Could Making Banks Hold Only Liquid Assets Induce Bank Runs?

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Introduction

- Glass-Steagall Act requires a division between commercial and investment banks.
- Is this restriction stabilizing or de-stabilizing?
- The finding of the paper is that the restrictions imposed by Glass-Steagall Act can create the incentive for liquidity-based runs.
The Model

- Three periods \( t = 0, 1, 2 \)
- A continuum of consumers
- A fraction \( \alpha \) of the consumers is impatient
- Utility functions:

\[
U_I(C^1_I, C^2_I) = \begin{cases} 
\bar{u} + u(C^1_I + C^2_I - 1) & C^1_I \geq 1 \\
\beta \bar{u} + u(C^1_I + C^2_I - 1) & C^1_I < 1 
\end{cases}
\]

\[
U_P(C^1_P, C^2_P) = \bar{u} + u(C^1_P + C^2_P - 1)
\]

where \( \beta < 1 \), and \( u' > 0, u'' < 0 \).

- \( \alpha \) is stochastic with density function \( f \) and support \([0, \bar{\alpha}]\), where \( \bar{\alpha} < 1 \).
There are two constant-returns-to-scale technologies:

▶ Illiquid, higher yield technology $i$ takes in 1 unit of investment and yields $R_i$ if held until period 2.

▶ Liquid, lower-yield technology $\ell$ takes in 1 unit of investment and yields $R_\ell$ if held until period 2, or 1 if harvested in period 1.

▶ $R_i > R_\ell > 1$
Time Line

- In period 0, the bank designs the contract.
- The bank maximizes the ex ante expected utility of consumers.
- In period 1, each consumer learns her type and decides whether to arrive at the bank in period 1 or 2.
- Consumers who decided to arrive at period 1 follows a sequential service constraint.
- Consumers have the opportunity to refuse to withdraw and return without prejudice in period 2.
- The bank can only keep track of the number of consumers it has already served but not the number of consumers who have refused to withdraw.
- In period 2, the bank chooses how to divide its remaining resources between those who have withdrawn in period 1 and those who have not.
Bank Contract

A bank contract contains:

- Fraction of consumer’s endowment invested in technology $\ell$, denoted by $\gamma$.
- Consumer’s period 1 withdrawal as a function of arrival position, denoted by $c^1(z)$.
- Consumer’s period 2 withdrawal from technology $\ell$ as a function of $\alpha_1$ and whether the consumer made a withdrawal in period 1, denoted respectively by $c^2_f(\alpha_1)$ and $c^2_P(\alpha_1)$.

The space of deposit contracts or mechanisms $M$ is given by

$$M = \{\gamma, c^1(z), c^2_f(\alpha_1), c^2_P(\alpha_1) | \text{Eq. (2) holds for all } \alpha_1 \}$$

$$\alpha_1 c^2_f(\alpha_1) + (1 - \alpha_1) c^2_P(\alpha_1) = \left[ \gamma y - \int_0^{\alpha_1} c^1(z) \, dz \right] R_\ell \quad (2)$$
Bank behavior was analyzed in each of the two financial systems:

1) Separated financial system:
   ▶ Consumers place a fraction \((1 - \gamma)\) of their wealth in technology \(i\), whose return cannot be touched by the bank.
   ▶ This restriction imposes that \(c^2_P(\alpha_1) \geq 0\) and \(c^2_I(\alpha_1) \geq 0\).

2) Unified financial system:
   ▶ The bank is able to invest in both technologies.
   ▶ This allows the bank more flexibility in smoothing consumption and preventing runs.
Definition 2.1
Consider either a unified financial system or a separated financial system, and a contract $m \in M$. Then the post-deposit game is said to have a run equilibrium if there is a Bayes-Nash equilibrium in which all consumers arrive in period 1 and a positive measure of patient consumers withdraw in period 1.
The Unified System

