Discussion of “Illiquidity and Interest Rate Policy” by Diamond and Rajan

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Model

Period 0:

- Bank has 1 unit of capital
- Financed with short term debt $D$ due in 1
Roll over

Period 1:

- Finance \( D \) with:
  - short-term loans at interest rate \( r \), i.e. rollover: \( L \)
  - partial liquidation of \( \lambda \in [0, 1] \) units of capital, yields \( \lambda X \)

\[
\lambda X + L \leq D
\]
Final payoff

Period 2:

Bank’s payoff

\[ F(1 - \lambda) - rL \]

\( F \) concave function

substitute:

\[ F(1 - \lambda) + r\lambda X - rD \]
Optimal liquidation

If

$$\max_{\lambda \in [0,1]} \{ F(1 - \lambda) + r\lambda X \} \geq rD$$

optimal liquidation

no liquidation : $\lambda = 0$ if $r < F'(1)/X$

partial liquidation : $F'(1 - \lambda) = rX$ if $r \in \left[F'(1)/X, F'(0)/X\right]$

complete liquidation : $\lambda = 1$ if $r > F'(0)/X$
Optimal liquidation

If

\[ \max_{\lambda \in [0,1]} \{ F(1 - \lambda) + r\lambda X \} \geq rD \]

optimal liquidation

no liquidation : \( \lambda = 0 \) if \( r < F'(1)/X \)

partial liquidation : \( F'(1 - \lambda) = rX \) if \( r \in [F'(1)/X, F'(0)/X] \)

complete liquidation : \( \lambda = 1 \) if \( r > F'(0)/X \)
Bankruptcy

If

$$\max_{\lambda \in [0,1]} \{ F(1 - \lambda) + r \lambda X \} < rD$$

bank fails to repay and shuts down

**Inefficient bankruptcy** if \( r < F'(0)/X \) lenders get

$$X < \frac{1}{r} \max_{\lambda \in [0,1]} \{ F(1 - \lambda) + r \lambda X \}$$
Demand for funds

- Bankruptcy
- Partial liquidation
- No liquidation

Graph with axes labeled $r$ and $D$, $L$.
Supply of funds

Supply of funds on the short-term loans market in 1 Consumers

$$\max_L u (e_1 - L + D) + u (e_2 + rL)$$
Equilibrium
Equilibrium

Exuberance: high r
Ricardian equivalence

Government taxes consumers and lends proceedings in loans market

$$\max_L u(e_1 - L + D - \tau) + u(e_2 + rL + r\tau)$$

The net supply of funds

$$L^S(r, \tau) + \tau = L^S(r, 0)$$

is independent of $\tau$

No effect on prices and allocation
Breaking Ricardian equivalence

Introduce a borrowing constraint

\[ L \geq 0 \]

(interpretation: withdrawals \( D - L \) bounded above by \( D \))

Now if initial equilibrium at \( r^* \) a positive tax reduces interest rates if

\[ \tau > L^S (r^*, 0) \]

as this tax makes the constraint binding
Optimal choice of $D$

- $D$ not state contingent
- Higher $D$ increases probability of inefficient bankruptcy
- But increases payment to consumers in non-bankruptcy states
- Equilibrium $D$ maximizes expected payment to consumers
Moral hazard

- Government intervenes ex post to save banks in 'exuberant' state
- $D$ adjusts up endogenously, more fragility
- possible to make everyone worse off
- moral hazard can go through pure market interventions
Monetary policy

- monetary policy: no effect of lower rates on activity \((e_1)\)

- ok because here exuberance driven high rates can happen without recession

- benefits and dangers of interest rate interventions not driven by cyclical conditions (asset price stabilization)

- novel and important emphasis on ex ante effects (moral hazard and reverse moral hazard)