

# Financial Crises – Lecture notes 1

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# Schedule and other initiatives

- Meet normally on **Tuesday** and **Thursday** at **11 am**
- Guest lecture by **Russell Cooper** (date to define)
- Initiatives within the framework “Financial Crisis: Sources, Propagation and Policy Responses”
  - *17 March*: Stephen Morris (?)
  - *22 March*: Franklin Allen
  - *30 March*: Jean Charles Rochet
  - *14 April*: Conference on “Life in the Eurozone With or Without Sovereign Default?”
  - *11 May*: Max Weber Conference on “Global Economic Crises and the Social Sciences”
  - *6 June*: Lecture by Constancio, Vice President of the ECB

# Course material

- Main material:
  - Allen and Gale (2007), *Understanding financial crises*, Clarendon Lecture in Finance  
(several copies available in the library; copies of the relevant chapters will be distributed in class)
  - Articles in the reading list (more may be added)
  - Lectures notes
- (Most) Material will be available on my webpage:  
<http://www.eui.eu/Personal/Carletti/>
  - See syllabus of the course -

# Evaluation I

- You are required to:
  - know the material covered in class
  - complement it with the additional papers in the reading list and other relevant papers
- Evaluation:
  - Take home exam (60%)
  - Research proposal (40%)
  - Participation in class is also important

# Evaluation II

- Take-home exam
  - Problem Set (Mathematica will be useful – class by **Agnese Leonello** on *March 16*)
  - Questions on material covered in class, also by Russell Cooper
- Research proposal (**no more than 5 pages**):
  - A precise research question with clear (economic) motivation (additional readings very useful for ideas)
  - (At least) sketch of how you would solve it
  - Empirical ideas are also possible

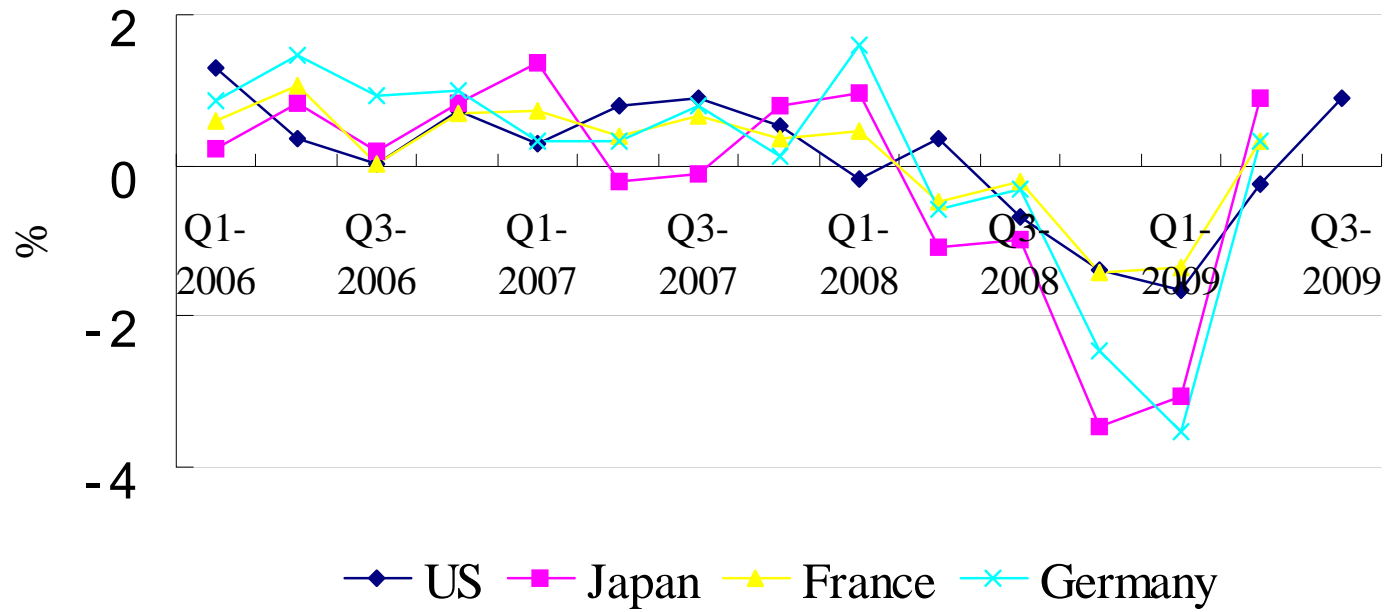
# Important dates

- You have to decide by **March 14** if you want to be evaluated for the course
- Problem set will be distributed on **March 24**
- **BOTH** take home exam **and** research proposal must be returned by **April 4** (midnight!)

