Supervisory Incentives in a Banking Union

Elena Carletti
Bocconi University

Giovanni Dell’Ariccia
IMF and CEPR

Robert Marquez
University of California, Davis

Sintra, July 2017

The views expressed here are those of the authors and do not necessarily represent those of the IMF or the IMF Board
Centralized versus local supervision

- Home country supervision
  - Nation-bound supervisors do not internalize cross-border effects
  - Perception of excessive risk taking by financial institutions and laxity in countries’ regulatory policies

- Hub and spoke system
  - Internalizes spillovers
  - Less “captive”, can impose tighter standards
  - May have to rely on local supervisors to collect actionable information
Explore consequences of centralization for supervisory incentives and bank behavior

- Centralization leads to tighter standards
- But causes agency problem between central and local supervisors
- Central supervisor sets standards / local collects information
- Effect on bank risk taking?

Use classical approach to bank supervision

- Banks subject to limited liability choose their portfolios
- Supervisors influence banks’ risk taking through capital requirements, portfolio restrictions, and intervention
- Some banks comply with supervisory requirements; others don’t comply and hope not to get caught
Model: Banks

- Banks have capital $k$, and raise $1-k$ in deposits
  - Limited liability for banks; deposits are insured
  - Opportunity cost for deposits and capital is the same and equal to 1

- Banks choose portfolio $q$ on the efficient frontier:

  $q \rightarrow R-(1/2)cq$

  $\$1 \rightarrow 1-q \rightarrow 0$

  In other words, a higher payoff can be earned at greater risk

- If bank fails, there is a social cost of $\psi_L \geq 1$ per unit of deposits
Bank’s moral hazard problem

- Bank chooses portfolio $q$ to maximize its profits

\[
\max_q q \left( R - \frac{1}{2}cq - (1 - k) \right) - k
\]

- Profit-maximizing portfolio $\hat{q}(k)$ is increasing in $k$: Leverage + Limited liability = Excessive risk taking:

\[
\hat{q}(k) = \frac{R - (1 - k)}{c}
\]

- Maximize total surplus

\[
\max_q q \left( R - \frac{1}{2}cq - (1 - k) \right) - (1 - q)(1 - k)\psi_L - k
\]

Implies: $q_L^*(k) = \frac{R + (1 - k)(\psi_L - 1)}{c} > \hat{q}(k)$
Model: Supervisors

- A (local) supervisor can invest costly resources to collect information about banks’ balance sheets
  - With probability $e$, observes the balance sheet of the bank; otherwise, observes nothing
  - Quadratic cost of supervisory “effort”

- Conditional on obtaining information, the supervisor can intervene the bank:
  - This entails a cost $A_L > 0$
  - Fully expropriate shareholders (maximal punishments)
  - Implement a portfolio $q_L^*$ to maximize total surplus

- Since intervention is costly, supervisor takes over a bank only when the bank deviates “enough” from regulatory standards
  - Social cost of failure decreasing in bank capital. Then, regulatory $q$ is decreasing in capital
  - Bank faces a risk-based capital requirement
Bank’s choice of portfolio quality increases in its capital
Supervisor demands a minimum portfolio quality $\tilde{q}_L$ decreasing in $k$
Banks’ reaction to supervision

- Banks recognize that, if discovered, they will be intervened
  - Lose franchise value

- For a given expected supervisory effort (a given probability of \( q \) being revealed to the supervisor), a bank weighs:
  - Choosing its preferred portfolio but risk intervention
  - Choosing a portfolio it likes less but avoid intervention
Bank reaction to regulation

Banks with less capital find it too costly to adopt regulatory standard
Bank reaction to regulation

\[ R - 1 \]
\[ \frac{c}{\tilde{q}_L} \]
\[ \tilde{q}(k) \]

Banks with a more capital bear little cost of adopting regulatory standard
Bank reaction to regulation

Banks with capital below \( \bar{k}_L \) stick with their preferred portfolio; those with capital between \( \bar{k}_L \) and \( \bar{k}_L \) choose regulatory standard (they *comply*).
Equilibrium with local supervision

Now we need to determine
- Optimal supervisory information effort \( e^* \)
- Aggregate banks’ response

Benefits from supervisory effort:
- Greater when a larger mass of banks are expected not to comply
- Formally, \( e \) is increasing in \( \bar{k}_L \)

Capital of marginal bank that complies with regulatory standards:
- Decreasing in expected supervisory effort
- Formally, \( e \) decreasing in \( \bar{k}_L \)
Equilibrium with local supervision: supervisor effort and bank behavior

The supervisor’s reaction function for effort is increasing in the threshold level of capital $\bar{k}_L$. 

