If fail, fail less: Banks' decision on systematic vs idiosyncratic risk

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Introduction

- How does the bailout policy affect bank's choice between systematic and idiosyncratic risk?
- **'Too many to fail' guarantees** implicit in Regulator's bailout policy (Acharya & Yorulmazer 2007, 2008)
  - State-contingent bailout policy: bailouts more likely, the more systemic is the crisis
  - Bailout probability increases in the number of banks that fail together
  - Banks prefer to increase correlation of their investments ex ante
- If individual bailout probability depends on how severely the bank failed, will this reduce the herding pressure of the 'too many to fail' guarantees?
- Identifying a regulatory channel that provides incentives for banks to undertake less correlated risk

Introduction

- Novel feature:
  - Banks are heterogeneous in failure - different values in failure
  - Regulator's ex-post optimal bailout policy: save banks that failed less
- The mechanism
  - Bank's choice between systematic and idiosyncratic risk:
    - Invest in the common project or in the bank-specific project
  - Bank's trade-off:
    - Higher overall probability of bailout intervention vs higher individual bailout probability given intervention happening
  - Regulator's trade-off :
    - Higher costs of deposit insurance in bailouts vs social loss from bank liquidations

Main results

- When bailout probability depends on bank's value in failure: banks invest more in their uncorrelated, but higher value bank-specific projects
- When aggregate state of the economy is better and probability of bank failures lower: Banks undertake more correlated risks - procyclical bank herding
- 'Fail less' bailout policy always dominates the 'Too many to fail' bailout policy in terms of social welfare

Model setup

General

- Economy with three dates $t = 0, 1, 2$
- All players are risk-neutral:
  - *n banks*: each Bank borrows from a continuum of depositors of measure 1 and makes investment decision x
  - *Depositors*: promised return r - deposits are fully insured
  - *Regulator:* decides between bailing out or liquidating a failed bank
  - *Outside investors:* purchase the failing banks' assets offered by the Regulator

Timeline

t=0

- Depositors deposit their endowments in banks
- Banks make the investment decision x_i

t=1

- First-period project cash flows are realized
- Banks need to repay r to depositors
- Regulator decides on bailout vs liquidation of the failed banks

t=2

- Banks that did not fail or were bailed out capture second-period cash flows
- Outside investors get liquidation values from the banking assets they purchased

Model setup

Banks

- Each bank invests in one of the two-period projects:

1. Market project $\tilde{R}_m$ $(x_i = 0)$ - systematic, correlated risk
2. Bank-specific project $\tilde{R}_I$ $(x_i = 1)$ - idiosyncratic, uncorrelated risk

- Project $j = I, m$ cash flows
  - $t = 1$:
    - high cash flow $\bar{R}_j$ with probability α and $\bar{R}_j > r$
    - low cash flow $\underline{R}_j$ with probability $1 - \alpha$ and $\underline{R}_j < r$
  - $t = 2$:
    - if high cash flow at $t = 1$, then V
    - if low cash flow at $t = 1$, then $R_{2j} \mid \underline{R}_{1j} \sim U\left(\underline{R}_{1j} - \varepsilon, \underline{R}_{1j} + \varepsilon\right)$

Model setup

Banks

- Banks choose their investment by maximizing total expected value of project cash flows
- Banks are identical at date 0 and choose between the same investment options - symmetric game
- Bank failures happen only if low cash flow realized at $t = 1$
- Symmetric equilibrium: all banks choose the same optimal strategy as the representative Bank i

Model setup

The Regulator

- Bailing out vs selling a failed bank to the outside investors
- Regulator's objective function
  - Maximizing total expected output of the banking sector, net of any bailout/liquidation costs
- Regulator's trade-off
  - Lower costs of deposit insurance by selling failed banks to outsiders
  - Social loss from bank liquidations - outsiders cannot realize full continuation value of the bank

Model setup

Outside Investors

- Less efficient users of the banking assets:
  - For each bank bought, they pay price $p(k)$ and produce liquidation value $L(k)$, where k is the total number of liquidated failed banks
  - $L'(k) < 0$: The more banks sold to outsiders, the lower the liquidation value
- Participation constraint binding:
  - $p(k) = L(k)$

'Too many to fail' benchmark

- All projects have identical cash flows - banks homogeneous in failure
  - $\bar{R}_m = \bar{R}_i = \bar{R}$ and $\underline{R}_m = \underline{R}_i = \underline{R}$
- Regulator's optimal bailout policy defined by the maximum number of bank liquidations k^*
  - When total number of failures is $f > k^*$, k^* banks are liquidated, while $f - k^*$banks are bailed out randomly.
  - Else, all failed banks get liquidated and no bailouts happen.
- Banks invest to maximize the probability of failing together:
  - In equilibrium, always invest in the Market project - highest interbank correlation to maximize the probability of bailout

