36	98.42
bonds	48.61	30.15
Liabilities		
equity	11.62	12.31
deposits	135.35	116.26
Total	146.97	128.57

All quantities are in percent of first-best lending. Loans are K, bonds are βB, equity is post dividend, $A - D$, and deposits are $q\chi$.

Implication for prudential regulation

- constrained-efficient balance sheets during normal times:
  1. are overall smaller
  2. have riskier assets (fewer bonds, somewhat more loans)
  3. have more stable liabilities (fewer deposits, more equity)

- banks should reduce "diversification" with bonds
  - margins are too thin during normal times

- fewer deposit-funded bonds lead to lower deposit rates
  - results in smaller but more profitable balance sheets
  - helps banks to maintain higher levels of costly equity capital

- supply of loans and deposits more stable over financial cycles

- key complementarity for regulation during normal times:

  additional capital buffers and fewer (safe) bonds

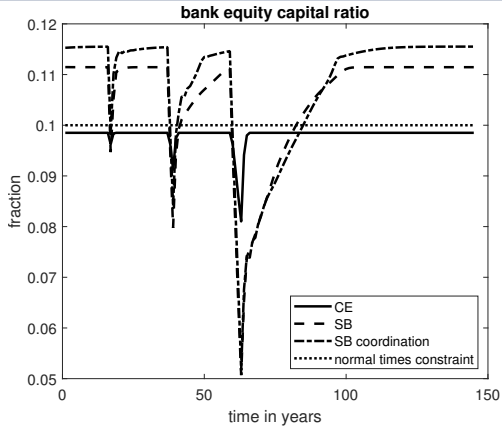
Optimal coordination of MP and prudential

- take into account effect of MP on banks' funding cost
- MP must balance loan supply and employment
- numerical exercise:
  - examine sequence of firm productivity shocks:

$$\{z_H, \ldots, z_H, z_L, z_H, \ldots, z_H, z_L, z_L, z_H, \ldots, z_H, z_L, z_L, z_L, z_L, z_H, \ldots, z_H\}$$

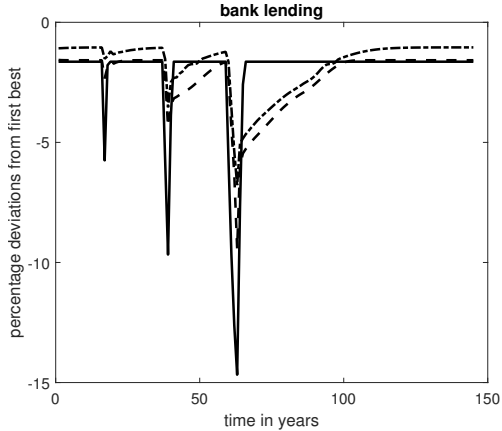
  - produces three impulse responses to illustrate non-linear effects
- compare:
  - second best without MP coordination
    - same as benchmark without MP
      intuition: bank regulator can ignore MP if it focuses narrowly on labor gap
  - second best with MP coordination

Bank equity capital



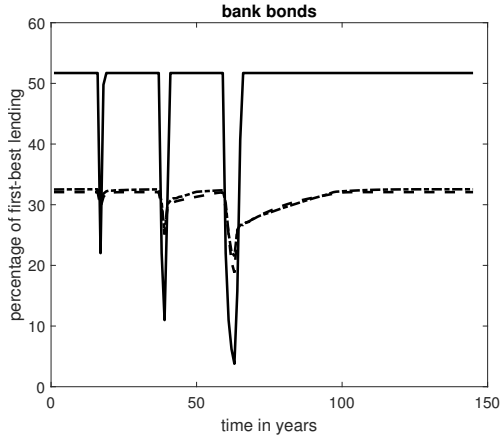
- constrained-efficient bank capital responds much more to shocks
- higher during normal times than in competitive equilibrium
  - even higher with MP coordination
  - MP provides additional support for banks' margins

Bank lending



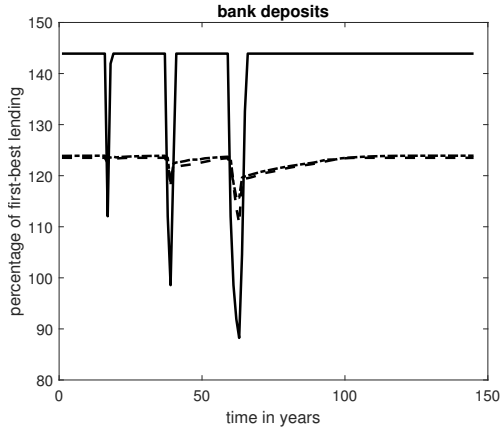
- constrained-efficient bank lending much more stable
  - even more so with MP coordination

Bank bonds



- constrained-efficient bank bonds lower and more stable
  - even more so with MP coordination

Bank deposits

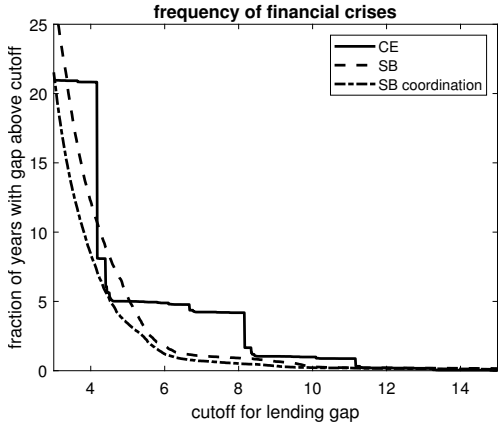


- constrained-efficient deposits lower and more stable
  - even more stable with MP coordination

Constrained-efficient MP

- constrained-efficient MP supports banks during crises
  - by providing additional tightening, to raise liquidity premiums

Fewer financial crises with MP coordination



- constrained efficiency features fewer and smaller lending gaps
  - stabilize lending even more so with MP coordination
    - avoid excessively hurting banks' margins when equity capital low

Conclusion

- banks supply liquidity to economy (eg, households)
  - coordinate prudential bank regulations to take this into account
- MP actions may compete with banks' liquidity provision
  - need to coordinate MP and macroprudential regulation
  - to avoid unintended consequences from MP on banks' health
- key result: augment countercyclical capital regulation in two ways
  1. restrict banks' safe asset holdings when capital (buffer) requirement high
     - avoid inefficiently high deposit supply and deposit rates
     - reduce banks' funding costs during normal times
  2. relative tightening of MP when capital (buffer) requirement reduced
     - reduce banks' funding costs during financial crises
- coordinate micro/macro/MP to stabilize lending and liquidity provision