Optimal Capital Regulation

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Bank regulation – ex-ante vs. ex-post

- financial crises have high social costs
  - almost always lead to policy interventions (Laeven-Valencia, 2013)
- ex-post interventions can reduce costs, e.g. recapitalization
  - Bebchuk-Goldstein (2011), Repullo (2012), Philippon-Schnabl (2013)
- but ex-ante measures also matter, e.g. capital buffers
  - Lorenzoni (2008), MartinezMiera-Suarez (2012)
- can trade off ex-ante and ex-post measures
  - Jeanne-Korinek (2013), this paper

Focus on bank long-term prospects

- literature relates bank access to funding to asset value during bank default
- reflects concern about liquidation value of bank
  - its assets worth less when bank defaults, e.g. loans not serviced
  - 2007–08 run on sale and repurchase market, Gorton-Metrick (2012)
- this paper assumes bank decision to default depends on its future prospects

  motivation:
  defaulting bank loses charter value, depends positively on future prospects

  care about liquidation value, but also about likelihood of liquidation
- use this focus to derive new implications for bank regulation

Preview of results

- laissez-faire competitive equilibrium:
  - banks engage in risk management through loan loss provisioning
  - lose access to market funding only occasionally, severe credit crunch
- constrained-efficient allocation:
  - additional capital buffers in normal times, builds resilience
  - boost bank future prospects during credit crunch

    lending drops much less but also recovers much more slowly

    smooth out scarcity of bank lending to economy over time
- implication for macro-prudential regulation: CCB, CCyB, resolution fund

Model

- infinite horizon, time periods $t = 0, 1, 2, \ldots$
- aggregate productivity shocks $z_t \in \{z_L, z_H\}$ i.i.d. with $Pr(z_t = z_L) = \rho$
- measure one of identical risk-neutral consumers:
  - supply labor inelastically, trade non-contingent bond at price $\beta < 1$
- measure one of identical short-lived firms:
  - borrow k_{t+1} in period t, hire labor l_{t+1} in period $t+1$
  - produce $z_{t+1} k_{t+1}^{\alpha} l_{t+1}^{1-\alpha} + (1-\delta) k_{t+1}$ in period $t+1$
  - contingent loan repayment $R_{t+1} k_{t+1}$, wage bill $w_{t+1} l_{t+1}$
  - firms eat any profits, exit, and new firms enter

- measure one of identical banks:
  - only banks can lend to firms, denote new lending in t by ℓ_{t+1}
  - bank equity costly, discount dividends d_t with $\gamma < \beta$
  - can extract $\theta\ell_{t+1}$ if bank chooses to default at end of period t

    e.g. risk-shifting or holding up creditors

    defaulting bank enjoys $\theta\ell_{t+1}$ but must exit afterwards
  - market discipline:
    bank has access to funding b_{t+1} as long as no-default condition holds

$$E_t \left[\sum_{\tau=1}^{\infty} \gamma^\tau d_{t+\tau} \right] \geq \theta\ell_{t+1}$$

Market-imposed equity requirements

- define bank equity: $A_t = R_t \ell_t - b_t$
- define bank future rents:

$$\Pi_t = \sum_{\tau=1}^{\infty} \gamma^\tau E_t \left[\left(R_{t+\tau} - \frac{1}{\gamma} \right) \ell_{t+\tau} \right] + \sum_{\tau=1}^{\infty} \gamma^\tau E_t \left[\frac{\beta - \gamma}{\gamma} b_{t+\tau} \right]$$

  - first term denotes profits from lending
  - second term denotes benefit from using external finance $b_{t+\tau}$

- re-write no-default condition: $\gamma E_t[A_{t+1}] \geq \theta \ell_{t+1} - \gamma E_t[\Pi_{t+1}]$
  - equity requirement is θ in normal times, when rents are zero
  - but lower during credit crunch, when banks earn positive rents

Competitive equilibrium and pecuniary externality

- markets for bank loans clears:

  aggregate bank lending is $K_t = k_t = \ell_t$

  bank lending return is $R_t = z_t \alpha K_t^{\alpha-1} + 1 - \delta$

- market for labor clears:

  aggregate labor is $L_t = l_t = 1$

  wage is $w_t = z_t(1-\alpha)K_t^{\alpha}$

- lending returns determine bank rents, affect equity requirement

- but banks take them as given. . . pecuniary externality!

