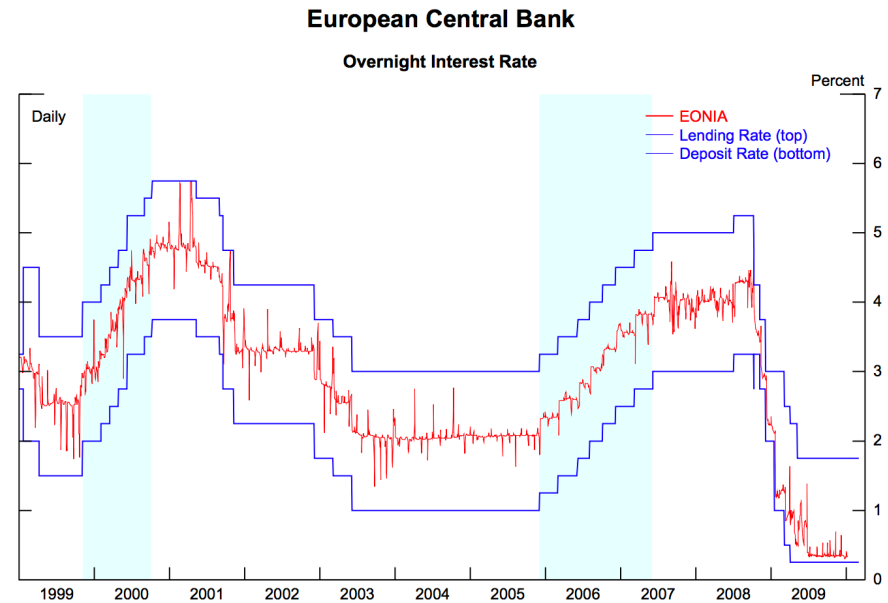


3 – The monetary system and financial markets



The monetary system and financial markets: an introduction

The plan:

1. Money
2. Bonds and interest rates
3. The Central Bank and monetary policy
4. The stock market

What is money?



*Money is a **financial asset** that serves simultaneously as:*

- medium of exchange*
- unit of account*
- store of value.*

Money is a IOU that everyone in the economy trusts

Clicker question

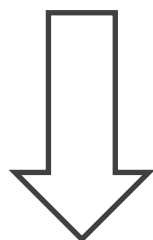


Money is debt. A banknote is a debt of the Central Bank. How does the Central Bank redeem its debt?

- A. with gold;
- B. with silver;
- C. with other banknotes/coins of equivalent value;
- D. it just does not (and cannot) redeem it;

Types of money

- In principle, any debt title could serve as money.
- But there are different degrees of acceptability (**liquidity**).

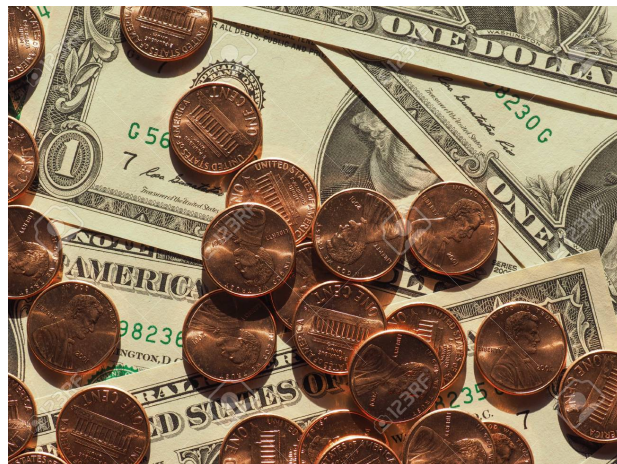


Hierarchy of money

The hierarchy of money

1. Government money [*narrow money*, $M0$]:
currency & bank reserves.
 2. Bank deposits:
saving & checking accounts.
- **Broad money** ($M2$) = 1. + 2.
 - Conventionally, we call **money** only the components of broad money (most liquid & widely accepted)

Currency



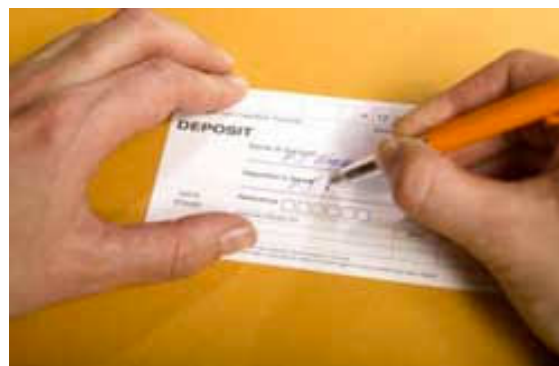
- banknotes & coins;
- they represent a debt of the Central Bank;
- in the past, redeemable in gold;
- today, *fiat money*: the C.B. honors its debt with money itself
 - you can go to the Fed and exchange your banknotes with other banknotes (or coins) of the same value.

Bank Reserves



- balances held by commercial banks at the Central Bank;
- debts of the CB towards commercial banks;
- convertible in currency at any moment;
- banks hold reserves to make payments to one another, and to have some liquidity to face withdrawals.
- Some CBs (e.g. the Fed) force banks to hold a certain amount of reserves (in the US, 10% of deposits).
 - Others (e.g. UK) don't.