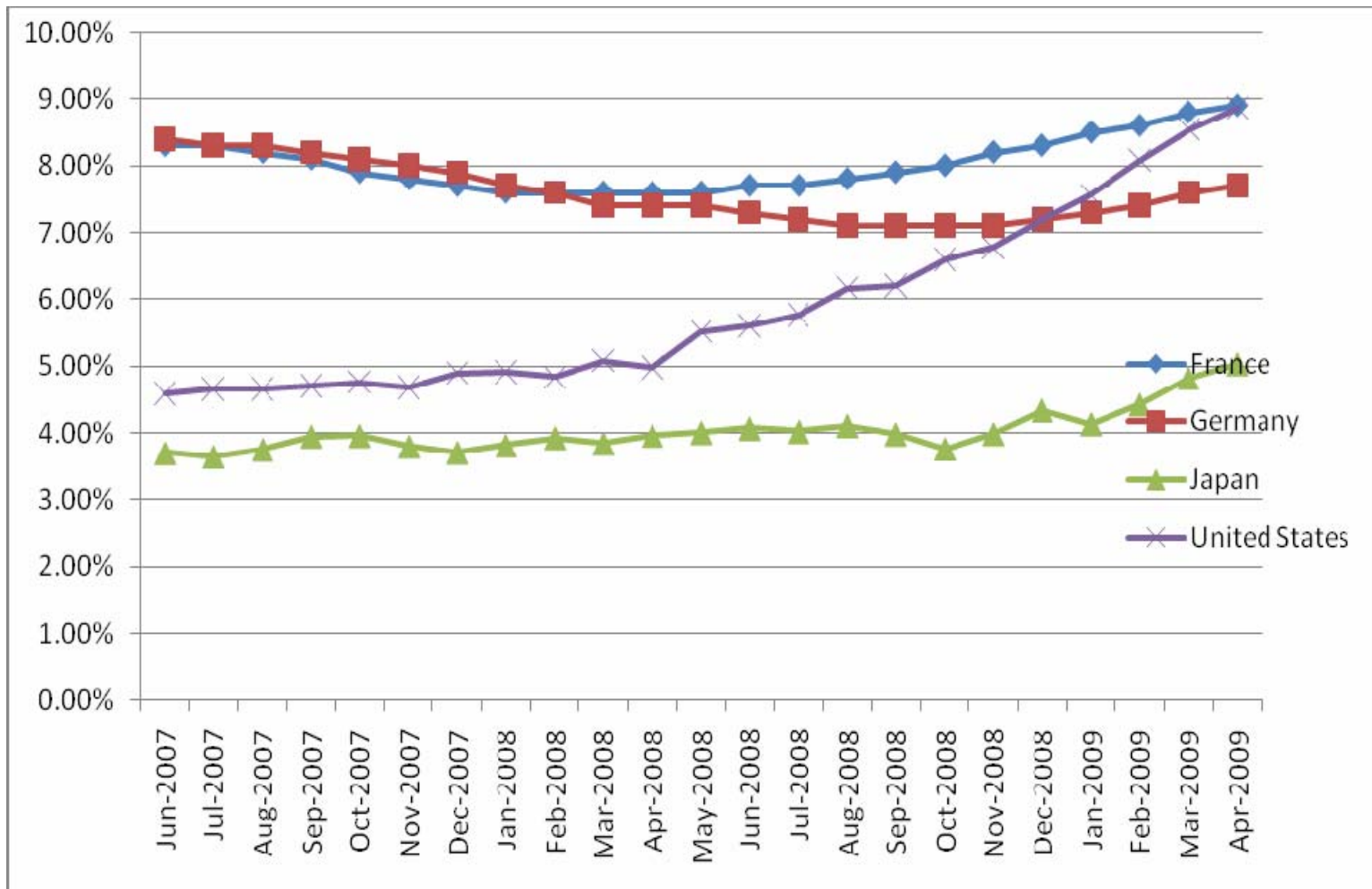
# Why studying financial crises?

- The crisis that started in 2007 is the first **global** and **systemic** crisis of the modern era, only comparable to the Great Depression in the 1930s or the Japanese crisis in the 1990s
- Large economic consequences
  - Large drop in GDP
  - Large increase in unemployment
- Problems first in the financial industry and then in public expenditures and country solvency, especially in the Euro area

# Quarterly Changes in GDP



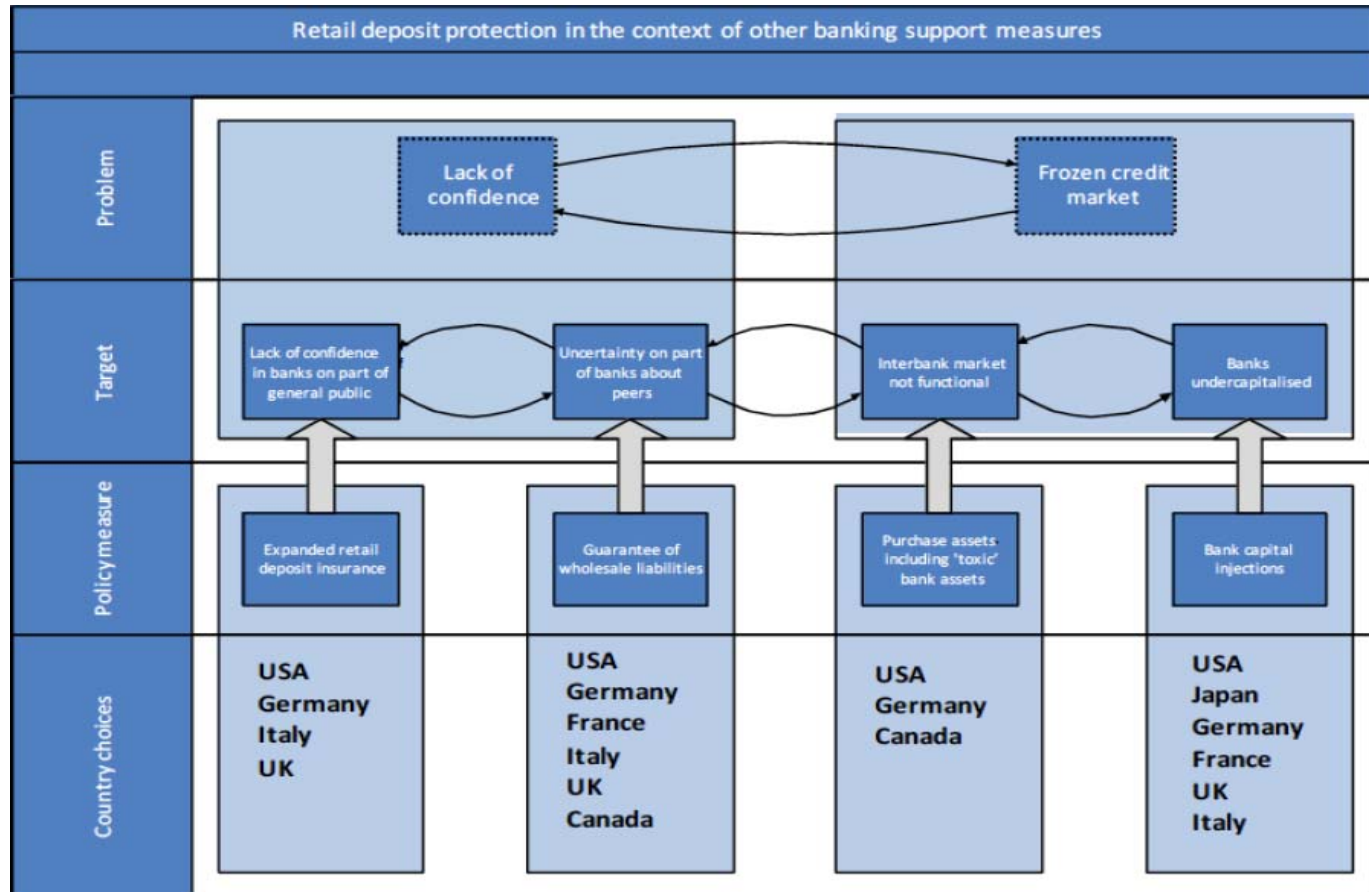
# Unemployment Rates



# Massive public intervention needed

- Massive central bank interventions to stabilize markets
- With the exception of Lehman Brothers, many large financial institutions were bailed out or induced to merge (e.g., Lloyds – HBOS, Merrill Lynch – Bank of America)
- State aid: recapitalization, loans, implicit and explicit guarantees by government and central banks
- Governments guaranteed **€2.9** trillion of bank borrowing and approved recapitalization plans for **€313** billion

