Could Making Banks Hold Only Liquid Assets Induce Bank Runs?

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September 5, 2017

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 α of the consumers is impatient
- Utility functions:

$$U_I(C_I^1, C_I^2) = \begin{cases} \bar{u} + u(C_I^1 + C_I^2 - 1) & C_I^1 \geq 1 \\ \beta \bar{u} + u(C_I^1 + C_I^2 - 1) & C_I^1 < 1 \end{cases}$$

$$U_P(C_P^1, C_P^2) = \bar{u} + u(C_P^1 + C_P^2 - 1)$$

  where $\beta < 1$, and $u' > 0$, $u'' < 0$.
- α is stochastic with density function f and support $[0, \bar{\alpha}]$, where $\bar{\alpha} < 1$.

Investment Technologies

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 ℓ takes in 1 unit of investment and yields R_ℓ 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- In period 2, the bank chooses how to divide its remaining resources between those who have withdrawn in period 1 and those who have not.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 tectnology ℓ, denoted by γ.
- Consumer's period 1 withdrawal as a function of arrival position, denoted by $c^1(z)$.
- Consumer's period 2 withdrawal from technology ℓ as a function of α_1 and whether the consumer made a withdrawal in period 1, denoted respectively by $c_I^2(\alpha_1)$ and $c_P^2(\alpha_1)$.

The space of deposit contracts or mechanisms M is given by

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

$$\alpha_1 c_I^2(\alpha_1) + (1 - \alpha_1) c_P^2(\alpha_1) = \left[\gamma y - \int_0^{\alpha_1} c^1(z) dz\right] R_\ell \tag{2}$$

Financial Systems

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 $c_P^2(\alpha_1) \geq 0$ and $c_I^2(\alpha_1) \geq 0$.
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 $z \leq \gamma y$.

Welfare

The ex ante welfare W is given by

$$
\begin{aligned}
W = \int_0^{\gamma y} & \left[\bar{u} + (1-\alpha) u((1-\gamma) y R_i + c_P^2(\alpha) - 1) \right. \\
& \left. + \alpha u((1-\gamma) y R_i + c_I^2(\alpha)) \right] f(\alpha) d\alpha \\
+ \int_{\gamma y}^{\bar{\alpha}} & \left[(1 - \alpha + \gamma y) \bar{u} + (\alpha - \gamma y) \beta \bar{u} \right. \\
& + (1-\alpha) u((1-\gamma) y R_i + c_P^2(\alpha) - 1) \\
& + (\alpha - \gamma y) u((1-\gamma) y R_i + c_P^2(\alpha) - 1) \\
& \left. + \gamma y u((1-\gamma) y R_i + c_I^2(\alpha)) \right] f(\alpha) d\alpha
\end{aligned}
$$

Constraints

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

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

The incentive compatibility constraint for patient depositors is

$$\int_0^{\bar{\alpha}} u(c_P^2(\alpha) + (1-\gamma)yR_i - 1)f_p(\alpha)d\alpha \geq \int_0^{\bar{\alpha}} u(c_I^2(\alpha) + (1-\gamma)yR_i)f_p(\alpha)d\alpha \tag{5}$$

The resource constraint (2) can be simplified to

$$\begin{aligned} &\alpha_1 c_I^2(\alpha_1) + (1-\alpha_1)c_P^2(\alpha_1) = (\gamma y - \alpha_1)R_i \text{ if } \alpha_1 \leq \gamma y \\ &\gamma y c_I^2(\alpha_1) + (1-\gamma y)c_P^2(\alpha_1) = 0 \text{ if } \alpha_1 > \gamma y \end{aligned} \tag{6}$$

Unified Problem

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

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

$$\text{subject to (5) and (6)}$$

Theorem 3.1
An optimal contract in the unified system satisfies $\gamma y < \bar{\alpha}$. The "first" γy 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.,

$$c_I^2(\alpha_1) = c_P^2(\alpha_1) - 1 \text{ for all } \alpha_1 \leq \gamma y$$

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 systme is a solution to the following problem:

$$\max_{\gamma, c_I^2(\alpha_1), c_P^2(\alpha_1)} W$$
$$\text{subject to } (5), (6), \text{ and } c_I^2(\alpha_1), c_P^2(\alpha_1) \geq 0 \qquad (10)$$

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 $(c_P^2(\bar{\alpha}))^* < 1$.

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 ℓ than any optimal contract for the unified financial system.

Conclusion

- 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 socity to overinvest in the liquid asset.
- This does not prove that imposing Glass-Steagal restrictions would be a mistake but it suggests that we should be skeptical about the purported stability benefits.