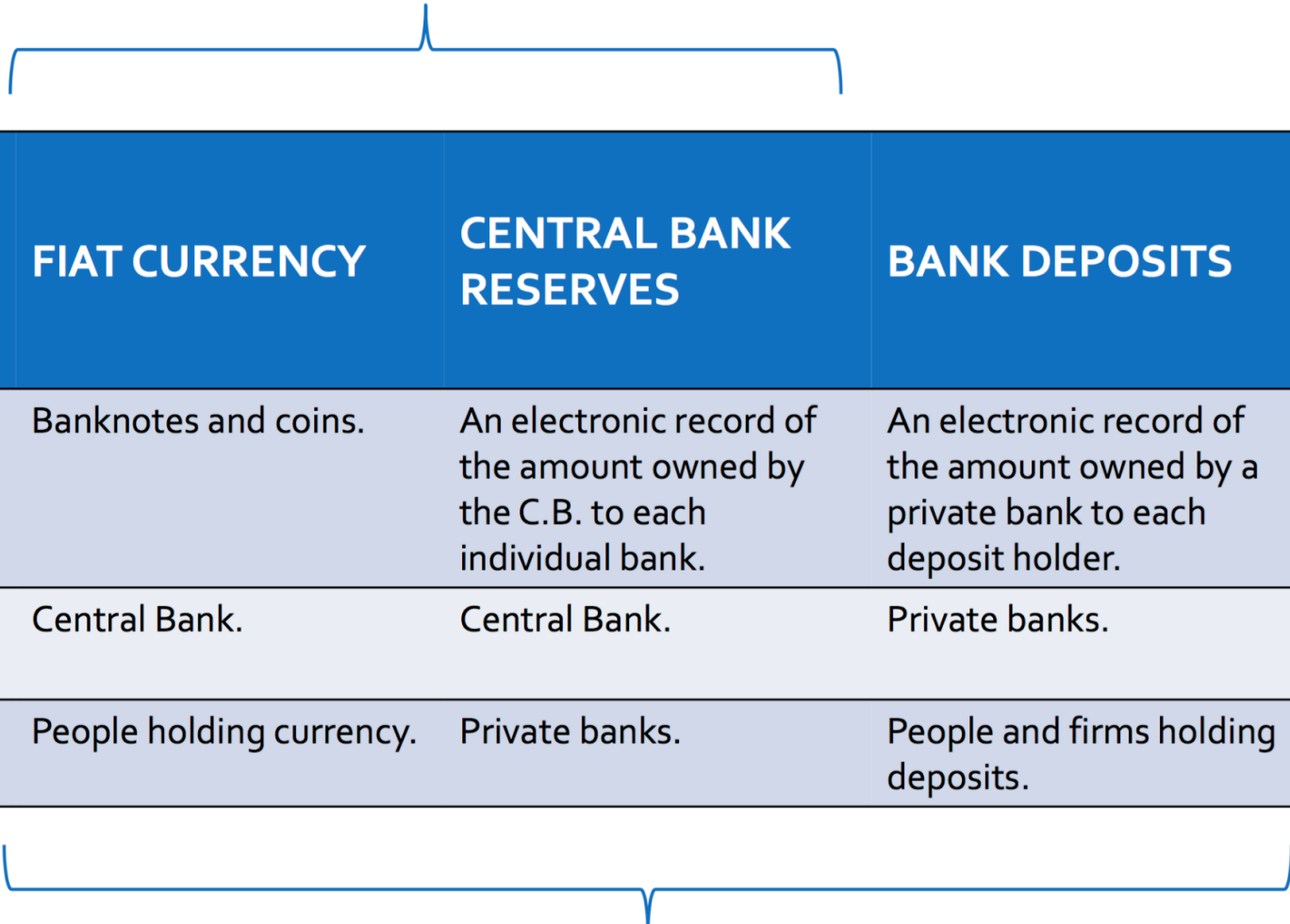
Bank deposits



- checking accounts and savings accounts.
- debts of commercial banks with their customers (households and firms).
- They are convertible in currency at any moment.

The broad money aggregate (M2)

Base money (or government money or narrow money)



	FIAT CURRENCY	CENTRAL BANK RESERVES	BANK DEPOSITS
Form	Banknotes and coins.	An electronic record of the amount owned by the C.B. to each individual bank.	An electronic record of the amount owned by a private bank to each deposit holder.
Issuer (Debtor)	Central Bank.	Central Bank.	Private banks.
Holder (Creditor)	People holding currency.	Private banks.	People and firms holding deposits.

Broad money

Why we trust money?

- To serve as money, a financial asset must be deeply trusted by the public.
- Why we trust currency and bank deposits so much?
- They are backed by the State, which will always accept them as tax payments.
- This ensures that they will always be in demand.

Money creation

- Money holdings by individuals & firms in the US (Aug 2019):
 - Currency: \$1,673 Billions (12%)
 - Bank deposits: \$11,715 Billion (88%)
- How are bank deposits created?
- For an individual bank: customers making deposits.
- BUT at the aggregate level *it is bank lending that creates deposits.*
 - *When a bank makes a loan, it credits money on the bank account of the borrower. This increases the amount of broad money (bank deposits) in the system.*

Money creation

What about **bank reserves**?