# Banking support measures



Source: Schich (2008)

# Consequences of the 2007 crisis

- Increased moral hazard problem for financial institutions
- Increased reliance of financial institutions (and markets) on public intervention
- Governments can guarantee private debt (in principle...), but, this shifts the problem to sovereign debt
  - Greece, Ireland, Spain and Portugal
  - Big decrease in tax revenues and increase in public expenditure
  - Problems in particular with extension of guarantees (e.g. Ireland)

Read Reinhart and Rogoff book!!

# Questions

1. What caused the crisis?
2. Why did markets stop working properly?
3. Why did the crisis spread so globally?
4. Why and how should central banks and governments intervene?
5. How to deal with the too-big-to-fail problem and restore market discipline?
6. How should financial regulation be reformed?
7. What is the role of deposit insurance (and lender of last resort)?

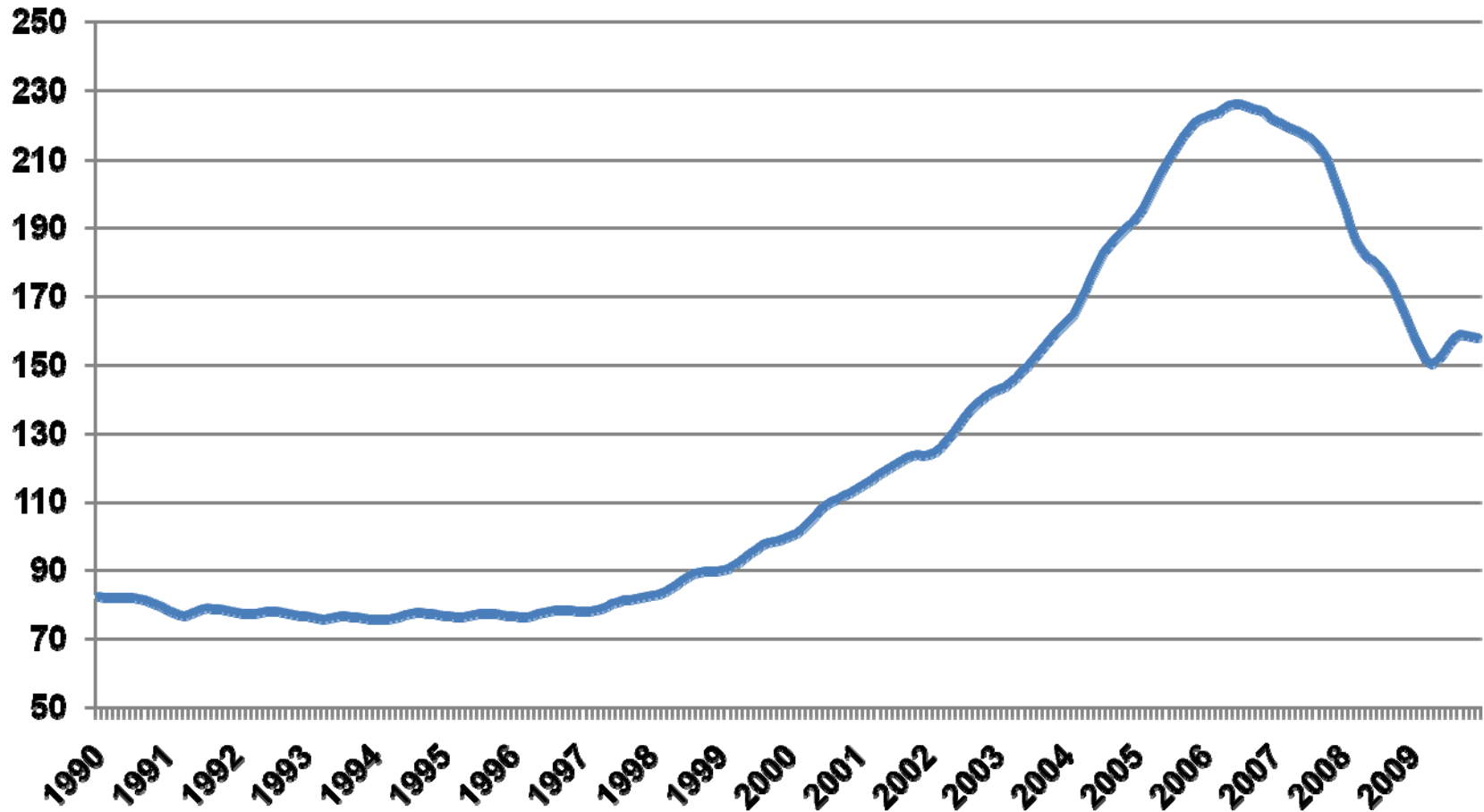
# What caused the crisis?

- It was believed that the crisis was caused by bad incentives in the mortgage industry

But now we know much more was going on...

