



# Econ 208

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Marek Kapicka

Lecture 15

Financial Intermediation



# What to read

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- DLS, chapter 17.4



# Where are we?

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- Monetary Policy
- Financial Intermediation
  - Bank Runs



# Financial Intermediation

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- Financial Intermediation has several roles:
  - Matching borrowers and lenders
  - Monitoring of loans
  - Matching liquid deposits and illiquid loans
- Today, we will focus on the third role

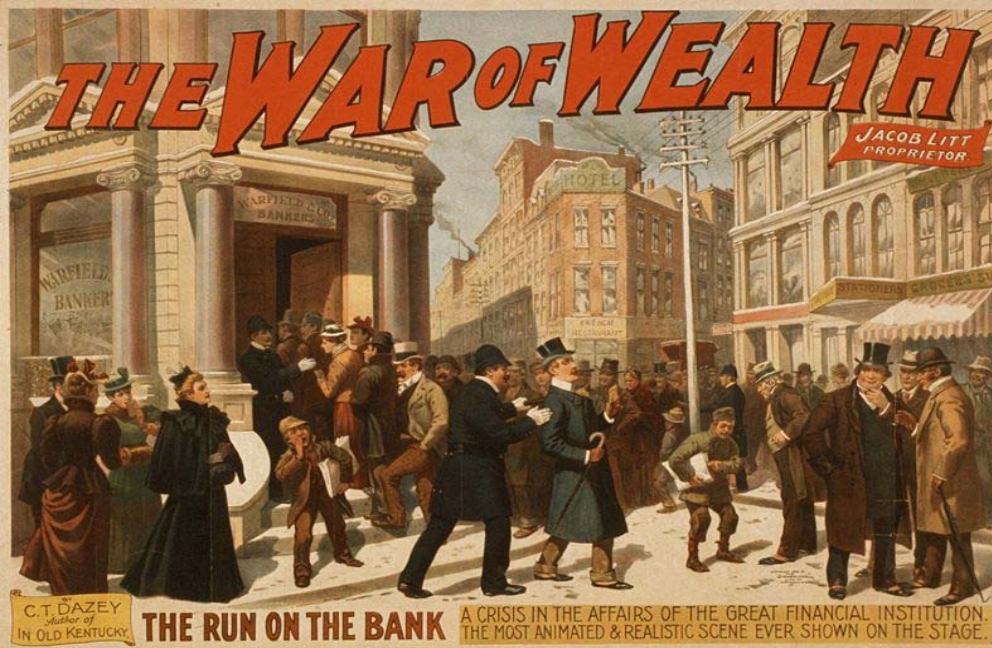


# Bank Runs

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- Two types of effects
  - Monetary effects: money multiplier decreases
  - Real effects: output decreases
- Why real effects?
  - Banks are forced to liquidate loans prematurely
- Questions about real effects
  - Is the banking system inherently unstable?
  - Are there any tools to prevent banking crises?

# Bank Runs





# Bank Runs in the United States (and England)

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- Recurrent Banking panics:
  - 1873, 1884, 1890, 1893, 1907
  - 1933: 1/3 of all depository institutions failed
  - 2007-2008:
    - Northern Rock, Bear Stearns
    - Lehman Brothers?



# Liquid Deposits vs. Illiquid Loans

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- Problems: If everyone wants to withdraw, there is not enough resources (Sequential Service Constraint)
  - If everyone runs, incentives to run
  - If nobody else runs, no incentive to run
  - Bank runs can be self enforcing
- Potential Resolutions
  - Bank Holidays
  - Deposit insurance



# The Model

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- 3 periods: 0, 1 and 2
- $N$  consumers,  $N$  is very large
  - Endowed with 1 unit of good in period 0
- Production technology
  - 1 unit of good invested in period 0 yields
    - a) nothing in period 1 and  $1 + r$  units in period 2, or
    - b) 1 unit in period 1 and nothing in period 2 (interrupted production)
- Goods can also be **stored** from period 1 to period 2
- No consumption in period 0 – invest everything



