Lecture 9

Market of goods and services, financial market

Dr. Anna Kowalska-Pyzalska
Department of Operations Research (W-8)

Presentation is based on:
http://www.swlearning.com/economics/mankiw/mankiw3e/powerpoint_more.html

Markets

There are three markets in the economy:

1. Market of production factors
2. Goods market
3. Financial market

Determinants of the national income in the long run

- Assumptions of the economy in the long run:
  - The prices of goods and the factors of production are flexible.
  - The output is adjusted to full-employment level (only natural unemployment rate)

Market of production factors

Demand:
- Firms

Supply:
- Households

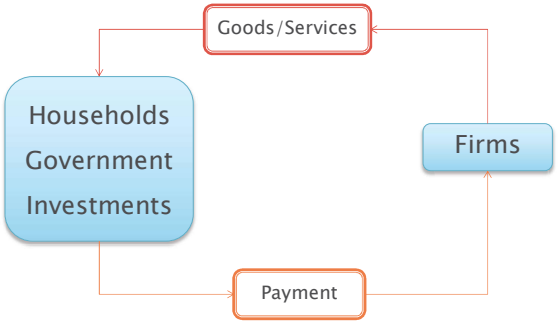
Equilibrium:
- Demand = Supply
- How … by adjustment of wages and rents.

Market of goods and services

Goods and services are purchased by:
- households (consumption and investments),
- firms (investments)
- government

Goods and services provided by:
- firms

Goods and services market



Demand…

- In the closed economy GDP depends on the aggregated demand (C + I + G)

Financial market

Financial market is a market, where households, firms and government:

- deposit their savings
- borrow money in order to finance investments
  - buy a house
  - build a new factory
  - renew capital stock
  - cover budget deficit.

Financial market

Demand for loans:

- Investors: households, firms and government

Supply of funds:

- Households
- Government

Demand and supply affected by the **interest rate** (market price of borrowed money)

Market of goods and services

- Total demand, personal consumption, government expenditure and investments

Determinants of demand for goods

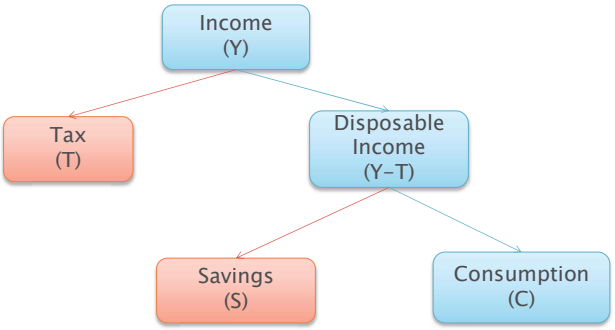
There are four main determinants of the demand for goods and services

1. Consumption (C)
2. Investment (I)
3. Government purchases (G)
4. Net Export (NX)

Assumption: the economy is closed (NX=0)

Consumption

Personal consumption



Consumption

Consumption is a function of a **disposable income**

$$C = MPC(Y - T)$$

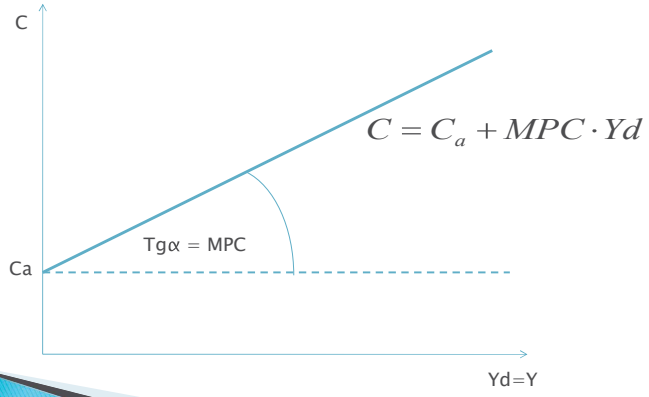
The **marginal propensity to consume** (MPC)

$$MPC = \frac{\partial C(Y_D)}{\partial Y_D}$$

MPC – how much the consumption increases when a disposable income increases by one

MPC – a first derivative of consumption with respect to disposable income

Consumption function



Questions

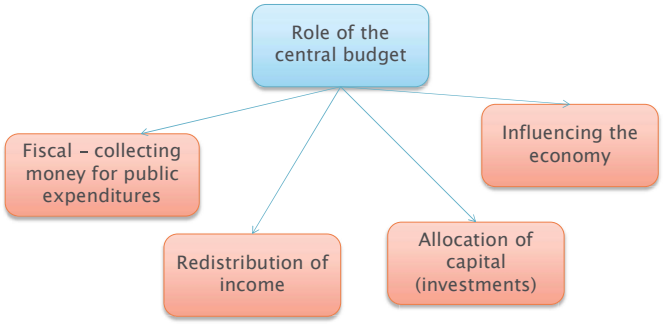
The consumption function

$$C = 100 + 0.7(Y - T)$$

1. What is the MPC?
2. Suppose the disposable income increases by 100. What could be a reason for the rise?
3. If the disposable income increase by 100, how much will the consumption change?
4. Suppose taxes increase by 10. How does the change affect the disposable income and consumption?