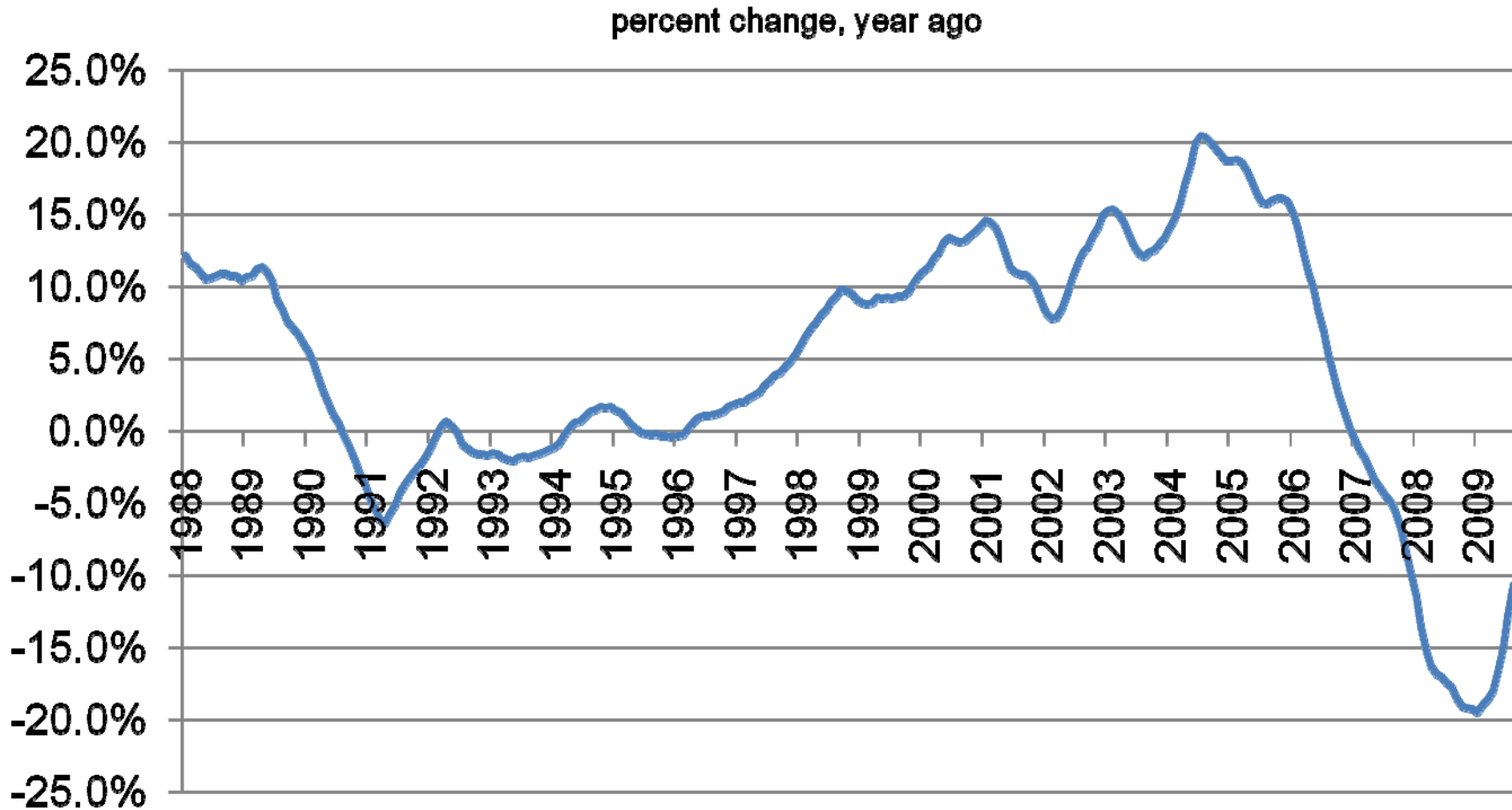
- The large global impact of the crisis suggests that the problems with subprime mortgages were a **symptom**
- Most importantly, there was a **bubble** in property prices in the U.S., Spain, Ireland and elsewhere
- The crisis started when the bubble burst

# Current Crisis: Case-Shiller 10 Cities Composite Index



Source=S&P

# Percentage Change in Case-Shiller 10 Cities Composite

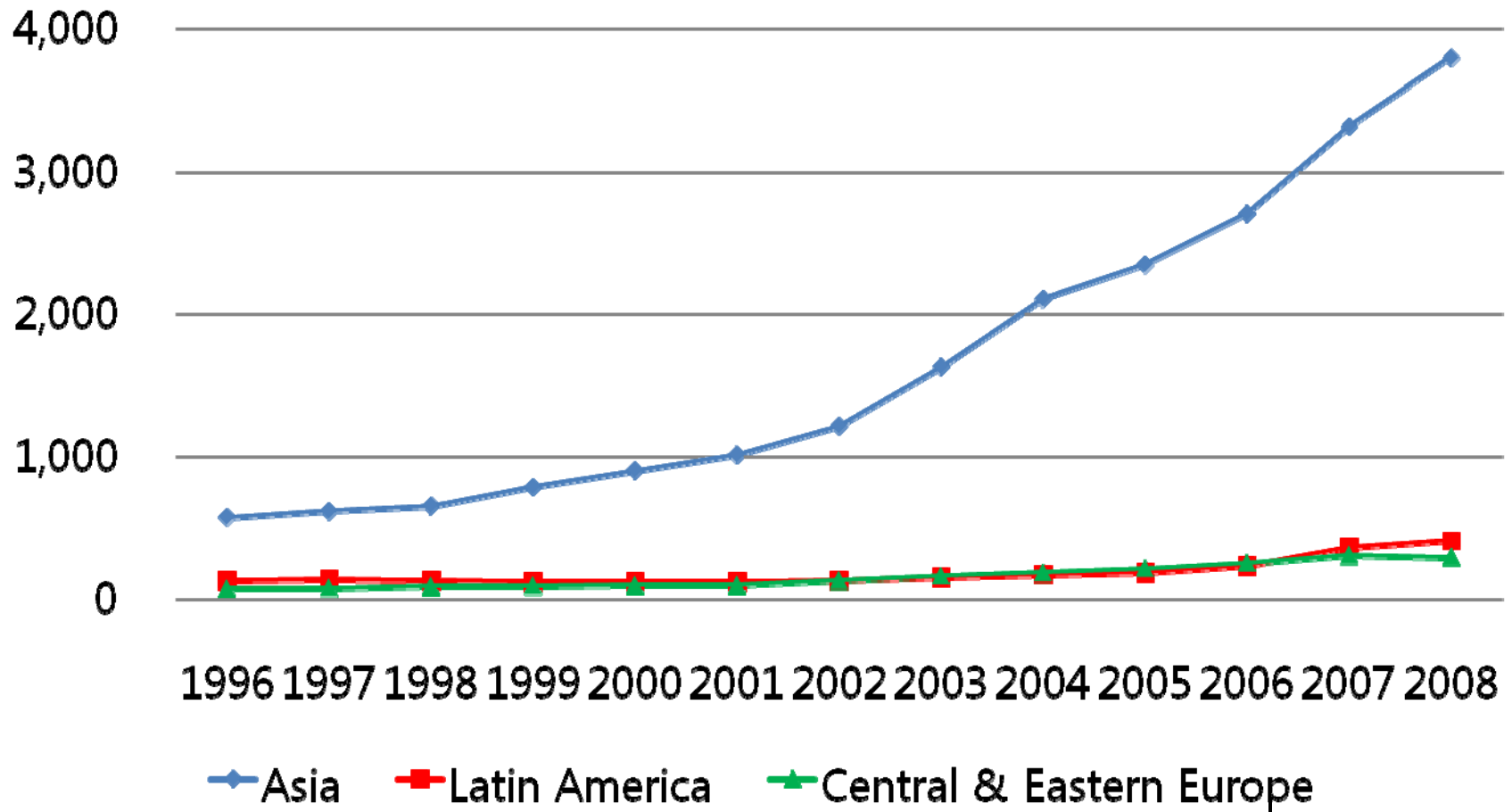


Source=S&P

# What caused the bubble?

1. Loose monetary policies, especially by the U.S. Federal Reserve (and ECB in some countries)
  - Central banks focused too much on consumer price inflation and ignored asset price inflation
  