# The Model

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- Some people want to consume early (period 1, early consumers), some later (period 2, late consumers)
- Probabilities
  - Early:  $\theta$
  - Late:  $1 - \theta$
- No utility from consumption in the "wrong" period
- The type revealed only at the beginning of period 1



# Consumers

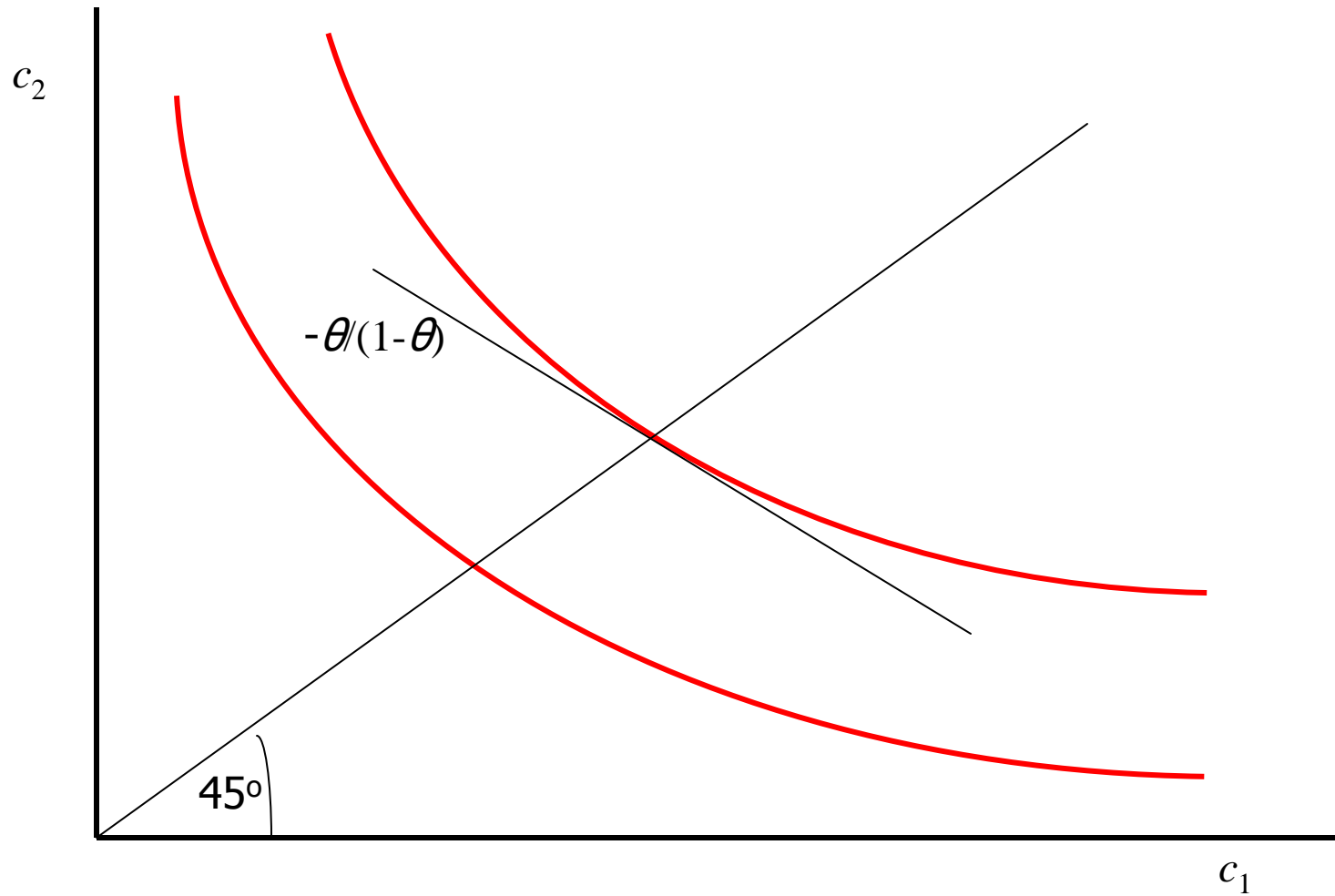
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- expected utility

