– Bank runs in Diamond-Dybvig (1983)–

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The issue of *bank runs*/1

- Let us start again with the Diamond-Dybvig (1983) framework we discussed in class.

- Let us remove the assumption of impossibility to liquidate the long term technology in $t = 1$

- Assume now that it is possible to liquidate the long term investment in $t = 1$ obtaining a value $0 < r \leqslant 1$ per unit invested

The issue of *bank runs*/2

- If the intermediary had to liquidate all her assets in $t = 1$ she could at most get

$$rx + y \leq x + y = 1$$

since $r \leq 1$

- Assume that :
  - $c_1^* > rx + y$;
  - the intermediary cannot distinguish between impatient and patient consumers;
  - the intermediary reimburses on a first-come first-served basis.

The issue of *bank runs*/3

• Then, if all consumers decide to liquidate their deposits at $t = 1$,

$$c_1^* > rx + y$$

the intermediary would not have enough resources/reserves to satisfy all the demand in $t = 1$, nor she could guarantee the promised repayment to the late consumers at $t = 2$

• Hence, those late (patient) consumers who would wait till $t = 2$ to withdraw their deposits would end up without any repayment.

• The bank would be liquidity constrained.

The issue of *bank runs*/4

• Consider the optimization problem of a patient (type 2) consumer who has to decide whether to withdraw at $t = 1$ or wait according to the original contractual agreement.

• Her choices will depend on the expected behavior of all the other patient consumers

The issue of *bank runs*/5

Let us consider the following payoff matrix:

	Run	No Run
Run	$rx + y, rx + y$	c_1, c_2
No Run	$0, rx + y$	c_2, c_2

in which the row player is Mr.i and the column player represents all patient consumers except i.

In every cell of the matrix, the first payoff refers to Mr.i and the second payoff to all the other late consumers except Mr.i.

The issue of *bank runs*/6

- Assume that $0 < rx + y < c_1 < c_2$

- Based on the expected behavior of all late consumers, there are two best replies for Mr.i: (Run,Run) and (No Run, No Run).

	Run	No Run
Run	$\underline{rx+y}, \underline{rx+y}$	c_1, c_2
No Run	$0, rx+y$	$\underline{c_2}, \underline{c_2}$

The issue of *bank runs*/7

• In the equilibrium (No Run, No Run), the intermediary is solvent, since she owns enough resources to comply with the initial contractual obligations and satisfy the demands for withdrawal in $t = 1$ and $t = 2$.

• In the equilibrium (Run, Run), all consumers will demand to withdraw in $t = 1$ and the intermediary has to prematurely liquidate all her assets, but it does not have enough resources to comply with her contractual promises, thus it will go bankrupt.

• This is an equilibrium with *bank run*.

Bank runs emerge as the result of a coordination failure on an inefficient equilibrium.

The issue of *bank runs*/8

• Few questions: Why would consumers accept a deposit contract which can be compatible with a bank run? and which solutions can we set up to reduce the risk of a bank run?

Why would consumers accept such deposit contract/9

- Assume $r = 1$.

- In such a case, a contract prescribing $c_1^{**} = 1$ and $c_2^{**} = R$ would not generate any run and would allow each consumer to achieve the level of expected utility equal to:

$$\lambda U(1) + (1 - \lambda)U(R)$$

Why would consumers accept such deposit contract/10

- Assume $r = 1$.

- If we consider a logarithmic utility, $U(x) = log(x)$, $(c_1^{**}, c_2^{**}) = (1, R)$ is the solution of the following Pareto problem:

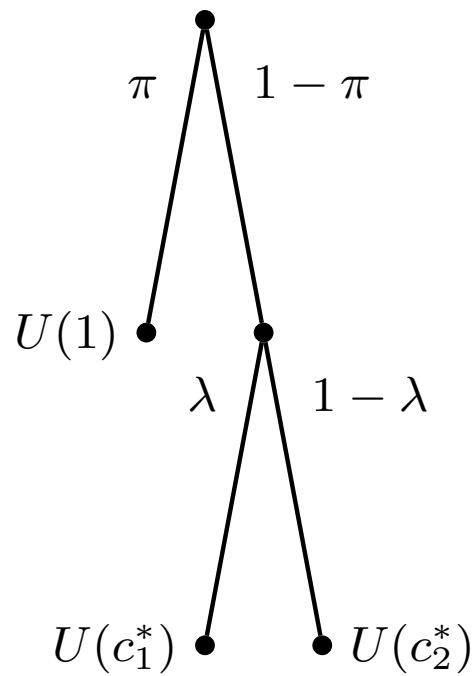
$$\begin{aligned} \max_{c_1, c_2} \quad & \lambda log(c_1) + (1-\lambda) log(c_2) \\ \text{s.t.} \quad & \lambda R c_1 + (1-\lambda) c_2 \leqslant R \\ & c_1 \leqslant 1 \end{aligned}$$

- In this case, the market allocation is efficient and the intermediary is irrelevant!