- The optimal contract does not have a run equilibrium.
- There is no reason for the bank to provide more than one unit in period 1.
- \( y \gamma \leq \bar{\alpha} \)
- Optimal contracts must satisfy \( c^1(z) = 1 \) for \( z \leq \gamma y \).
The ex ante welfare $W$ is given by

$$
W = \int_0^{\gamma y} \left[ \bar{u} + (1 - \alpha)u((1 - \gamma)yR_i + c^2_P(\alpha) - 1) \\
+ \alpha u((1 - \gamma)yR_i + c^2_i(\alpha)) \right] f(\alpha) d\alpha \\
+ \int_{\gamma y}^{\bar{\alpha}} [(1 - \alpha + \gamma y)\bar{u} + (\alpha - \gamma y)\beta \bar{u} \\
+ (1 - \alpha)u((1 - \gamma)yR_i + c^2_P(\alpha) - 1) \\
+ (\alpha - \gamma y)u((1 - \gamma)yR_i + c^2_i(\alpha)) - 1) \\
+ \gamma yu((1 - \gamma)yR_i + c^2_i(\alpha)) \right] f(\alpha) d\alpha
$$
Constraints

Conditional on being patient and being offered $c^1 = 1$, the conditional density for $\alpha$ is

$$f_p(\alpha) = \frac{(1 - \alpha)f(\alpha)}{\int_0^\alpha (1 - a)f(a)da}$$

The incentive compatibility constraint for patient depositors is

$$\int_0^{\bar{\alpha}} u(c_P^2(\alpha) + (1 - \gamma)yR_i - 1)f_p(\alpha)d\alpha$$

$$\geq \int_0^{\bar{\alpha}} u(c_i^2(\alpha) + (1 - \gamma)yR_i)f_p(\alpha)d\alpha$$

(5)

The resource constraint (2) can be simplified to

$$\alpha_1 c_i^2(\alpha_1) + (1 - \alpha_1)c_P^2(\alpha_1) = (\gamma y - \alpha_1)R_i \text{ if } \alpha_1 \leq \gamma y$$

$$\gamma yc_i^2(\alpha_1) + (1 - \gamma y)c_P^2(\alpha_1) = 0 \text{ if } \alpha_1 > \gamma y$$

(6)
The optimal contract under the unified system is the solution to the following problem:

\[ \max_{\gamma, c_i^2(\alpha_1), c_p^2(\alpha_1)} W \]

subject to (5) and (6)
Theorem 3.1
An optimal contract in the unified system satisfies $\gamma y < \bar{\alpha}$. The "first" $\gamma y$ impatient consumers to arrive are fully served by the bank in period 1. There is a positive probability that $\alpha > \gamma y$ holds, in which case $(\alpha - \gamma y)$ impatient consumers are rationed. Patient consumers do not withdraw in period 1, and there is full consumption smoothing, i.e.,

$$c^2_I(\alpha_1) = c^2_P(\alpha_1) - 1 \text{ for all } \alpha_1 \leq \gamma y$$

Theorem 3.2
There exists an optimal contract for the unified system. For any optimal contract, the corresponding allocation is socially optimal, maximizing $W$ subject only to the resource constraint (6). Assuming that a patient depositor will choose not to run when indifferent between running and not running, there is an optimal contract that does not have a run equilibrium.
The Separated System

An optimal contract under the separated system is a solution to the following problem:

$$\max_{\gamma, c_i^2(\alpha_1), c_P^2(\alpha_1)} W$$

subject to (5), (6), and $c_i^2(\alpha_1), c_P^2(\alpha_1) \geq 0 \quad (10)$

Let $m^* = \{\gamma^*, (c_i^2(\alpha_1))^*, (c_P^2(\alpha_1))^*\}$ denote the solution to the problem.
Lemma 4.1
Any optimal contract in the separated system, which solves problem (10), satisfies $(c^2_P(\bar{\alpha}))^* < 1.$

Lemma 4.2
Any optimal contract in the separated financial system always has a run equilibrium.

Theorem 4.3 (Overinvestment in the liquid asset)
Assume $\bar{\alpha} < 1/R_\ell$ holds. An optimal contract for the separated financial system does not ration consumers in period 1 in the no-run equilibrium, and invests more in technology $\ell$ than any optimal contract for the unified financial system.
Two important innovations:

- Opportunities are urgent: If checks do not clear at par, the transactions are lost.
- The opportunities can arise at any time: There is typically a long future of potential shopping beyond periods 1 and 2.

The unrestricted bank is more stable (in fact, perfectly stable).

The restricted bank leads society to overinvest in the liquid asset.

This does not prove that imposing Glass-Steagall restrictions would be a mistake but it suggests that we should be skeptical about the purported stability benefits.