'Fail less'

Heterogeneity in failure

- Bank-specific projects have higher cash flows in the low state, than the Market project:
  - $\overline{R}_i = \overline{R}_m$ and $\underline{R}_i > \underline{R}_m$
- Heterogeneity in low cash flow realizations $\rightarrow$ heterogeneity in banks' continuation values in failure
- Bailout probability will depend on the total number of failures, but also on bank's value in failure

'Fail less'

Regulator's optimal bailout policy

- Regulator will always bailout the higher value banks first:
  - Social loss of bank liquidation: $\underline{R}_{1j} - L(k)$
  - Gains from liquidation: $p(k)$
- For each investment project $\tilde{R}_j$:
  - k_j^* maximum number of liquidated banks, such that the Regulator is indifferent between liquidating and bailing out $k_j^* - th$ bank
    - $\underline{R}_{1j} - L(k_j^*) = p(k_j^*)$
- Bank that failed with $\underline{R}_j$ has positive bailout probability only if at least k_j^* banks with the same or lower value than $\underline{R}_j$ failed together

'Fail less'

Bank's optimal investment decision

- Bank's tradeoff:
  - Higher probability of states in which bailouts happen - common project

  vs
  - Higher probability of being bailed out, conditional on bailouts happening - uncorrelated bank-specific projects
- Bank *i* invests in the bank-specific project when expected bailout subsidy, given failure is higher:

$$(1-\alpha)\,\underline{R}_I > \left(1-\frac{k_m^*}{n}\right)\underline{R}_m$$

- In equilibrium, there will be some α^*_{FL} , such that banks choose to invest in their bank-specific projects, if $\alpha < \alpha^*_{FL}$.

Welfare implications

- Banks invest in the common project:
  - Regulator always liquidates maximum number of banks - reduction in deposit insurance cost is perfectly offset by social losses from bank liquidations
- Banks invest in the bank-specific projects:
  - Lower cost of deposit insurance
  - Higher cash flows in low realizations
  - Gains from no-herding: banks sold at high enough prices so that gains from bank sales are not offset by liquidation losses
    - $\beta_{FL} = \sum_{f=0}^{k_i^*} fPr(f)\left(p(f) - \left(\underline{R}_i - L(f)\right)\right) > 0$
- 'Fail less' bailout policy implements the ex ante welfare maximizing investment outcome:
  - Banks invest in bank-specific projects

Heterogeneous banks

Ex ante heterogeneity

- Two types of banks:
  - Good banks: good idiosyncratic project $\widetilde{R}_G$
  - Bad banks: bad idiosyncratic project $\widetilde{R}_B$
- Project cash flows heterogeneous in low state:
  - $\underline{R}_G > \underline{R}_m > \underline{R}_B$ and $\bar{R}_m = \bar{R}_G = \bar{R}_B$

Heterogeneous banks

Regulator's optimal bailout policy

- The lower the value in failure, less costly it is to liquidate the bank: $k_B^* > k_m^* > k_G^*$
- Bank that invested in $\widetilde{R}_j$ has positive bailout probability only when at least k_j^* banks that invested in the same or worse project fail together.

Banks' optimal investment decision

- Bad banks dominant strategy: invest in the Market project
- Good banks: invest in their bank-specific project $\widetilde{R}_G$, whenever $\alpha < \alpha_{HFL}^*$ holds

Heterogeneous banks - Welfare implications

- 'Fail less' dominates 'Too many to fail' bailout policy:
  - Total welfare is always improved when Good banks invest in their idiosyncratic projects
- Bad banks welfare trade-off:
  - Higher values in failure and lower costs of deposit insurance - Market project

  vs
  - Gains from no herding - Bad idiosyncratic project
- There will be some threshold $\underline{R}_B^*$ such that:
  - If $\underline{R}_B \leq \underline{R}_B^*$, 'fail less' bailout policy implements the welfare-maximizing outcome
  - If $\underline{R}_B > \underline{R}_B^*$, total welfare is maximized when all banks invest in their bank-specific projects

Conclusion

- Investigate the effects of a regulatory channel on the banks' choice between systematic and idiosyncratic risk
- Novel feature:
  - Banks heterogeneous in failure
  - Regulator's ex post optimal 'fail less' bailout policy
- Bailout probability increases in bank's value in failure
  - If idiosyncratic projects have higher values than the Market project - reduced herding incentives
- Heterogeneous bank-specific projects:
  - Herding of Bad banks not always a bad thing
  - 'Fail less' bailout policy reduces the amount of correlated risk and frequency of systemic banking crises