$$\theta U(c_1) + (1 - \theta)U(c_2)$$

- $c_1$ : consumption if in period 1
- $c_2$ : consumption if in period 2
- Total number of early consumers:  $N\theta$
- Total number of late consumers:  $N(1-\theta)$

# Consumer's Preferences





# No Banking

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- Each consumer invest on his own
- If he needs to consume early, he interrupts his production
- expected utility

$$\theta U(1) + (1 - \theta)U(1 + r)$$



# Banking

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- A bank offers a deposit contract:
  - withdraw  $d_1$  units in period 1 or
  - withdraw  $d_2$  units in period 2
- The bank needs to
  - choose the banking contract  $(d_1, d_2)$
  - choose resources  $X$  to withdraw in period 1
  - make sure that it is in the interest of late consumers to wait:

$$d_1 \leq d_2$$



# Bank's Problem

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- Let  $x = (X/N)$  be a fraction of investment to be interrupted
- Bank's decision problem

$$\max_{X, d_1, d_2} [\theta U(d_1) + (1 - \theta)U(d_2)]$$

*s.t.*

$$\theta d_1 = x$$

$$(1 - \theta)d_2 = (1 - x)(1 + r)$$

$$d_1 \leq d_2$$



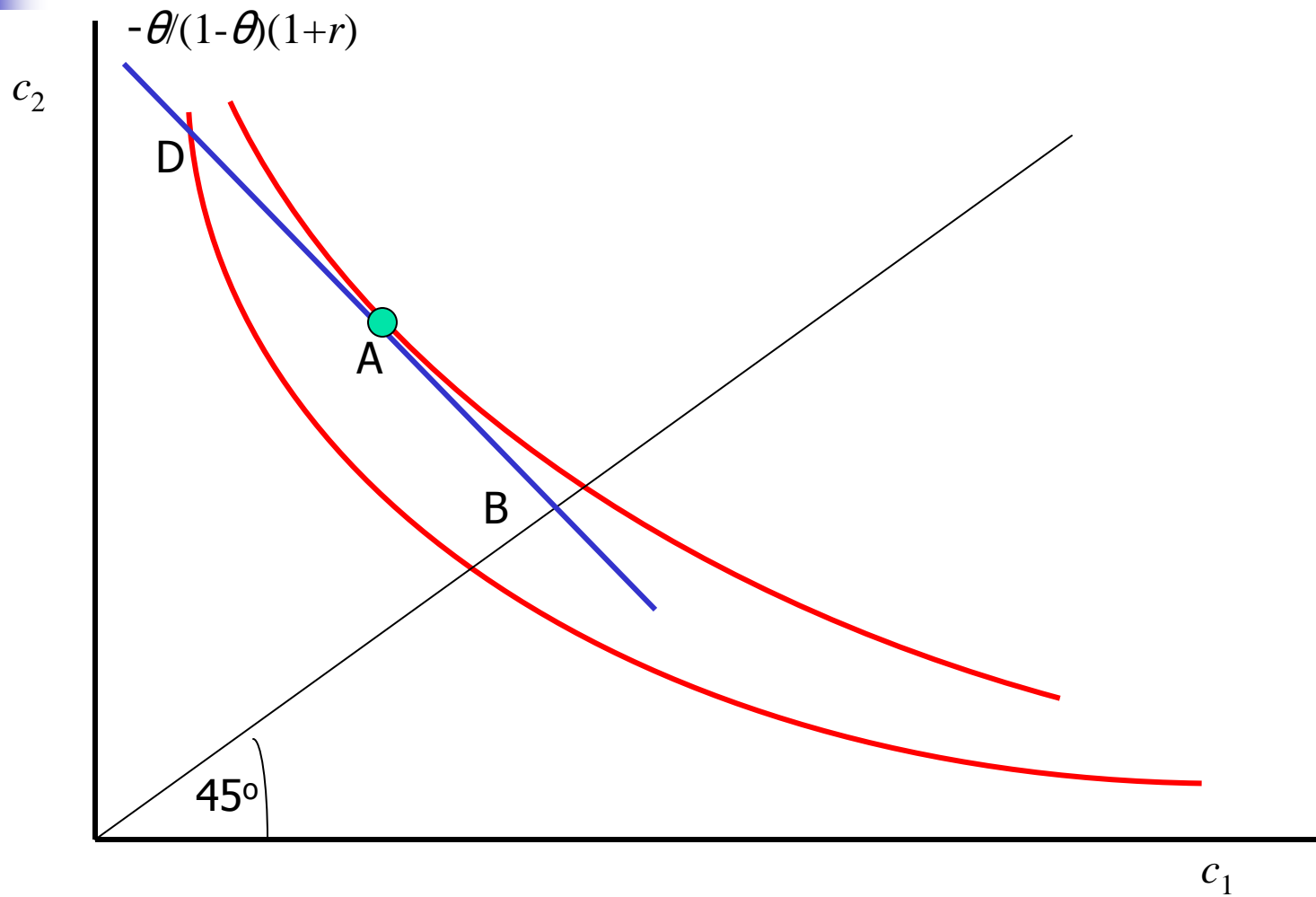
# Bank's Problem

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- Eliminate  $x$  to get bank's budget constraint

$$d_2 = -\frac{\theta}{1-\theta}(1+r)d_1 + \frac{1+r}{1-\theta}$$

# Optimal Contract





# Optimal Contract

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- First Order Condition:

$$U'(d_1) = (1+r)U'\left(\frac{1+r}{1-\theta} - \frac{\theta}{1-\theta}(1+r)d_1\right)$$

- If  $-cU''(c)/U'(c) > 1$  then
  - One can show that  $d_1 > 1$  and  $d_2 < 1+r$
  - Bank provides insurance against the shock