2. Excessive availability of credit due to global imbalances
  - Large accumulation of reserves by Asian countries after the crisis in 1997

# Reserves: A Comparison



# What exacerbated the crisis?

- Poor functioning of the financial system
  - Subprime mortgages
  - Funding structure of financial intermediaries
  - Illiquidity and asset price volatility
  - Contagion after the Lehman default
- Breakdown of credit and money markets
- Weak regulatory system
  - Too much focus on individual risk, no systemic risk
  - Mark-to-market accounting

## To summarize:

- The main problem was the development and bursting of the property bubble
- The consequences of the bubble collapse were exacerbated by the poor functioning of the financial system in the crisis
- The crisis had severe consequences on the real economy
  - Even in countries in countries with strong financial systems (e.g., Spain, where unemployment is around 20% )

# The current crisis is not the first one...

- Crises are not a new phenomenon
- A few examples:
  - 19th and early 20th century crises in the US
  - Great depression in the 1930s
  - East Asia in 1997
  - Norway, Sweden and Finland in the early 1990's
  - Japan in the 1990s
  - Argentina crisis in 2001-2002
- They occurred in many countries where institutions are vastly different

- The experience of the 1930's was so bad that it led to regulation and direct government ownership of banks and other financial institutions in many countries
- This essentially eliminated the occurrence of crises in the period 1945-1971

**...however...**

- This “repression” prevented the financial system from doing its job of allocating resources and led to calls for deregulation
- The resulting financial liberalization led to the reemergence of banking crises after 1971

- Stark contrast between views of crises in the 30's and after 1971
  - In the 1930's crises were perceived as a market failure and government regulation and intervention was introduced
  - Today many regard crises as the result of a government failure (even the 2007 crisis)
- These two approaches have led to a number of theories:
  - Financial panic (multiple equilibria)
  - Business cycle (essential crises)
  - Inconsistent government macroeconomic policies
  - Bubble collapse
  - Amplification theories (fragility and contagion)
  - Government guarantee models

# The course will focus on....

- Banking crises
- Amplification theories
  - Contagion and financial networks
  - Financial fragility
- Interbank markets and central bank intervention
- Accounting methods
- Bubble creation

With emphasis on asset prices and interrelation between financial institutions and markets

# Outline of the course I

## 1. Bank runs

- Depositors ask their money back prematurely
- Panic and fundamentals

## 2. Financial contagion

- How problems at one institutions propagate to others

## 3. Financial networks

- How the propagation depends on how institutions are linked with each other

## 4. Asset markets and cash in the market pricing

- Market for premature sale of long term assets banks hold

# Outline of the course II

## 5. Financial fragility

- How does a small shock propagate in the system

## 6. Interbank markets and central bank intervention

- Can the central bank prevent inefficiencies in the interbank market

## 7. Accounting standards

- How contagion depends on the accounting system firms/banks use (historical cost/mark to market)

## 8. Bubbles and crises

- How bubbles are formed and how they can lead to crises

# Topic 1: Bank Runs

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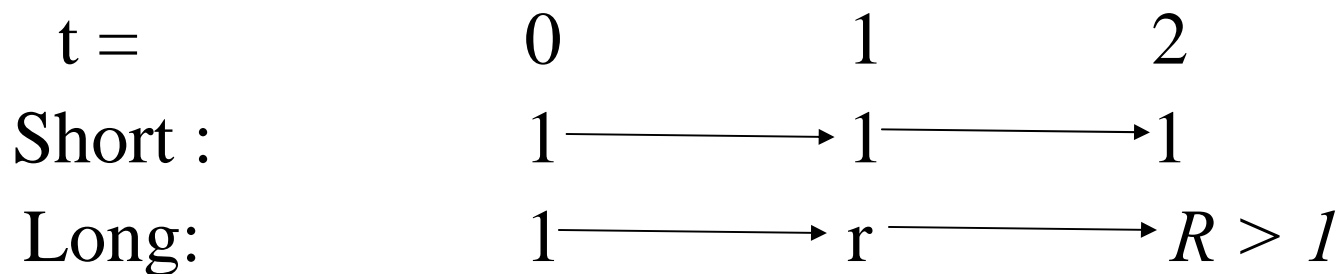
1. Bank runs as panic, sunspot, multiple equilibria
  - Diamond and Dybvig (1983)
2. Business cycle, essential crises, linked to fundamentals
  - Jacklin and Bhattacharya (1988)
3. A combination of the two
  - Chari and Jagannathan (1988)

# Common elements (and basics for the future)

- Banks issue *liquid liabilities* in the form of demandable deposits
  - depositors can withdraw at any time
- **but** invest mainly in *illiquid assets*
  - which are costly to be liquidated prematurely
- This allows banks to provide **liquidity insurance** to depositors but also creates a **maturity mismatch** which exposes them to the possibility of runs

# A model of bank runs I

- Three dates  $t = 0, 1, 2$
- A single good that can be used for consumption or investment at each date
- Banks: At  $t=0$  they raise 1 unit of deposits and invests  $y$  in a short asset and  $x$  in a long asset



# A model of bank runs II

- Depositors:
  - Measure is 1, with an initial endowment of 1 each
  - Are subject to consumption shocks
    - $\lambda$  consume early at  $t = 1$  (early type)
    - $1 - \lambda$  consume late at  $t = 2$  (late type)
  - Utility function  $u(c_t)$  for  $t = 1, 2$

$$U(c_1, c_2) = \lambda u(c_1) + (1 - \lambda)u(c_2)$$

with  $u' > 0$  and  $u'' < 0$

# A model of bank runs III

- Uncertainty about depositors' type is resolved at  $t=1$
- Types are private information
- The bank cannot observe them
- This implies that a late depositor can mimic an early depositor and withdraw at  $t=1$
- When this happens, the bank may not have enough funds to repay all depositors at  $t=1$