$e_L(\bar{k}_L)$
Equilibrium with local supervision: supervisor effort and bank behavior

The **banks’ reaction function** is characterized by the threshold level of capital, $\bar{k}_L(e)$, above which banks comply. It is decreasing in the supervisor’s effort $e$. 
Equilibrium with local supervision: supervisor effort and bank behavior

The intersection of the two reaction functions – for the banks and for the supervisor – defines the equilibrium.
Introducing a central supervisor

- A central supervisor decides when to intervene and which portfolio to implement upon intervention.

- Local supervisor retains control over information collection (e).

- Conflict: A central supervisor may be **tougher** either because:
  1. He is less captured by local banks: $A_C < A_L$
  2. He internalizes more of the losses associated with bank failure: $\psi_C > \psi_L$
Central supervisor’s intervention decisions

- In either case ($A_C < A_L$ or $\psi_C > \psi_L$) central supervisor is **tougher** in his **intervention policy**: $\tilde{q}_L(k) < \tilde{q}_C(k)$
  - Higher intervention threshold
  - So that now banks with $k < \tilde{k}_C$ are intervened, where $\tilde{k}_L < \tilde{k}_C$

- If $\psi_C > \psi_L$, central supervisor imposes also a **higher portfolio quality** when he intervenes: $q_C^* > q_L^*$

- Two sources of conflict between central/local supervisors:
  - Intervention thresholds – which banks to intervene
  - Implemented quality – what to impose on intervened banks
Reaction functions with $A_C < A_L$

- **Result:** Effort by local supervisor will be *weakly* lower than under independence
  - Central supervisor mandates to intervene banks, which the local supervisor would prefer **not** to intervene

- **Result:** For given supervisory effort, fewer banks will comply with supervisory standards
  - Tougher standards make it more costly for banks to comply
Centralization and the local supervisor’s effort decision with $A_C < A_L$

Supervisory effort becomes decreasing in the banks’ threshold level of capital beyond $\tilde{k}_L$
Centralization and the local supervisor’s effort decision with $A_C < A_L$
Centralization and the local supervisor’s effort decision with $A_C < A_L$

Banks’ reaction function shifts up; leads to an increase in supervisory effort in equilibrium
Centralization and the local supervisor’s effort decision with $A_C < A_L$

Q: Can supervisory effort decrease?
Centralization and the local supervisor’s effort decision with $A_C < A_L$

Q: Can supervisory effort decrease?
A: Yes, if agency problem between supervisors is large enough (if $A_L - A_C$ is large enough)
Centralization and the local supervisor’s effort decision with $A_C < A_L$

**Result:** If $A_L - A_C$ is large enough, there are equilibria with lower regulatory effort under centralization.

These equilibria can entail more overall risk in the banking sector.
Case 2: Greater internalization of costs:

\[ \psi_C > \psi_L \]

- Central supervisor will now want to implement a safer portfolio conditional on intervention: \( q_C^* > q_L^* \)
  
  - This has a much larger effect on local supervisor since he is unhappy no matter what happens!
  - Even for banks she would have liked to intervene, central supervisor imposes a different portfolio choice
Centralization and the local supervisor’s effort decision with $\psi_C > \psi_L$

Local supervisor’s reaction function for effort shifts down (i.e., $e_C(k)$ is lower) when central supervisor has a lower cost of funds.
Centralization and the local supervisor’s effort decision with $\psi_C > \psi_L$
Centralization and the local supervisor’s effort decision with $\psi_C > \psi_L$
Centralization and the local supervisor’s effort decision with $\psi_C > \psi_L$
Centralization and the local supervisor’s effort decision with $\psi_C > \psi_L$

Supervisory effort may increase or decrease in equilibrium – Aggregate portfolio risk may be higher even though regulatory standards have increased
Conclusions

- When supervision is centralized
  - Standards increase, but ...
  - ... Reliance on local supervisor who faces a larger agency conflict may lead to less information acquisition, which ...
  - ... may lead to greater risk-taking by banks
  - As a result, aggregate portfolio risk may go up or down

- Our analysis highlights hurdles that centralization may face to the extent that local agencies still play an important role in information acquisition and implementation of regulation
Conclusions

- SSM and Fed/States models

- Several mechanisms to address agency problems
  - Multi-country teams
  - Direct information collection
  - Power to switch to direct supervision
  - Alternating on-site inspections