Why would consumers accept such a contract//11

• Alternatively, consumers may believe that the probability with which a run can occur is equal to $\pi > 0$ (a bank run does not occur with probability $1 - \pi$)

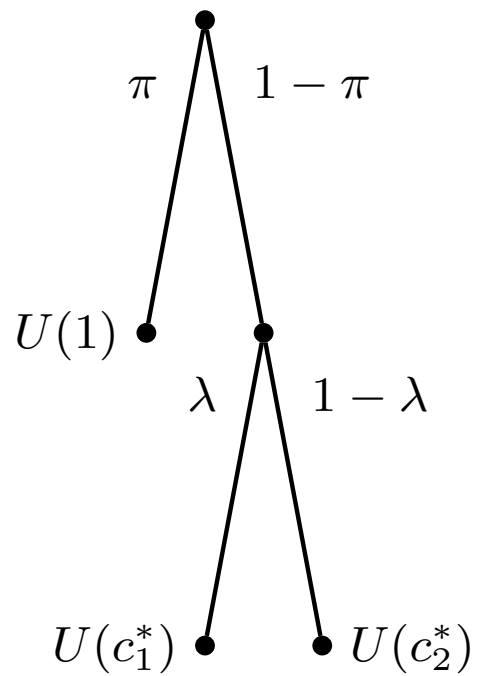
• This is the sequential representation of what consumers think it may happen in the economy.



Why would consumers accept such deposit contract//12

- If a run does not occur, the consumer can achieve $c_1 = 1$ withdrawing at $t = 1$.

- If a run occurs every consumer obtains a contract (c_1^*, c_2^*) which solves the constrained maximization problem of the bank when solvent.



Would consumers accept such deposit contract/13

- It is possible to show that :

$$U(1) < \lambda U(1) + (1-\lambda)U(R) < \lambda U(c_1^*) + (1-\lambda)U(c_2^*)$$

- Hence, there exists a probability π_0 such:

$$\pi_0 U(1) + (1-\pi_0)\left[\lambda U(c_1^*) + (1-\lambda)U(c_2^*)\right] = \lambda U(1) + (1-\lambda)U(R)$$

- If $\pi < \pi_0$, then:

$$\pi U(1) + (1-\pi)\left[\lambda U(c_1^*) + (1-\lambda)U(c_2^*)\right] > \pi_0 U(1) + (1-\pi_0)\left[\lambda U(c_1^*) + (1-\lambda)U(c_2^*)\right]$$

hence the consumer prefers to bear the risk of a bank run.

Comments on *bank runs*/14

• The probability of a bank run is exogenous

• We can interpret this π as a measure of a *selfulfilling profecy* which once started is impossible to stop.

• Due to the *mob psycology*, expectations/beliefs on the behavior of the late consumers, a bank run starts and it is strongly correlated with the diffusion of panics among depositors

• To fully understand how can an equilibrium with bank runs emerge, it is crucial to specify the way in which individual expectations translate into collective beliefs, what determines the two and how they evolve

Comments on *bank runs*/15

• This is not the only explanation for bank runs.

• Issue of deterioration of the quality of the assets in banks' balance sheets due to adverse macro-economic conditions.

• If macro-economic situation gets worse and worse, the value of the assets in a bank's balance sheets diminishes, and the risk of insolvency increases.

• Adverse macroeconomic conditions, such as a recession in the economic cycle, can convince consumers/depositors that the intermediary's solvency perspective is getting worse, and this could potentially lead to a bank run.

• Bank runs would not be the result of a coordination failure on an inefficient equilibrium, as in the Diamond Dybvig model, on the contrary they would be easily predictable since their relationship with general economic conditions.

A few remedies to a *runs*/1

- Suspension of convertibility
- Deposit insurance
- Narrow banking