Financial Contagion and Bank Run

Diamond and Dybvig, "Bank Runs, Deposit Insurance, and Liquidity", 1983

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Macro Finance

- Macro-finance is a broad area at the intersection of financial economics and macroeconomics.
- macro models with a financial sector
- Micro banking models: How panics occur, how shocks propagate throughout the whole economy and so on.
- Asset pricing: Macro-finance addresses the link between asset prices and economic fluctuations.

This Reading Group

- We start with the basic and important papers in bank run, financial contagion and relationship between finance sector and real sector of economy(4 papers)
- Then we jump to the new papers in recent years, covering the same areas(5 papers)
- At the end, we will be familiar with: bank modeling, financial modeling, macro models with financial sector, how empirical works in this area

Diamond and Dybvig(1983)

- What is bank run?
  - People panics and withdraw their money from financial institutions, at the same time.
- How bank run occur?
  - Information channel, random event, credit channel...
- Why it is important?
  - Banks would stop working, so they could not provide loans to real sector
  - Payment system would collapse
  - Many feedbacks into the real economy. For instance, asset prices would change which would affect investors, firms, interest groups and so on.

Motivation

- Model Bank Runs as a Rational Phenomenon of Multiple Equilibrium
- Deposits as Optimal Contracts for Sharing Risk under Asymmetric Information
- Toy model (not a realistic model)
- Simplicity (crystal or poem) for clarity and allows generalization

Results

- Bank runs can happen rationally even if bank assets are riskless (and obviously they can still happen with bank assets are risky)
- Bank runs can be eliminated by deposit insurance or discount window
- New role for policy in the context of multiple equilibria: eliminate a bad equilibrium but leave the good equilibrium alone

Framework

- The economy has three periods
- An investment can be made by individuals or organizations at date 0. At date 1, the owner can decide to terminate it or continue it. The payouts are as shown below:

Date	0	1	2
Terminate	-1	1	0
Continue	-1	0	$R > 1$

- The productive technology yields R ¿ 1 units of output in period 2 for each unit of input in period 0. If production is interrupted in period 1, the salvage value is just the initial investment the choice between (0, R) and (1, 0) is made in period 1. Constant returns to scale imply that a fraction can be done in each option.

Depositors

- Agents are "named" on the line segment [0,1]
- When there is a shock that hits individuals:
  - The probability (t) of guy x being hit with a shock
  - Or, the fraction (t) of population being hit by a shock
- The model has individuals either preferring to consume at date 1 or at date 2 randomly:
  - $u(c_1)$ with probability "t" (impatient: needs funds at date 1)
  - $\rho u(c_1 + c_2)$ with probability "1-t" (patient: can wait until date 2)
- General idea: motivate demand for liquidity

autarchy

- Impatient individuals: if an individual is impatient for sure, then His consumption would be c1 =1 (his initial wealth); his utility would be u(1)
- Patient individuals: Assumed to prefer to defer consumption if return is high enough, then his consumption would be c2 =R*1 (return times his initial wealth); his utility would be u(R)

Optimal allocation with types uncertain at date 0 but observable at date 1

- Use expected utility as criterion:

$$tu(c_1^1) + (1-t)\rho u(c_1^2 + c_2^2) \tag{1}$$

- Note that impatient guys (type 1) dont care about second period consumption, so that this does not enter in expected utility
- Maximize utility subject to economywide resource constraint:

$$\max_{c_1^2, c_1^2, c_2^2} u(c_1^1) + (1-t)\rho u(c_1^2 + c_2^2) \tag{2}$$

$$s.t. \quad tc_1^1 + (1-t)c_1^2 + (1-t)\frac{1}{R}c_2^2 = 1 \Rightarrow \tag{3}$$

$$u'(c_1^1) = \rho R u'(c_2^2) \Rightarrow \tag{4}$$

$$\boxed{c_1^{1*} > 1 and c_2^{2*} < R, \text{if } \rho R > 1.} \tag{5}$$

Implementing optimum as a bank contract

- Everyone deposits 1 unit endowment in bank
- Period 1 (early) withdrawers get $r_1 > 1$.
- Period 2 (late) withdrawers get $r_1 r_2 < R$.
- Under complete competition:
  - terminate fraction at date 1
  - complete fraction $(1 - t)r_1$ at date 2 getting $(1 - tr_1)R$
- Link between optimal quantities and returns: $r_1 = c_1^{1*}$, $r_2 r_1 = c_c^2$
- Can think of individual banks offering interest rate packages to individuals: people will flow to the one with the highest expected utility

Bank Run

- Consumption of a depositor at place j in line, given that a fraction place f_j of prior depositors has withdrawn and that a fraction f of depositors will withdraw
- Consumption from withdrawing:

$$\begin{cases} r_1 & if \quad r_1 f_j < 1 \\ 0 & if \quad r_1 f_j > 1 \end{cases} \tag{6}$$

- Consumption from not withdrawing:

$$max\{0, R\frac{(1 - r_1 f)}{1 - f}\} \tag{7}$$

Bank Run

- A bank run equilibrium has all agents panicking and trying to withdraw their deposits at date 1: if this is anticipated, all agents will prefer to withdraw at date 1. This is because the face value of deposits is larger than the liquidation value of the banks assets.
- In terms of the prior discussion, for f sufficiently larger than t (including f=1), the consumption from withdrawing exceeds the consumption from not withdrawing. Hence, all patient agents will withdraw unless the bank has gone bust by the time that it reaches their place in line.
- **Bank run is self-fulfilling equilibrium.**

Deposit insurance

- Can prevent bank runs completely:
  - Government says each will get his money, at his option, either now or later
  - Patient depositors no longer believe that their return can be less than r_1, so they never have an incentive to run
- Hence, deposit insurance improves welfare by eliminating a bad equilibrium.
- In the DD model, it will never be called into action so long as it is on the books.

Summary

- Banks could provide liquidity and implement optimal allocation
- However, there are two equilibriums: Good one, Bad one!!
- Government, could prevents bank run with deposit insurance
- However, *Moral Hazard* problem arises.

Thanks For Your Attention!