# What is a run and what generates it?

- A run occurs when *all* depositors withdraw at  $t = 1$  so that the bank has to liquidate the long term asset
- Crucial elements:
  - Return of the long term asset  $R$ 
    - Safe or risky asset –  $R$  deterministic or stochastic
  - Liquidation value
    - Liquid or illiquid asset –  $r$  equal to or less than 1
    - Exogenous or endogenous (price)
  - Structure of depositors' preference shocks
    - Fraction  $\lambda$  deterministic or stochastic – idiosyncratic or aggregate liquidity shocks

# Panic runs (Diamond and Dybvig, 1983)

- Asset return  $R$  deterministic – safe asset
- Liquidation value  $r = 1$  – exogenous
- Fraction  $\lambda$  deterministic

We solve the model in steps

1. Autarky
2. Bank equilibrium
  1. Good equilibrium – *liquidity insurance*
  2. Bad equilibrium - *run*

# The problem in autarky

Individual's problem is to choose portfolio  $(y,x)$  to

$$\max U(c_1, c_2) = \lambda u(c_1) + (1 - \lambda)u(c_2)$$

subject to

$$x + y \leq 1$$

$$c_1 \leq y + rx$$

$$c_2 \leq xR + y$$

# Solution to the autarky problem

Given  $r = 1$ , individuals are indifferent between long and short term assets so

$$y = 0$$

$$x = 1$$

$$c_1 = x + y = 1$$

$$c_2 = (x + y)R$$

Individuals consume just the return of the assets in both periods

# Bank equilibrium I

- $(c_1, c_2)$  is now the optimal deposit contract
- $(x, y)$  is now the optimal portfolio of the bank
- Competitive banking sector:
  - This ensures that banks maximize the expected utility of depositors otherwise another bank would enter and bid away all the customers

# Bank equilibrium II

Bank's problem is

$$\max U(c_1, c_2) = \lambda u(c_1) + (1 - \lambda)u(c_2)$$

subject to

$$x + y \leq 1$$

$$\lambda c_1 \leq y$$

$$(1 - \lambda)c_2 \leq Rx$$

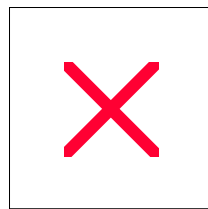
$$u(c_1) \leq u(c_2)$$

# Good bank equilibrium I

From first order conditions:

$$\frac{u'(c_1)}{u'(c_2)} = R$$

so



$$c_1 < c_2 \quad \text{since } u'' < 0$$

This ensures late consumers never want to imitate early consumers

# Good bank equilibrium II

- When does the bank give more to early consumers than the autarky solution?
- When the budget constraints hold with equality, then
$$c_1 = y/\lambda$$
$$c_2 = R(1 - y)/(1 - \lambda)$$
- The bank solution gives more to early depositors than the autarky solution when  $c_1 = y/\lambda > 1$
- This happens when their relative risk aversion of depositors is greater than 1,  $-\frac{cu''(c)}{u'(c)} > 1$

# Good bank equilibrium III

- So the bank solution given by

$$y = \lambda c_1; \quad x = 1 - y$$

$$c_1 = \frac{y}{\lambda} > 1; \quad c_2 = \frac{R(1-y)}{(1-\lambda)} < R \quad \text{with } c_1 \leq c_2$$

- This solution can be achieved for example for members of the HARA family such as  $u(c) = c^{1-\gamma} / 1 - \gamma$
- With this class of utility functions, the bank does strictly better than the market and offers depositors liquidity insurance against liquidity shocks

# Bad bank equilibrium I

- Suppose the bank's deposit contract says that it must pay out the promised amount to anybody who requests it at  $t = 1$
- If  $c_1 > 1$  and all depositors (early and late consumers) withdraw at  $t=1$  then the bank will have to liquidate all its assets since

$$rx + y = x + y = 1$$

- Anybody who does not attempt to withdraw at  $t=1$  will be left with nothing since all the bank's assets will be liquidated at  $t=1$ .
- Hence it becomes rational to run if everybody else is running

# Bad bank equilibrium II

- One important element that produces the bad equilibrium is the assumption of *sequential service constraint*
- This means the depositors reach the bank one at a time and withdraw  $c_1$  until all the bank's assets are liquidated
- This has two effects:
  - It forces the bank to deplete its resources
  - It gives an incentive for depositors to get to the front of the queue

# Multiple equilibria – selection I

- How to select between the two equilibria?
- Diamond and Dybvig did not formally introduce the equilibrium selection mechanism
- One way to do this is through „sunspots“. When a sunspot is observed, depositors assume that there is a going to be a run
- Policy intervention can prevent sunspot runs
  - Deposit insurance
  - Central bank or government may be able to ensure that good equilibrium is chosen

# Multiple equilibria – selection II

- But what determines the sunspot?
- It can be anything:
  - „Mob psychology“ or „Mass Hysteria“
  - Heartquake, etc.
  - Self fulfilling expectations
- It is not possible to know the ex ante probability of the occurrence of the run
- Equilibrium selection:
  - Postlewaite and Vives (1988)
  - Global game approach: Goldstein and Pauszner (2005)  
(Using Morris and Shin, 1998)

# Additional references

- Postlewaite A. and X. Vives (1988), “Bank Runs as an Equilibrium Phenomenon”, JPE, 95, 485-491
- Morris S. and H. Shin (1998), “Unique Equilibrium in a Model of Self-Fulfilling Currency Attacks”, AER, 88, 587-597
- Goldstein I. and A. Pauszner (2005), “Demand Deposit Contracts and Probability of Bank Runs”, JF, 60(3), 1293-1328

# Business cycle, Fundamental runs: Evidence in Gorton (1988)

- Evidence supports the hypothesis that US banking panics in the late 19th and early 20th century were related to the business cycle
- Panics were systematic events: whenever the leading economic indicator represented by the liabilities of failed businesses reached a certain threshold, a panic occurred

(insert table)