Constrained-efficient allocation

- competitive equilibrium not constrained-efficient:

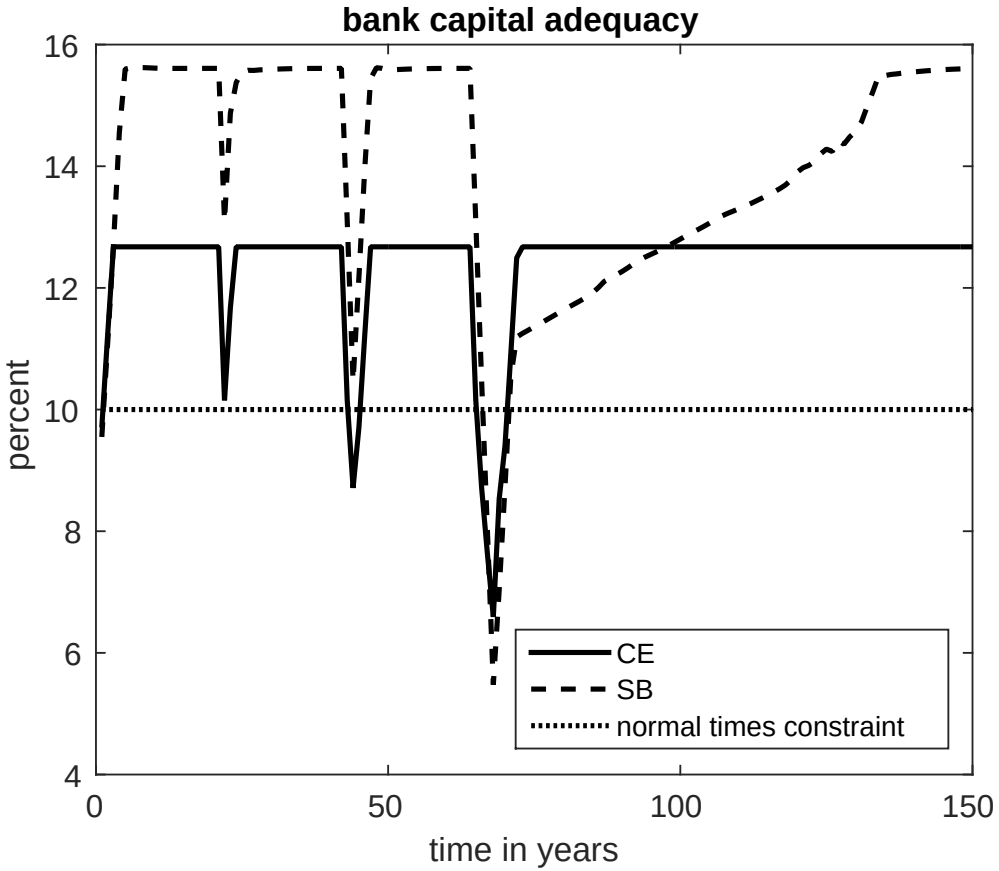
  can improve allocation by taking pecuniary externality into account

- maximize expected present value of dividends and wages
  - internalize how lending affects market-imposed equity requirement
  - also do not consider equity costly, discount dividends with β as well
- competitive equilibrium (CE) vs. constrained-efficient allocation (SB)
  - interpret differences as due to macro-prudential concerns