- they are provided '*on demand*' by Central Banks, in exchange for banks' assets.
- When new bank lending increases deposits, banks tend to demand more bank reserves (to face possible withdrawals or meet deposit requirements).
- Bank lending → Broad money → Base money

Money creation

common 'myths' (1):

~~*"Banks lend out the money that depositors entrust to them"*~~

- Actually, bank deposits are **liabilities** (debts) of the bank. Not funds that can be lent out.
- It is the **other way round**: bank lending → deposits

Banks are not just intermediaries of pre-existing funds. They are money-creators.

Money creation

common 'myths' (2):

~~*"The Central Bank fixes the quantity of money in circulation, by controlling bank reserves."*~~

- Banks do not (and cannot) lend out reserves to the public. Reserves are provided 'on demand'.
- Reverse causation: it is the amount of assets, loans and bank deposits that banks have that determines the quantity of reserves they want to hold.

It is the lending decisions of commercial banks that determine the quantity of money.

Limits to money creation by banks

1. Banks must be profitable to stay in business
 - can only make loans that they expect to be repaid *at the current interest rate*.
2. Demand for new loans is limited
 - volume of new loans depends also on the willingness of people/firms to take up new loans *at current interest rate*.
3. By repaying previous loans, households and firms reduce the quantity of money in circulation

(some of) your Qs on the reading

1. What is preventing too many people from asking banks for their deposits back all together in case they lose confidence in a bank? (Anmol)
2. There is always a topic of cryptocurrencies replacing fiat money and becoming the sole currency of the world. After reading this I feel it's not going to happen anytime soon because of its volatile nature and not enough confidence in it. (Tanishq);
3. Why do central banks hold foreign money? Wouldn't it be useless within that country's borders? (Matthew)
4. What are the differences between the stock market indexes, Dow Jones, NASDAQ, and S&P 500? (Sophia)

2 – Bonds & interest rates

- Firms can issue bonds & stocks
- **Bond:** a loan agreement;
- gives the right to receive a fixed payment from the bond issuer at a certain point in the future;



Example:

- A firm sells a 1-year bond that pays 110\$
- price of the bond: 100\$
- Interest rate: the rate of return earned by the bond buyer

$$i = \frac{\$110 - \$100}{\$100} = 0.10 = 10\%$$

Bond price and interest rate

- Interest rate on a 1-year bond:

$$i = \frac{x - P_B}{P_B}$$

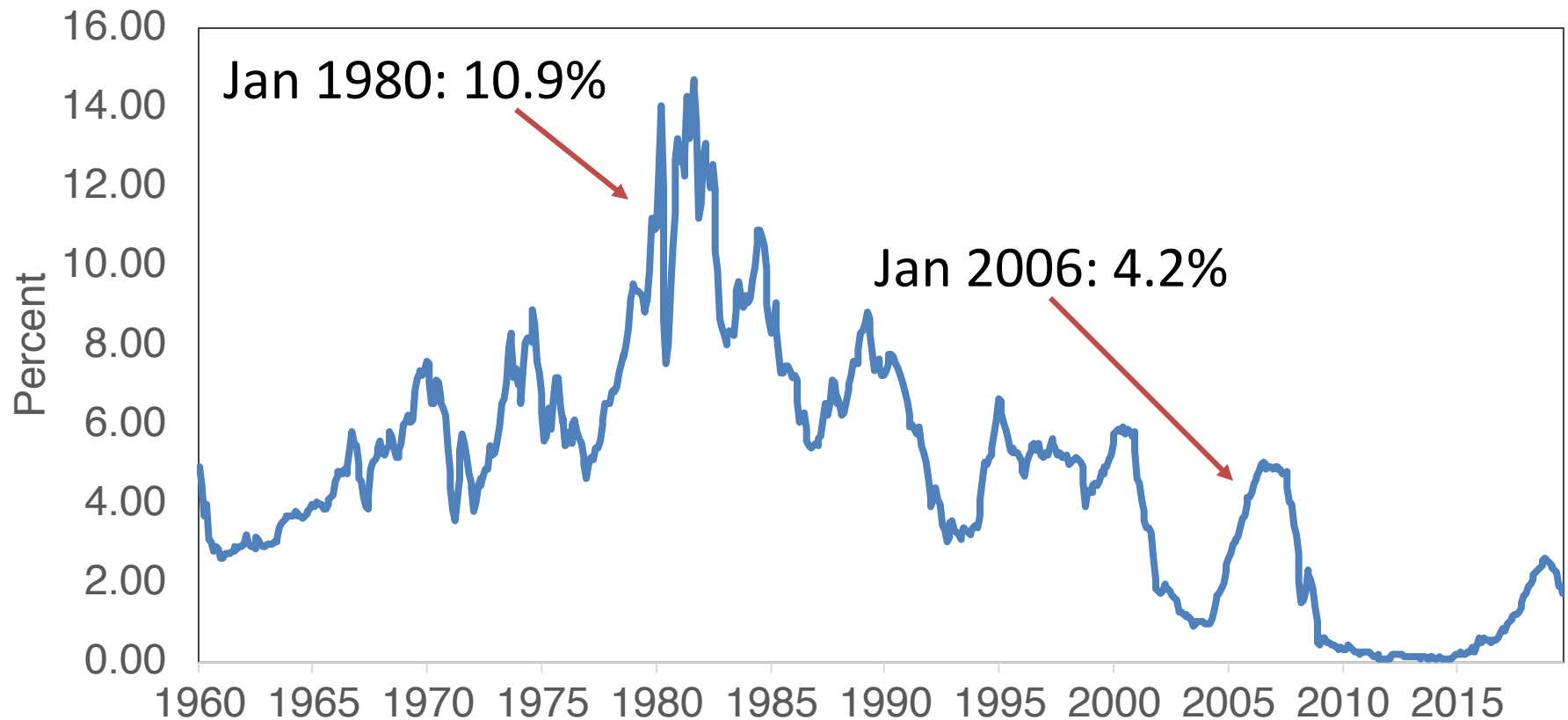
P_B =bond price; x =how much the bond will pay;