**Table 1**  
**National Banking Era Panics**

NBER Cycle Peak–Trough	Panic Date	%Δ(Currency/ Deposit)*	%Δ Pig Iron†
Oct. 1873–Mar. 1879	Sep. 1873	14.53	–51.0
Mar. 1882–May 1885	Jun. 1884	8.80	–14.0
Mar. 1887–Apr. 1888	No Panic	3.00	–9.0
Jul. 1890–May 1891	Nov. 1890	9.00	–34.0
Jan. 1893–Jun. 1894	May 1893	16.00	–29.0
Dec. 1895–Jun. 1897	Oct. 1896	14.30	–4.0
Jun. 1899–Dec. 1900	No Panic	2.78	–6.7
Sep. 1902–Aug. 1904	No Panic	–4.13	–8.7
May 1907–Jun. 1908	Oct. 1907	11.45	–46.5
Jan. 1910–Jan. 1912	No Panic	–2.64	–21.7
Jan. 1913–Dec. 1914	Aug. 1914	10.39	–47.1

\*Percentage change of ratio at panic date to previous year's average.

†Measured from peak to trough.

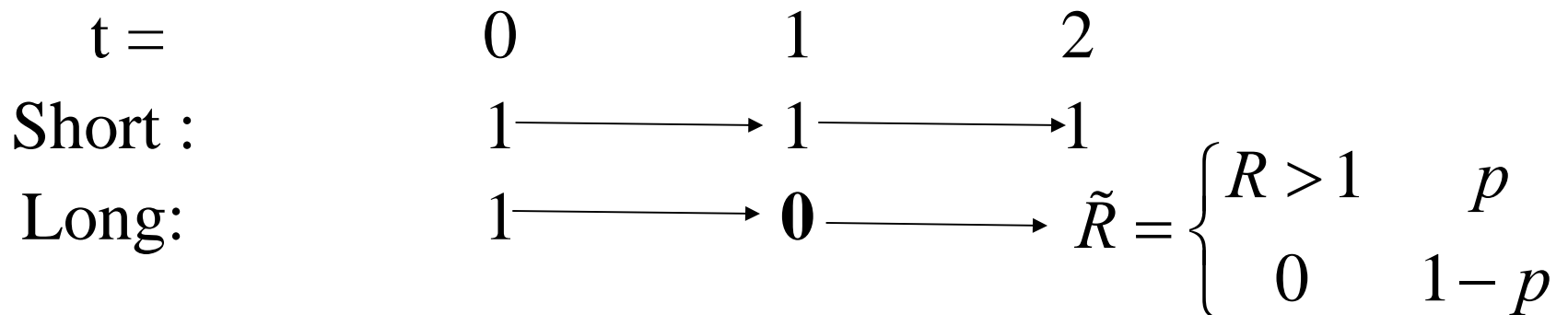
(Adapted from Table 1, Gorton (1988), p. 233.)

# Business cycle, Fundamental runs

- Asset return  $R$  stochastic – risky asset
- Liquidation value:  $r < 1$  – exogenous
- Fraction  $\lambda$  deterministic
  
- At  $t = 1$  (some) late depositors observe a signal on the project return at  $t=2$
- They condition their withdrawal decision on this signal
- They withdraw if signal is bad enough

# Jacklin and Bhattacharya (1988)

- Three dates  $t = 0, 1, 2$ , a single good
- Banks: At  $t=0$  they raise 1 unit of deposits and invests  $y$  in a short asset and  $x$  in a long asset



with  $pR > 1$

- Depositors:
  - Measure 1, with an initial endowment of 1 each
  - Are subject to consumption shock
    - $\lambda$  consume early at  $t = 1$  (early type)
    - $1 - \lambda$  consume late at  $t = 2$  (late type)
  - Smooth utility function over the two dates

$$U^1 = u(c_{11}) + \rho_1 u(c_{21})$$

$$U^2 = u(c_{12}) + \rho_1 u(c_{22})$$

where

- $c_{ij}$  is the consumption at date  $i$  of an agent of type  $j$  and  $\rho_i$  is the intertemporal discount factor with  $1 > \rho_2 > \rho_1 > 0$
- $RRA = -cu''(c)/u'(c) < 1$

- Information:
  - At  $t=1$  a fraction  $\alpha$  receives a signal  $s$  on the value of  $\tilde{R}$  at  $t=2$ . In particular,

$$p = \sum_s \text{prob}(s) \hat{p}_s$$

where  $\hat{p}_s$  is the value of  $\hat{p}$  given that  $s$  is observed

Notes:

- Signal  $s$  is costless and „partial“
- Only an exogenous and deterministic fraction  $\alpha$  of late depositors observes it
- Only this fraction of late depositors responds to the signal

Bank's problem is

$$\max U(c_{ij}) = E\{\lambda U^1(c_{11}, c_{12}(R)) + (1-\lambda)U^2(c_{21}, c_{22}(R))\}$$

subject to

$$x + y \leq 1$$

$$\lambda c_{11} + (1-\lambda)c_{12} \leq y$$

$$\lambda c_{21}(R) + (1-\lambda)c_{22}(R) \leq Rx \quad \forall R$$

$$U^j(c_{1j}, c_{2j}) \leq U^j(c_{1k}, c_{2k}) \quad \text{for } j, k = 1, 2 \text{ and } j \neq k$$

Solution:

$$1 > c_{11}^* > c_{12}^*$$

$$c_{22}^* > c_{21}^*$$

But still possibility of runs because of  $r = 0$

- Depositors' withdrawal decisions at  $t=l$ :
  - $\lambda$  early depositors withdraw
  - $\alpha$  late depositors withdraw if

$$\hat{E}[U^2(c_{12}, \tilde{c}_{22})] < \hat{E}[U^2(c_{11}, \tilde{c}_{21})] \quad (*)$$

where  $\hat{E}$  indicates the expectation calculated using the posterior  $\hat{p}$

- That is a run occurs for all  $\hat{p} < \bar{p}$  where  $\bar{p}$  satisfies (\*) with equality

# Information-based run

- The first  $\lambda$  depositors receive the full amount  $c_{11}^*$
- The remaining  $(1 - \lambda)$  receive only  $c_{12}^*$
- It is a sort of *suspension of convertibility*
- Is the run efficient?
  - It can prevent the inefficient continuation of bad projects
  - **But** the welfare of both types of agents decrease
  - Is it efficient to avoid runs by making the contract incentive compatible after late type depositors have observed  $s$ ? It depends (Alonso, 1996)