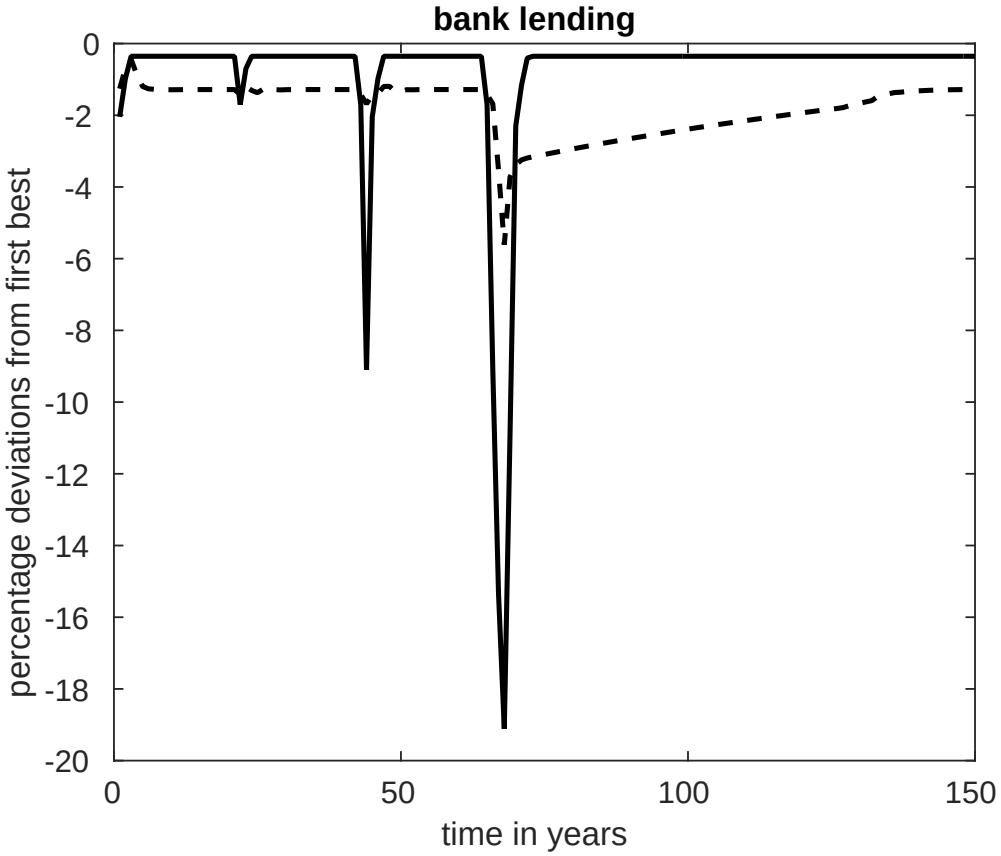
Numerical solution

parameter	value	target
β	0.94	risk-free interest rate
γ	0.93	crisis frequency
δ	0.12	average replacement investment
α	0.35	capital income share
θ	0.10	average bank leverage
(z_L, z_H, ρ)	(0.8,1.05,0.2)	several large crises