- Rearranging:

$$P_B = \frac{x}{1 + i}$$

- Inverse relation between P_B & i :
the higher the interest rate, the lower the price of a bond;

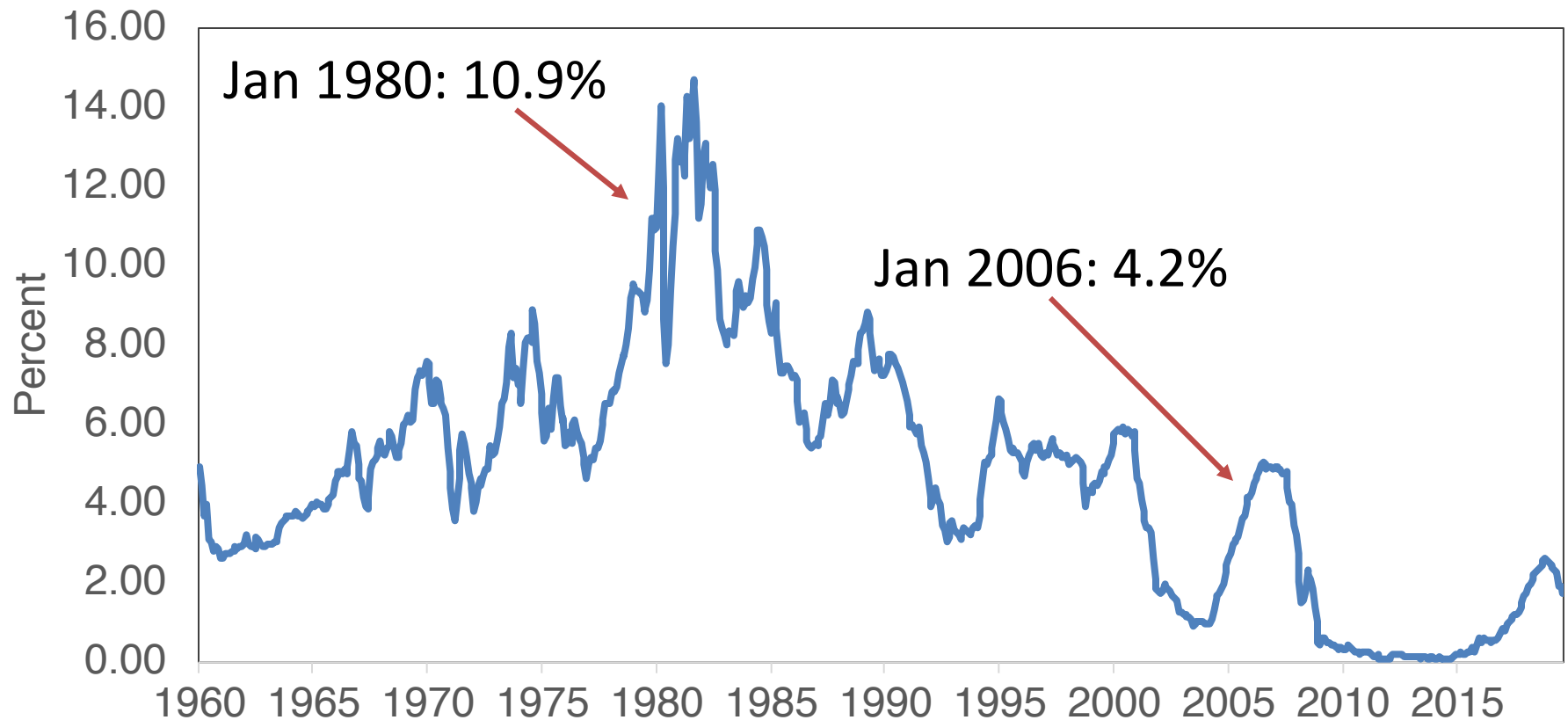
Interest rate on 1-year T-bills



Clicker question: Based on the info above, was a T-bill a better deal in 1980 or in 2006?