# Panic and fundamental runs

- Asset return  $R$  stochastic – risky asset
- Liquidation value  $r < 1$  – exogenous
- Fraction  $\lambda$  of early depositors is stochastic
- Fraction  $\alpha$  of informed late depositors is still exogenous **but** stochastic
- $(1 - \alpha)(1 - \lambda)$  uninformed late depositors play a role
- At  $t = 1$  the  $\alpha(1 - \lambda)$  informed late depositors observe a signal  $s$  on the project return at  $t=2$
- The  $(1 - \alpha)(1 - \lambda)$  uninformed late depositors observe the total withdraws at  $t = 1$  and decide whether to withdraw, but their inference is *noisy* and they can make mistakes

# Chari and Jagannathan (1988)

- Three dates  $t = 0, 1, 2$ , a single good
- Banks invest only in one long-term asset

$$\begin{array}{cccc}
 t = & 0 & 1 & 2 \\
 \text{Long:} & 1 \longrightarrow & r & \longrightarrow \tilde{R} = \begin{cases} R > 1 & p \\ 0 & 1-p \end{cases}
 \end{array}$$

$$\text{with } r = \begin{cases} 1 & \text{if } W < \bar{W} \\ \bar{r} < 1 & \text{otherwise} \end{cases}$$

where  $W$  is the queue of withdrawals

- Depositors:
  - Measure 1, with an initial endowment of 1 each
  - Are subject to consumption shock
    - $\tilde{\lambda}$  consume early at  $t = 1$  (early type)
    - $1 - \tilde{\lambda}$  consume late at  $t = 2$  (late type)

where  $\tilde{\lambda} = \{0, \lambda_1, \lambda_2\}$  with prob.  $q_0, q_1$  and  $q_2$

- Utility function

$$U^1(c_{11}) = c_{11}$$

$$U^2(c_{22}) = c_{22}$$

Depositors are risk neutral so that banks do not play any role

- Information:
  - At  $t=1$  a fraction  $\tilde{\alpha}$  receives a signal  $s = \{R, 0\}$ , where
$$\tilde{\alpha} = \{\bar{\alpha}, 0\}$$
 with prob  $\theta$  and  $1 - \theta$
- The realizations of  $\tilde{\lambda}$ ,  $\tilde{\alpha}$ ,  $\tilde{R}$  as well as  $s$  are not observable
- Only publicly observable variable is the amount of withdrawals  $W$  at  $t = 1$

- Solution to bank's problem is  $c_{11}^* = 1$ ;  $c_{22}^* = R$
- Depositors' withdrawal decisions at  $t=1$ :
  - $\lambda$  early depositors withdraw
  - $\alpha(1 - \lambda)$  informed late depositors withdraw if  $s = 0$  and leave their funds if  $s = R$
  - $(1 - \alpha)(1 - \lambda)$  uninformed late depositors observe  $W$  and update their expected utility

$$W = \lambda + \alpha(1 - \lambda)w^i(R) + (1 - \alpha)(1 - \lambda)w^u(W)$$

- How precise is their inference? Can they make mistakes?

$$\lambda_1 = \bar{\alpha}; \lambda_2 = \lambda_1 + \bar{\alpha}(1 - \lambda_1)$$

$$\bar{W} = \lambda_2$$

	$\lambda, R, \alpha$		W
1	$0, \tilde{R}, 0$	$w^u(W)$	0
2	$0, R, \bar{\alpha}$	$(1 - \bar{\alpha})w^u(W)$	0
3	$0, 0, \bar{\alpha}$	$\bar{\alpha} + (1 - \bar{\alpha})w^u(W)$	$\bar{\alpha}$ <i>inefficient</i>
4	$\lambda_1, \tilde{R}, 0$	$\lambda_1 + (1 - \lambda_1)w^u(W)$	$\lambda_1$
5	$\lambda_1, R, \bar{\alpha}$	$\lambda_1 + (1 - \lambda_1)(1 - \bar{\alpha})w^u(W)$	$\lambda_1$
6	$\lambda_1, 0, \bar{\alpha}$	$\lambda_1 + (1 - \lambda_1)\{\bar{\alpha} + (1 - \bar{\alpha})w^u(W)\}$	1
7	$\lambda_2, \tilde{R}, 0$	$\lambda_2 + (1 - \lambda_2)w^u(W)$	1 <i>inefficient</i>
8	$\lambda_2, R, \bar{\alpha}$	$\lambda_2 + (1 - \lambda_2)(1 - \bar{\alpha})w^u(W)$	$\lambda_2$
9	$\lambda_2, 0, \bar{\alpha}$	$\lambda_2 + (1 - \lambda_2)\{\bar{\alpha} + (1 - \bar{\alpha})w^u(W)\}$	1

# Panic and information run

- In state 3 there is an inefficient continuation
- In state 7 there is a “panic” run: uninformed depositors runs for *fear* that some informed depositors have received  $s=0$
- A run never occurs when  $\alpha = \bar{\alpha}$  and  $s = R$
- Runs in states 6 and 9 are efficient

# Runs as discipline devices

- Why do banks issue demand deposits? Can a run be efficient?
  - Yes, when it prevents the continuation of valueless assets
- Note: „bank managers” do not play any role so far
  - Banks provide liquidity insurance to risk averse depositors but banks maximize depositors’ expected utility
- Assume that banks (or bank managers) choose among assets with different risk

- Then, bank runs can provide a mechanism to provide banks with incentives to choose the “right” asset at  $t=0$
- That is, demandable debt can provide an incentive-compatible solution to the bankers’ moral hazard problem arising in the investment choice
- Depending on the information available to depositors, runs can still be inefficient ex post though
- Literature:
  - Calomiris and Kahn (1991) in AER
  - Various papers by Diamond and Rajan

# Policy implications

- How do we discipline bankers?
- If bank runs are fully efficient, then we do not need regulation. Market discipline suffices
- If bank runs are not fully efficient, then regulation is needed
- What is market discipline and how efficient is it?

# Market discipline

- There is a long standing debate on the role and effectiveness of market discipline
- A good reference is Flannery M. and S. Nikolova, 2004, "Market Discipline of U.S. Financial Firms: Recent Evidence and Research Issues," in Market Discipline across Countries and Industries, edited by C. Borio, W. Hunter, G. Kaufman, and K. Tsatsaronis, Cambridge, MA: MIT Press