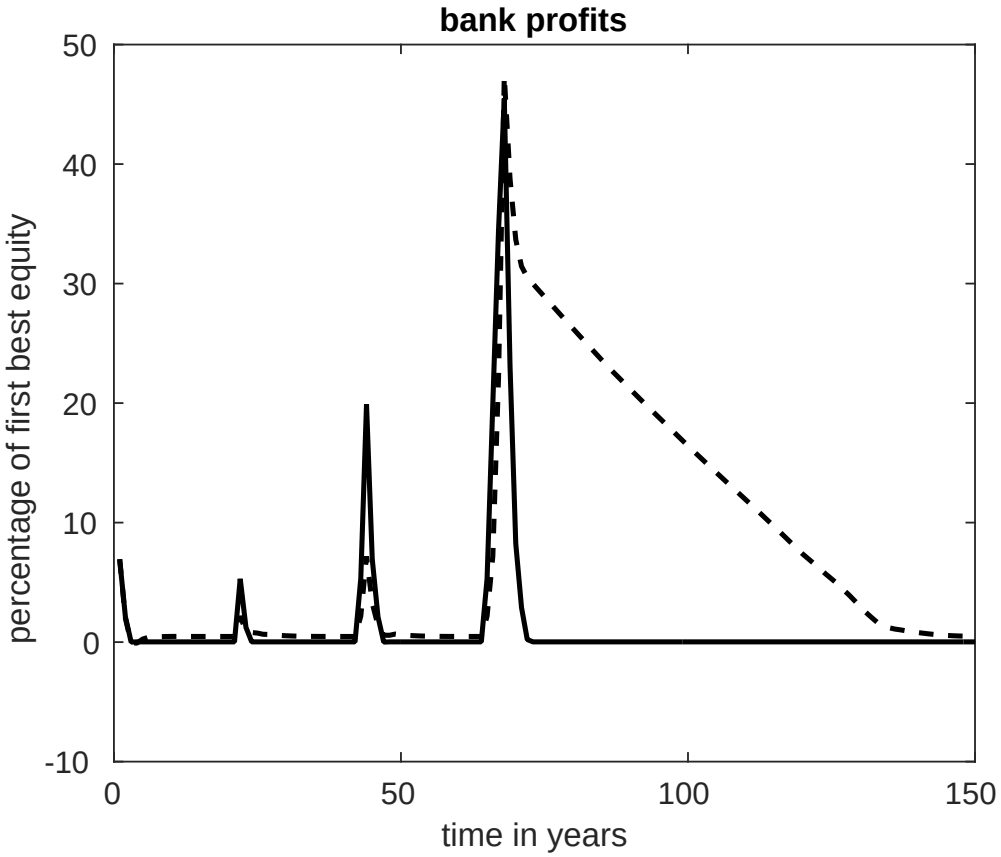
- define financial crisis: bank lending 5% or more below first best
- economy spends 6% of time in financial crisis in competitive equilibrium
- define normal times: bank equity constant as long as z_H occurs



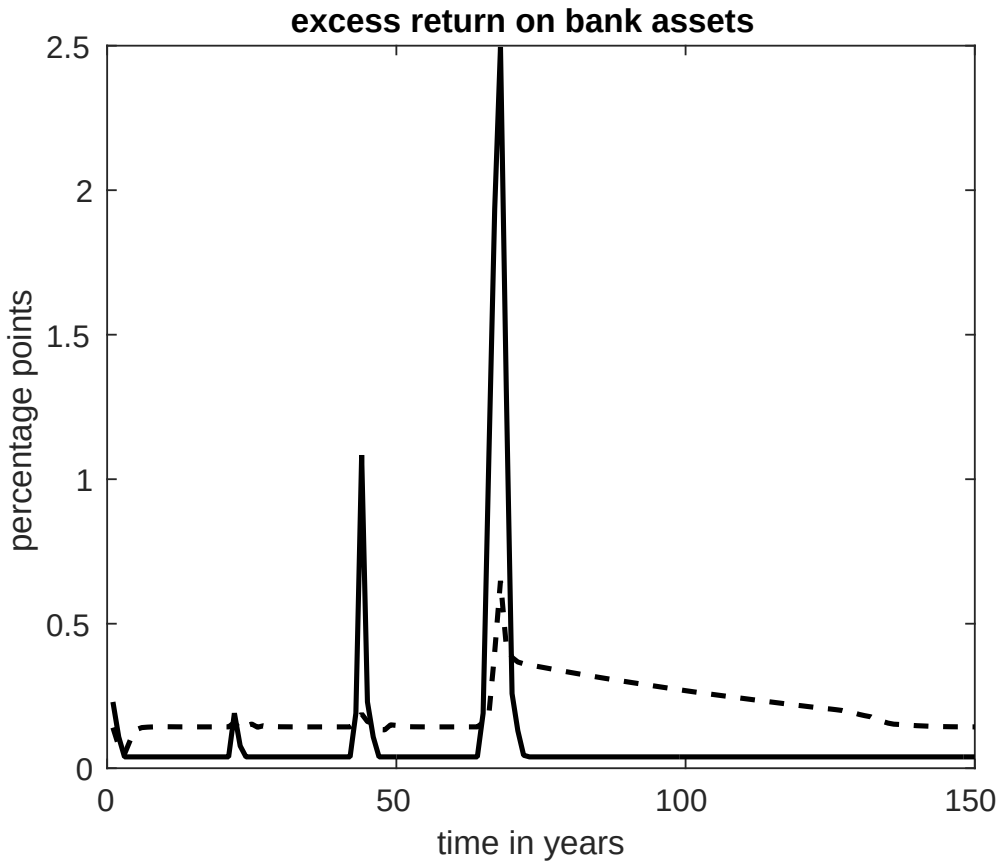
- 'capital adequacy ratio' measured by $\gamma E_t[A_{t+1}]/\ell_{t+1}$ in model
- additional buffer in SB, but more time to build it up