- A. better deal in 1980;
- B. better deal in 2006;
- C. not possible to say;

Interest rate on 1-year T-bills



Inflation: 9.5% in 1980; 2.5% in 2006

Nominal and real interest rate

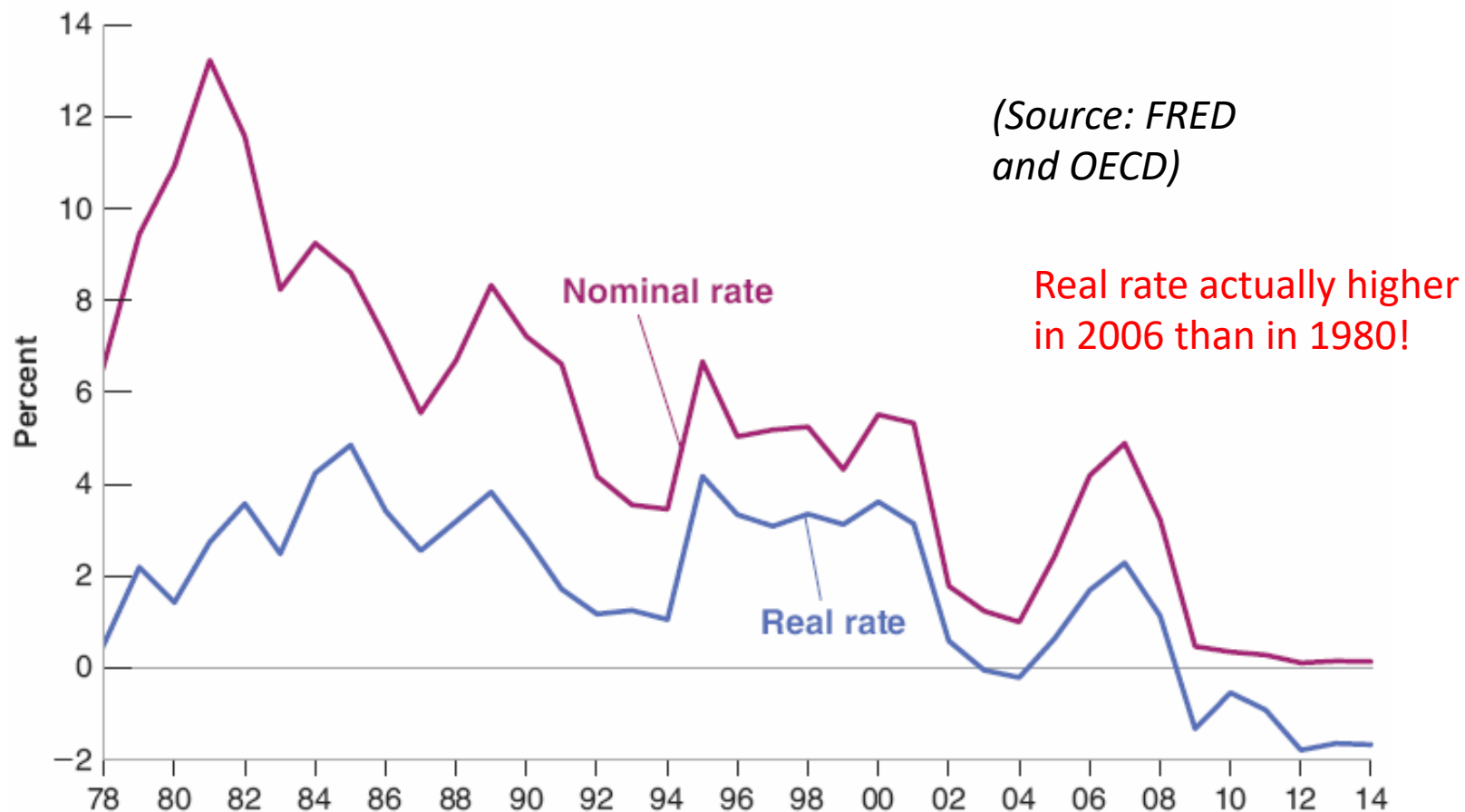
- *Nominal interest rate*: interest rate in terms of current dollars.
- *Real interest rate*: interest rate in terms of real purchasing power (or constant dollars).
- *Ex-post* (realized) real interest rate:

$$r_t \approx i_t - \pi_{t+1}$$

- *Ex-ante* (expected) real interest rate:

$$r_t \approx i_t - \pi_{t+1}^e$$

Nominal and real one-Year T-Bill Rates (US)



The nominal interest rate has declined considerably since the early 1980s, but because expected inflation has declined as well, the real rate has declined much less than the nominal rate.

