Capital Requirement, Bank Competition and Financial Stability

Xingpeng Wei

Southwestern University of Finance and Economics

ABSTRACT

This paper examines the tradeoff between bank competition and financial stability resulting from the capital requirement. Built on the framework of Diamond-Dybvig, the model shows that a higher capital requirement tightens banks' capacities for taking deposits, thus reducing the intensity of competition between banks and at the same time help stabilize the financial system either by eliminating runs, or if runs are not eliminated, by compensating depositors more when a run happens. The effect of capital requirement on welfare depends on banks' capital endowments.

ENVIRONMENT

t=0, 1, 2

Agents: measure 2 of depositors, two banks

Endowments:

Depositors each has one unit of consumption good at t=0, together they own measure 2 of consumption goods after normalization.

Banks each has measure K of goods at t=0.

Preferences:

Depositors are identical at t=0 (ex ante) and face an uncertainty at t=1; u(C_1) with probability α (impatient), u(C_2) with probability 1-α (patient).

Banks consume at t=2.

Technology:

Storage and Investment. Only banks have investment technology.

Capital requirement θ:

the amount of capital a bank needs to have to support 1 unit of deposit. Each bank's capacity of taking deposits thus is: D≡K/θ

Bank Contract:

a simple demand deposit contract $(c_1,\ c_2)$, truth telling constraint $c_1 \le c_2$, participation constraint $w = \alpha u(c_1) + (1-\alpha)u(c_2) \ge w^{aut}$. A contract provides expected utility in $w \in [w^{aut}, w^*]$.

TIMING

t=0: Banks announce contracts. Depositors make deposit decisions as to whether to deposit at a bank and to which bank to deposit. A depositor can only deposit at one bank.

t=1: Depositors learn their types and make withdrawal decisions.

t=2: Those depositors who did not withdraw at t=1 withdraw and consume. Banks realize profits.

Banks and depositors do not expect run.

EQUILIBRIUM

$D \ge 2$: perfect competition

$w = w^*, \pi = 0.$

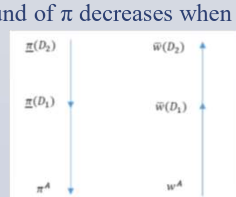
$D \in [1, 2)$: imperfect competition

$w \in [w^{aut}, \overline{w}(D)]$,
$\pi \in [\underline{\pi}(D),\ \ \pi^{aut}]$.

Lower bound of w is always w^{aut}. Upper bound of w increases when D increases.

Correspondingly, upper bound of π is always π^{aut}.

Lower bound of π decreases when D increases.



$D < 1$: local monopolies

$w = w^{aut}, \pi = \pi^{aut}$.

WELFARE

Normal and Crisis Times

If $1+\theta \ge c_1$: run-proof.

$W_N = \alpha u(c_1) + (1-\alpha)u(c_2)$.

If $1+\theta < c_1$: run-admitting.

$W_N = \alpha u(c_1) + (1-\alpha)u(c_2)$.

$W_R = \left(\frac{1+\theta}{c_1}\right)u(c_1)$.

Depositors' Welfare

When $\frac{K}{2} \ge C_1^* - 1$, optimal θ exists that achieves w^* as a unique equilibrium.

If $\theta < C_1^* - 1$, run is not eliminated.

If $\theta \in [C_1^* - 1,\ \frac{K}{2}]$, w^* achieved as a unique equilibrium.

If $\theta > \frac{K}{2}$, increasing θ decreases welfare.

When $\frac{K}{2} < C_1^* - 1$, no θ can achieve w^* as a unique equilibrium.

If $\theta < \frac{K}{2}$, w^* is achieved in normal time, run is not eliminated.

If $\theta \in [\frac{K}{2}, C_1^* - 1]$, increasing θ increases run time welfare at the cost of normal time welfare.

If $\theta > C_1^* - 1$, run eliminated, increasing θ decreases welfare.

Banks' Aggregate Profit

Banks' aggregate profit in normal and crisis times

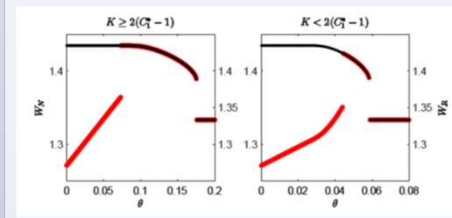
$$\Pi_N = \begin{cases} 0 & if\ D \ge 2 \\ 2\underline{\pi}(D) & if\ 1 \le D < 2 \\ 2\pi^{aut}D & if D < 1 \end{cases}$$

$$\Pi_R = \begin{cases} \Pi_N & if\ 1+\theta \ge c_1 \\ -2\theta d & if\ 1+\theta < c_1 \end{cases}$$

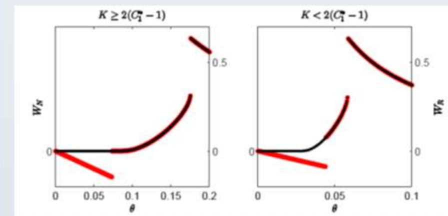
$d = \min(1, D)$.

Assume when $D < 1$, banks take deposits up to D.

VISUALIZATION



How Depositor's Welfare Change with Capital Requirement under Different Capital Endowments of Banks



How Banks' Profit Changes with Capital Requirement under Different Capital Endowments

CONCLUSIONS

1. As capital requirement increases, depositors get less favorable contracts in normal times. On the other hand, with higher capital requirement the set of contracts that admits bank runs shrinks and better insurance can be provided to depositors when a run happens.
2. There is a level of capital above which the best incentive feasible allocation for depositors can be strongly implemented if the capital requirement is properly set.
3. If capital requirement is such that run is not eliminated, depositors' run-time welfare increases at the cost of increasing banks' loss in run time as capital requirement increases.
4. If the capital requirement is such that run is eliminated, banks will not suffer loss and increasing capital requirement increases banks' profit at the cost of reducing depositors' welfare until capital requirement is too high and it only reduces banks' profit without improving depositors' welfare.

CONTACT

Xingpeng Wei, weixp@swufe.edu.cn