Lender of Last Resort Policy: What Reforms are Necessary?

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Motivation: Northern Rock Crisis

- September 2007: first bank run on a British bank in approximately 130 years.
- Concerns about the efficiency of banking regulation in the UK
  [UK House of Commons’ (2008) report]:
  - Failure of the Financial Services Authority (the financial supervisor) to prevent the problems.
  - Imperfections on the Financial Services Compensation Scheme (the deposit insurer).
  - Inefficiencies on the current arrangements to manage banking crisis (the Tripartite Standing Committee).
Purpose of the Paper

- Derive the optimal lender of last resort policy to deal with liquidity problems in individual banks.
- Derive policy implications and suggest reforms to improve banking regulation and supervision in the UK.
Incomplete contracts: Dewatripont and Tirole (1994).


Differences with Repullo’s model:

- Active role for bankers in determining the magnitude of their banks’ liquidity problems.
- Enlarged set of policy instruments.

Bank Supervisor:

- Supervisor’s opinion on liquidity provision.
- Supervisory corrective actions (e.g., banker demotion).
Basic Model Setup

- Depositors, a banker (who runs a bank) and bank regulators (central bank, supervisor, deposit insurer).
- Four dates: 0, 1/2, 1 and 2.
- Risk neutrality and no time discounting.
- Illiquid, risky and ex ante efficient technology:
  - 1 at date 0 $\Rightarrow \tilde{R} \in \{0 \text{ ‘failure’}; \; R > 1 \text{ ‘success’}\}$ at date 2
  - Liquidation value $L \in (0, 1)$ at date 1.
- Social cost of bank failures: $c > 0$.
- No access to the interbank market at date 1.
- Shocks:
  - Liquidity: $v \in [0, 1]; \; \tilde{v} \sim G \in \mathcal{G} \equiv \{G_b, G_m\}; \; G_m \text{ FOSD } G_b$.
  - Solvency: $u \in [0, 1]; \; \tilde{u} \sim F \text{ (probability of success, } \tilde{R} = R)$. 
Date 0.
– The lender of last resort policy is designed.
– The banker collects 1 unit of deposits and invests them in illiquid, risky loans.

Date 1/2.
– The banker and bank regulators observe the solvency signal, \( u \), (non-verifiable).
– The banker decides whether to manipulate the liquidity shortfall (i.e., \( G = G_m \)) or not to manipulate it (i.e., \( G = G_b \)).

Date 1.
– The liquidity shortfall, \( v \), is publicly observable and verifiable.
– The lender of last resort policy is applied.

Date 2.
– Conditionally on continuation, bank’s assets payoff.
Date 1: Lending Decisions

- Benchmark (first-best):

\[ W \equiv E \left\{ 1_{\{LLR\}} \left[ uR - (1-u)c \right] + \left( 1 - 1_{\{LLR\}} \right) (L-c) \right\} \]

\[ u \geq \frac{L}{R + c} \equiv u^* \]
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\[ U = I - \mathbf{1}_{\text{failure}} C \]

Net Income  \hspace{2cm}  Political Cost
Date 1: Lending Decisions

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- **Objectives of bank regulators:**
  \[ U = I - 1_{\{\text{failure}\}}C \]
  - Central bank’s lending decision:
    \[ u \geq \frac{v}{v + c} \equiv u_{CB}(v) \]
  - Deposit insurer’s lending decision:
    \[ u \geq \frac{L}{1 + c} \equiv u_{DI} \]
  - Supervisor’s lending decision (unconditional bailout rule):
    \[ u \geq 0 \equiv u_{UBR} \]
Date 1: Normalized Expected Social Welfare

\[ W = E \left[ 1_{\{LLR\}} (u - u^*) \right] (R + c) + (L - c) \]

\[ w \equiv E \left[ 1_{\{LLR\}} (u - u^*) \right] \]

\[ w_{CB}(v) = \int_{u_{CB}(v)}^{1} (u - u^*) \, dF(u), \]

\[ w_{DI} = \int_{u_{DI}}^{1} (u - u^*) \, dF(u), \]

\[ w_{UBR} = \int_{0}^{1} (u - u^*) \, dF(u). \]

If \( E(\tilde{u} \mid u \leq u_{DI}) > u^* \), then
Proposition 1

- If the liquidity shortfall is smaller than a threshold $v^* \in (v_A, v_B)$, it is optimal to allocate the lender of last resort responsibilities to the central bank.
- If the liquidity shortfall is bigger than $v^*$, it is optimal to apply the unconditional bailout rule.
Proposition 2

If the banker observes a small enough solvency signal, she will manipulate her bank’s liquidity shortfall to increase the probability of being unconditionally bailed out.
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Sketch of the Proof:
Banker’s problem: $\max_{G \in \{G_b, G_m\}} u (R - 1) \left\{1 - \left[G (v^*) - G(v_{CB}(u))\right]\right\}$,