Interest rates and risk premia

- What determines i for a particular bond?
 - economy-wide factors (monetary policy);
 - bond-specific factors: *maturity* & *riskiness*
- ignore maturity for now (assume all bonds are 1-year);
- interest rate on a given (risky) bond (i_R):
riskless interest rate (i) plus a risk premium (x_R)

$$i_R = i + x_R$$

- x_R depends on probability of default & degree of risk aversion of investors

Interest rates and risk premia

i = nominal interest rate on a riskless bond

x_R = risk premium

p = probability of defaulting

- To get the same *expected return* on the risky bond as on the risk-less one:

$$(1 + i) = (1 - p)(1 + i + x_R) + (p)(0)$$

- Which implies:

$$x_R = (1 + i) \frac{p}{1 - p}$$

Interest rates and risk premia

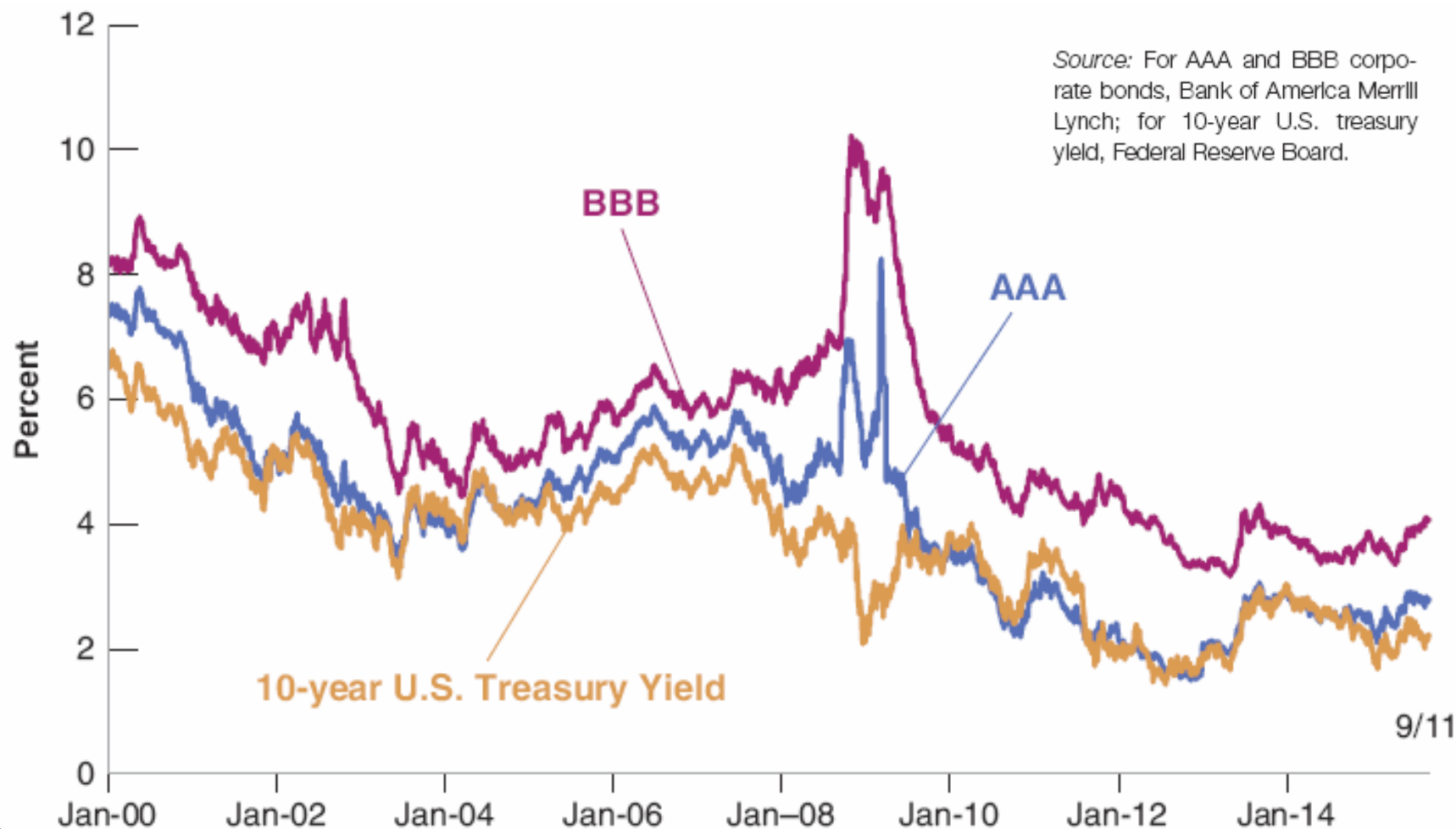
- Minimum required risk premium:

$$x_R = (1 + i) \frac{p}{1 - p}$$

- Takeaway: higher $p \rightarrow$ higher x_R ;
- Moreover, people are generally **risk averse**
 - certain gain of 100\$ preferred to a risky investment with expected value 100\$
- So we actually have $x_R > (1 + i) \frac{p}{1 - p}$
- The higher the risk-aversion of investors, the higher the interest rate on risky bonds.