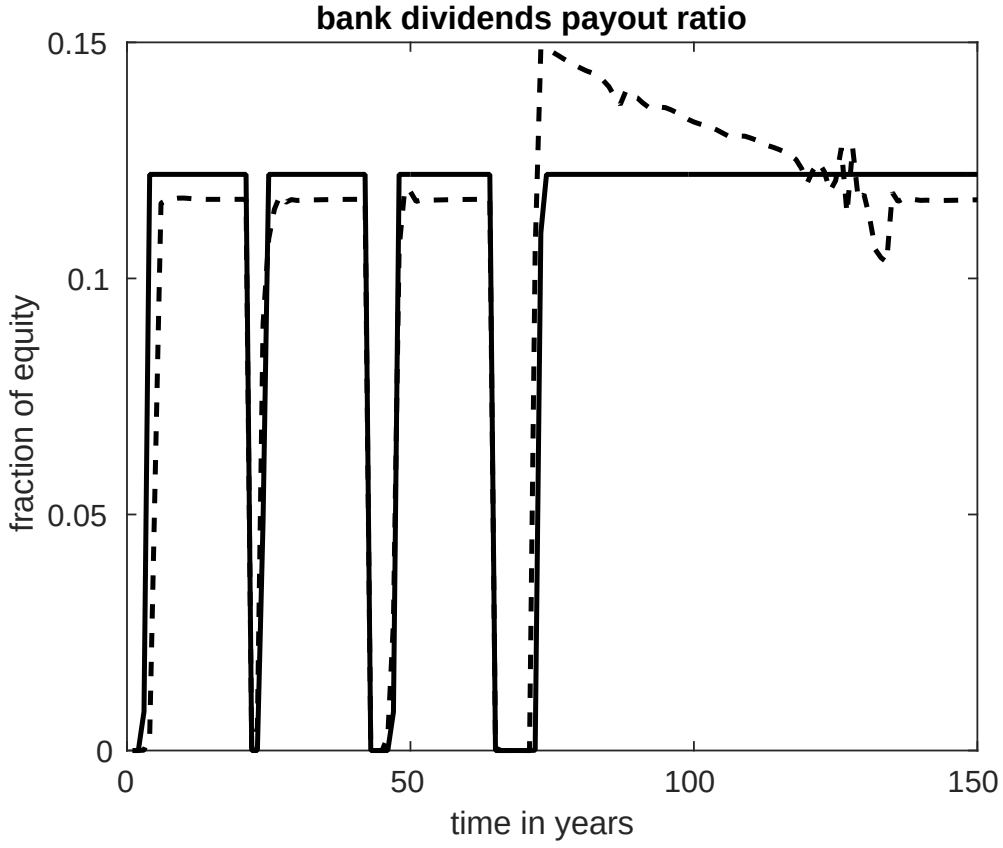
- additional buffers avoid some crises but not all, even in SB
- crisis in SB much less severe, but also slower recovery



- promising future profits relaxes equity requirement in SB
- possible implementation: equity injection financed by tax on bank lending



- deliver profits over many periods in SB, less distortionary than spike
- smooth out scarcity of bank lending over time, reason for slow recovery!



- in practice: Basel III has CCB, but why do we need CCyB as well?
- no dividend if CCB breached, but allow payouts while CCyB being rebuilt