$\max_{G \in \{G_b, G_m\}} G(v_{CB}(u)) - G(v^*)$
Proposition 3

The optimal lender of last resort policy is characterized as follows:

- the central bank should act as lender of last resort for small liquidity shortfalls (i.e., $v \leq v^*$),
- the unconditional bailout rule should be applied for larger than $v^*$ shortfalls (i.e., the optimal allocation characterized in Proposition 1), and
- the banker should be penalized (e.g., demoted) each time the unconditional bailout rule is applied.
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Sketch of the Proof:

Banker’s problem: \( \max_{G \in \{G_b, G_m\}} G(v_{CB}(u)) + (1 - d)(1 - G(v^*)) \).

Thus \( d \geq d \equiv 1 - \frac{G_b(v_{CB}(u)) - G_m(v_{CB}(u))}{G_b(v^*) - G_m(v^*)} \).
Proposition 4

The optimal lender of last resort policy (characterized in Proposition 3) can be implemented by the following organization of the regulatory system:

- the central bank acts as lender of last resort (i.e., it decides whether to support illiquid banks and funds the operation);
- the deposit insurer guarantees those central bank’s last resort loans bigger than the threshold $\nu^*$; and,
- the provision of such loans triggers corrective actions on the bank to be applied by the supervisory authorities.

Sketch of the Proof:

$d$ resembles the mandatory provisions in PCA.

The deposit insurer’s guarantee reduces taxpayers’ exposure and provides incentives to improve the deposit insurance scheme.
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Sketch of the Proof:

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Policy Implications and Reform 1

- Bank of England should:
  - act as lender of last resort.

Reform 1:
- To transfer the lending of last resort responsibilities from the Tripartite Standing Committee to the Bank of England.
- Bank of England should ensure its access to the information it needs to meet its responsibilities.

[Extension: under some conditions FSA does not have incentives to truthfully reveal (to share) supervisory information.]
Financial Services Authority should:

- supervise banks,
- run a “sound” deposit insurance scheme,
- guarantee the Bank of England’s large last resort loans, and
- apply corrective actions to those banks that receive guaranteed last resort loans.

Reform 2:

- To transfer the deposit insurance responsibilities from the Financial Services Compensation Scheme to the Financial Services Authority.
- To set the basis to guarantee Bank of England’s large loans and to apply corrective actions.
Corrective Actions \implies \text{probability of success: } (1 - \delta) u, \delta \in [0,1].
Extension 2: Bank Capital

- Equity capital: $k$
  Deposits: $1 - k$

- The deposit insurer is tougher than before (its liability is now $1 - k$ instead of 1):

$$u \geq u_{DI}^k = \frac{L}{1 + \beta c - k} \geq \frac{L}{1 + \beta c} = u_{DI}$$
Deposit Insurance Premium: $p$

Loans: $1 - p$

The deposit insurer is softer than before:

$$u \geq \frac{(1 - p) L}{1 + (1 - p) \beta c} \equiv u_{DI}^p$$

But, $p$ has to be too large for the allocation of the lender of last resort responsibilities to the deposit insurer to be optimal:

$$\left| \frac{\partial u_{DI}^p}{\partial p} \right| = \frac{L}{[1 + (1 - p) \beta c]^2} < 1$$
Proposition 6

Assume the central bank is the lender of last resort, it is a junior creditor, and only the deposit insurer gathers information about the bank’s solvency signal $u$ (i.e., it is also the bank supervisor). Then, there exist values of $u$ such that the deposit insurer will not truthfully reveal such information to the central bank, except possibly in the implausible case in which the lending decisions of both agencies coincide under perfect information.
Demostración.

\[ z(1-u)(v-1-\beta c) + (1-z)(L-1-\beta c) = \]
\[ L - 1 - \beta c + z[v - L + u(1 + \beta c - v)] \]

Let \( u_0(v) \equiv \frac{L - v}{1 - v + \beta c} \).

The deposit insurer’s strategy is a function \( m(u) : [0, 1] \rightarrow [0, 1] \).

The central bank’s strategy is then a function \( z(m) : [0, 1] \rightarrow [0, 1] \).

A necessary condition for any Nash equilibrium to be a truthful revelation \([m(u) = u]\) equilibrium is that:

\[
\begin{align*}
    u < u_0(v) &\iff u \in \{m : z(m) = 0\} \\
    u \geq u_0(v) &\iff u \in \{m : z(m) = 1\}
\end{align*}
\]

which is satisfied for all \( u \in [0, 1] \) only if:

\[
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    u < u_0(v) &\iff u \in \{u : z(u) = 0\} \\
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