2 – Bonds & interest rates

Yields on 10-Year U.S. Government bonds, AAA Corporate Bonds, and BBB Corporate Bonds



The Central Bank balance sheet

- **Liabilities** = debts; **Assets** = credits.
- Total value of **liabilities** = Total value of **assets**

Liabilities	Assets
Currency	Foreign exchange reserves
Commercial bank reserves	Securities
Government's account	Other items
(Capital)	

The CB's liabilities

- **Currency:**
 - banknotes and coins;
 - enter in circulation through commercial banks.
- **Banks' Reserves:**
 - reserve balances held by commercial banks at the CB.
- **Government's account:**
 - to receive money (including taxes) and to pay suppliers, employees and benefits.
- **Capital** = Assets minus Liabilities (residual item)

The CB's assets

- **Foreign exchange reserves:**
 - quantities of foreign currency (Euros, Sterlings, Yen, ...);
 - to make sure the country meets external obligations;
 - also used to influence exchange rates;
 - held in the form of safe short-term assets.
- **Securities:**
 - domestic financial assets, mainly short-term Gov't bonds;
 - bought and sold during open market operations.
- **Other items:**
 - buildings, gold bars,

Monetary policy

- The Central Bank sets the risk-less interest rate in the economy;
- it does so by controlling the **overnight inter-bank rate**: the rate at which banks lend reserves to each other *overnight*;
 - (in the US, this is called the *Federal Funds Rate*).
- the CB decreases the interest rate when it wants to increase GDP growth and reduce unemployment;
- it raises the interest rate when it wants to cool down the economy to reduce inflation.

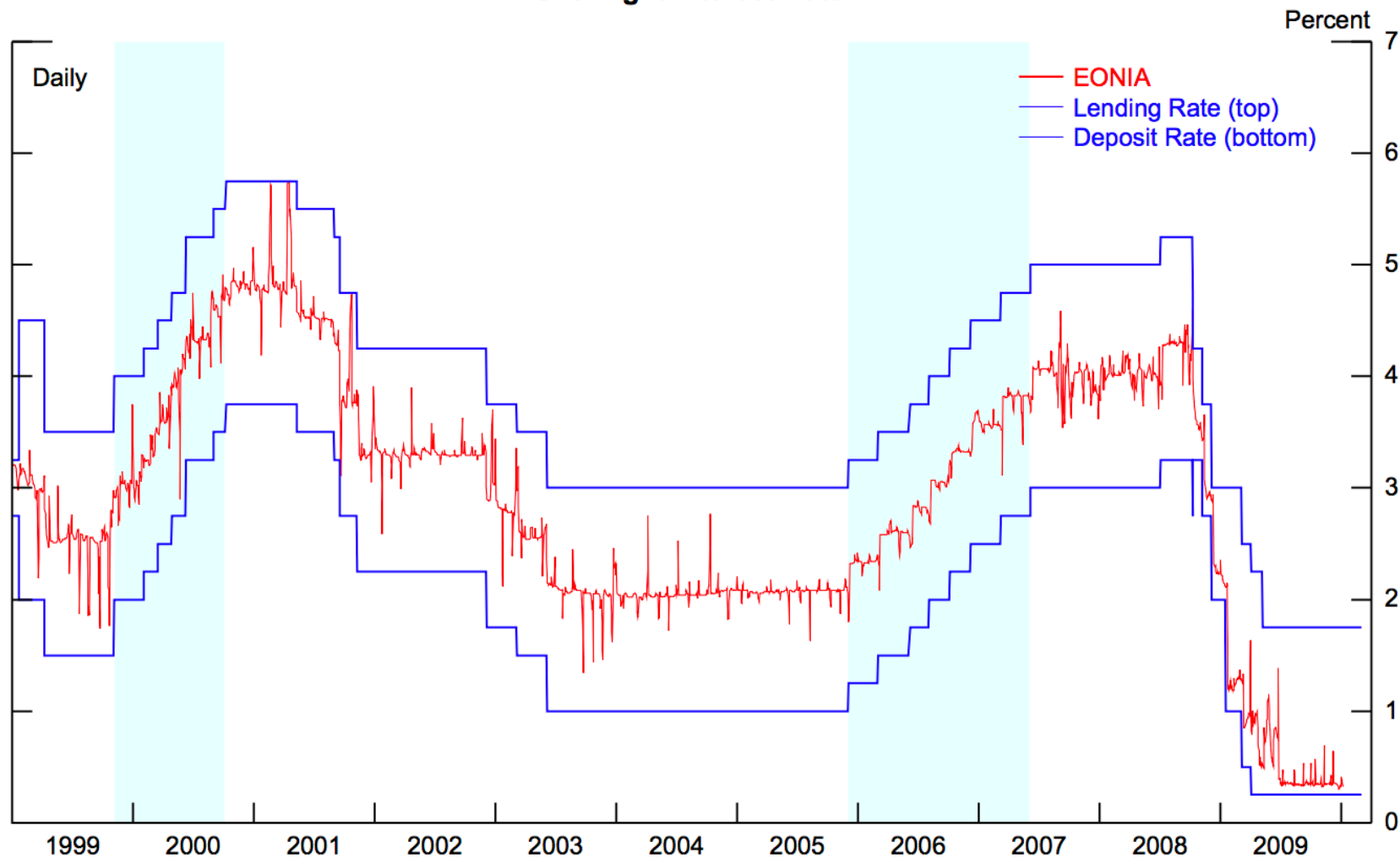
Monetary policy

- Alternative ways of controlling the overnight inter-bank rate:
 - Open Market Operations:
 - CB exchanges securities for reserves with banks;
 - changes the supply of reserves until their price (the overnight interest-rate) reaches the desired level;
 - used by the US Federal Reserve.
 - Corridor System:
 - *lending facility rate* (ceiling);
 - *deposit facility rate* (floor);
 - the overnight inter-bank rate always lies between the two.
 - used by ECB, BoE, BoC, ...