# The Equilibrium

## A Good Equilibrium

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- We have  $d_1 < d_2$  in equilibrium
  - late consumers strictly prefer to wait
  - only early consumers prefer to withdraw in period 1



# The Equilibrium

## A Bad Equilibrium (Banking Panics)

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- Suppose that a late consumer believes that all other **late** consumers withdraw in period 1
- Because  $d_1 > 1$ , even liquidating all assets will not be enough
- Sequential Service Constraint:
  - late consumer prefers to withdraw in period 1
  - Beliefs are correct  $\rightarrow$  it is an equilibrium!



# Solution#1: Suspension of convertibility

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- Suppose that the bank can refuse to pay deposits in period 1 if  $X$  is exhausted
- Then waiting guarantees  $d_2$
- Thus, no late consumers decide to run

# Solution #2: Deposit Insurance



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- Suppose the government guarantees that each depositor will receive  $d_2$ 
  - Tax all consumers in period 1 to finance this in case bank run happens
  - Then no late consumer will withdraw in period 1 even if he believes that everyone else withdraws in period 1
  - Bank run will not occur

# Solution #2: Deposit Insurance



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- 1934: Federal deposit Insurance Corporation (FDIC) established
  - deposits up to \$250000 insured
    - Raised from \$100000 in 2008
  - No large banking runs on commercial banks since the Great Depression

# Solution #2: Deposit Insurance



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- Problems with Deposit Insurance:
  - Moral Hazard
    - Bank may take too much risk
      - If successful, profits
      - If unsuccessful, insured
  - Bear Stearns