Research Record for the Project "Large vs Small Banks"

Kai-Jyun Wang*

Fall 2024

1. Main Idea

This project aims to study the relation between the size of a bank in terms of its balance sheet and the probability of the bank run occurring. And, if the larger the bank, the more can a bank immune itself from the bank run, then what is the implication of this result?

Suppose that the banking market is oligopolistic, then there is a dead weight loss in the market (under some kind of oligopolistic competition), and the larger the bank, the more oligopolistic the market is. However, if the size also prevents the bank from the crisis, then the limitation of the size of the bank can increase the financial fragility of the banking system. This is the trade-off between the oligopoly and the financial fragility. Consider the limitation of the size of the bank and the federal deposit insurance.

2. To Do

- See how to incorporate the bank run from Diamond and Dybvig (1983).
- How to write a model having the feature that the bank size affects the probability of a bank run.
- Evidence of the bank size-bank run relation.

*National Taiwan University, Department of Economics.

3. Model

3.1. Household

The time is continuous, $t \in [0, \infty)$. There is a unit mass of households. Each household solves the following problem:

$$\max_{c_t, \theta_{n,t}} \mathrm{E}\left[\int_0^\infty e^{-\rho t} u(c_t) dt\right] \tag{1}$$

subject to

$$da_t = \left[r_t \sum_{n=1}^{N} \theta_{n,t} a_t - c_t\right] dt - \sum_{n=1}^{N} a_{t^-} \theta_{n,t^-} dJ_{n,t}, \tag{2}$$

$$a_t \geq 0, \tag{3}$$

where a_t is the total asset of the household at time t, $\theta_{n,t}$ is the fraction of asset in bank n savings with interest rate r_t. The bank savings suffer from the risk of default, with rate $\lambda_{n,t}$, so that $J_{n,t}$ is a Poisson process with intensity $\lambda_{n,t}$. The process $\lambda_{n,t}$ is determined in a similar manner as Moreira and Savov (2017), equation (10).

Think about the information shocks.

3.2. Bank

There are N banks, competing in the deposit market in Cournot's fashion.

What makes the depositors choosing different banks?

The banks can choose to invest in a risky asset k, which yields $y_t = Ak_t$ and follows the process

$$dk_t = k_t \phi(\iota_t) dt - \kappa k_t dZ_t,$$

where dZ_t is a compensated Poisson process with intensity λ_t. Let p_t be the price of the risky asset, E_t be the value of existing equity and D_t be the total deposits.

A bank falls when its net worth becomes negative. When a bank falls, the rest of the banks can buy the failed bank's asset and the depositors can take their deposits back according to the proportion.

A new bank enters the market with rate ψ.

References

Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *Journal of Political Economy*, *91*(3), 401–419.

Moreira, A., & Savov, A. (2017). The macroeconomics of shadow banking. *The Journal of Finance*, *72*(6), 2381-2432.