2 – The CB & monetary policy

European Central Bank

Overnight Interest Rate



Bank runs

- Commercial banks tend to have a *liquidity mismatch*: long-term assets vs. short-term liabilities;
- a ‘bank run’ can cause a financially sound bank to fail;
- self-fulfilling prophecies;
- ‘domino’ effects.
- Solvency crisis vs. liquidity crisis



The CB as a lender of the last resort

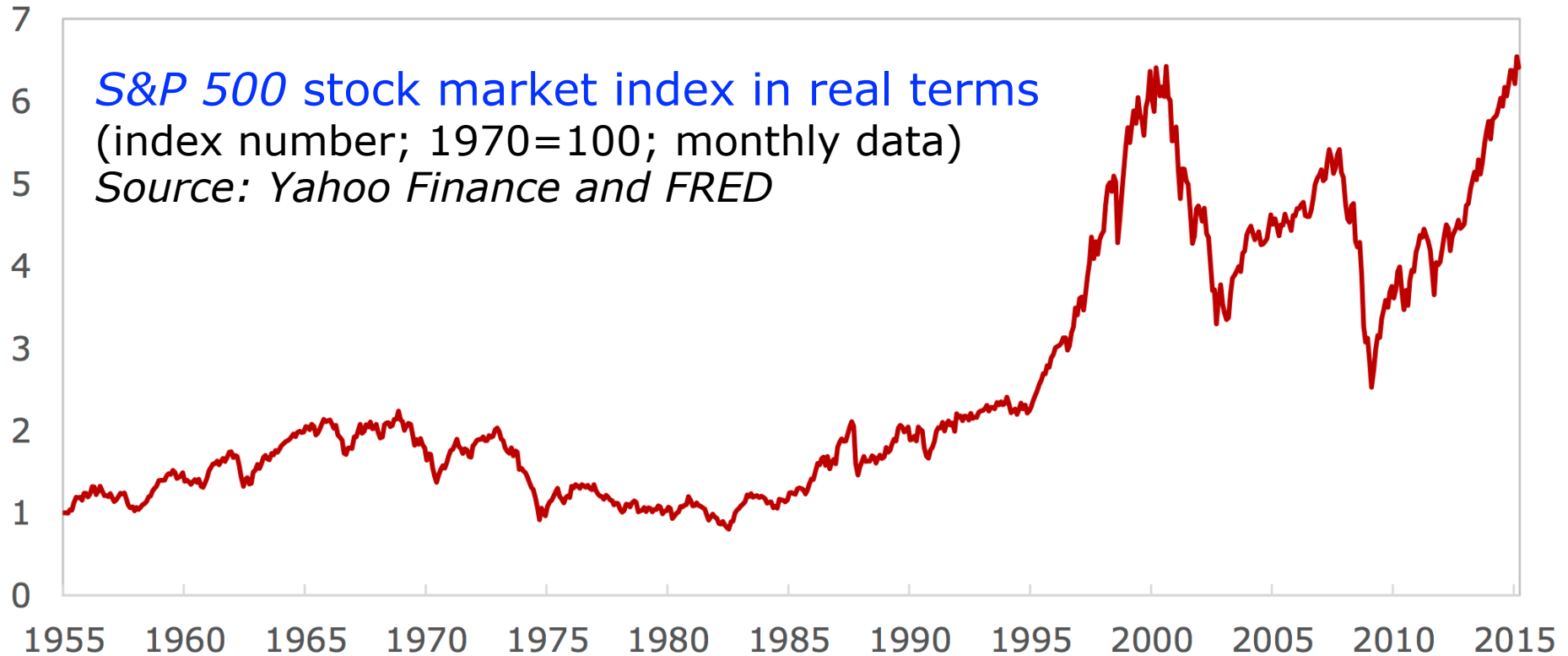
- Before the Fed existed, bank runs were common;
- Fed founded after the 'Panic of 1907';
- original mission: provide emergency loans to banks facing a liquidity crisis;
- *moral hazard* problem: unconditional insurance might induce irresponsible behavior;
- Fed should save only *solvent* banks; but sometimes it's hard to tell;
- *deposit insurance* ended bank runs by depositors, but other forms of runs still possible.

The stock market

- Firms finance their investments through:
 - Internal finance: their own profits;
 - External finance: Bank loans, bonds & stocks.
- By buying a stock, you acquire a fraction of the ownership of the firm.
- This gives you the right to receive **dividends** (your share of non-reinvested profits).
- Being a share of profits, dividends are very correlated with profits: the higher the profits of the firm, the higher the dividends it can pay.

Stock market indexes

- Track overall stock market movements.
- In the US: *S&P 500* (500 large companies)



What moves stock prices?

- price of a stock = present (discounted) value of all the future dividends that the stock is expected to provide;
- the higher a firm's expected profits, the higher the price of its stocks;
- on aggregate, the higher expected total profits in the economy, the higher average share prices;
 - GDP growth and the share of profits in GDP positively influence stock prices;
- the higher the interest rate, the lower average share prices.