Government expenditure

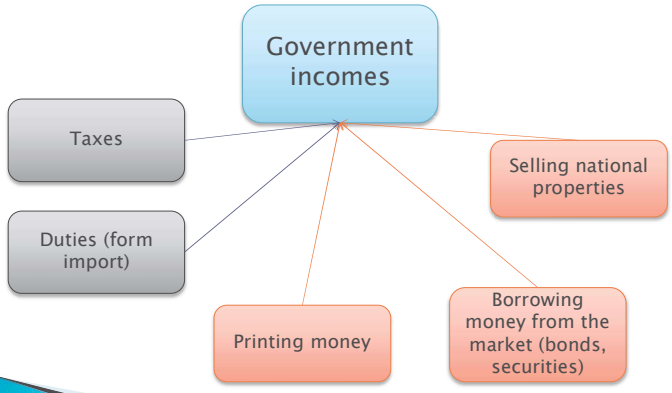
Role of the central budget



Government expenditure

- Defense and public administration
- Supporting social and cultural development
- Income allocation (transfers, benefits ect.)
- Investments in infrastructure
- For international organizations such as EU (5% of expenditures)

Government incomes



Taxes and government purchases

Government budget is **balanced** if

$$G = T$$

Most countries have a **budget deficit**.

$$G > T$$

Some countries have a **budget surplus**.

$$G < T$$

Budget

Countries with budget deficit

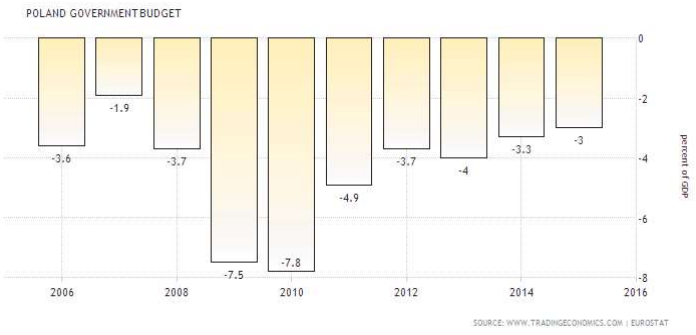
Country	Budget deficit (as % of GDP, 2016)
United Kingdom	−3,8%
Poland	−2,8%
Venezuela	−39,9%

And surplus

Country	Budget surplus (as % of GDP, 2016)
Norway	2,9%
Germany	0,6%

http://www.worldatlas.com/articles/countries-with-the-top-budget-surplus.html

Polish budget deficit (% of GDP)



Questions

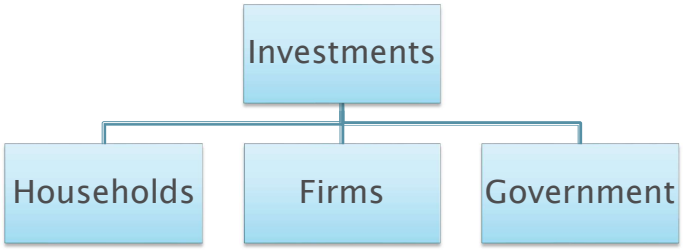
What happens to the budget deficit when government decides to:

1. increase wages in the public sector without rising taxes (all other expenditures are fixed)?
2. increase the VAT tax without rising its spending?
3. increase taxes and expenditure by the same amount?

What do you think, how the budget deficit is financed?

Investments

Investments



Investments

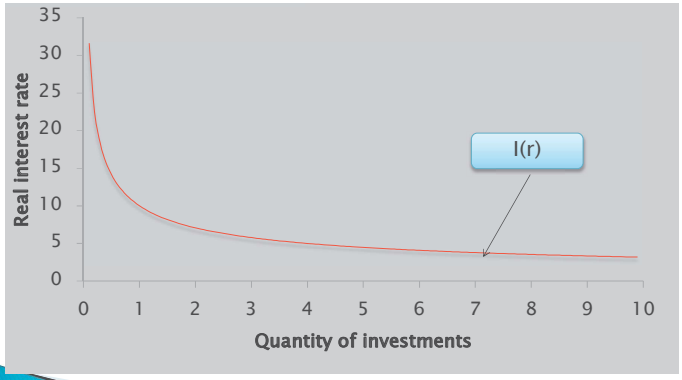
The amount of investments is a function of an interest rate

$$I = I(r)$$

Investment curve:

- downward sloping
- the higher the interest rate the lower investments

Investments



Interest rate

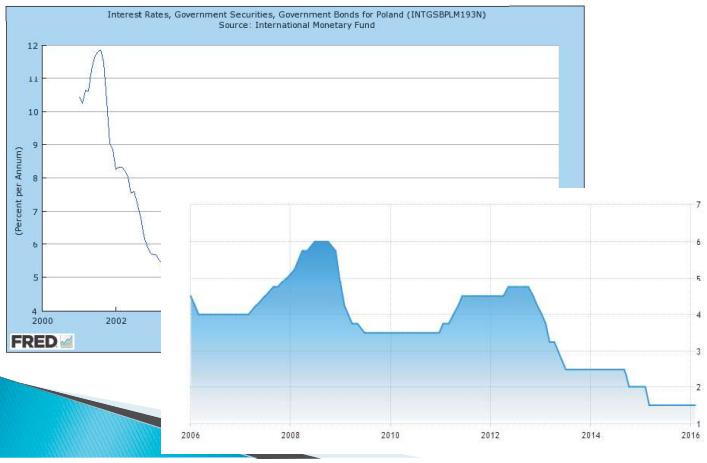
Two interest rates

- a nominal interest rate
- a real interest rate

Nominal interest rate: interest rate paid to banks for loans

Country	Interest rate (2017)
Poland	1.5%

Interest rate – Poland

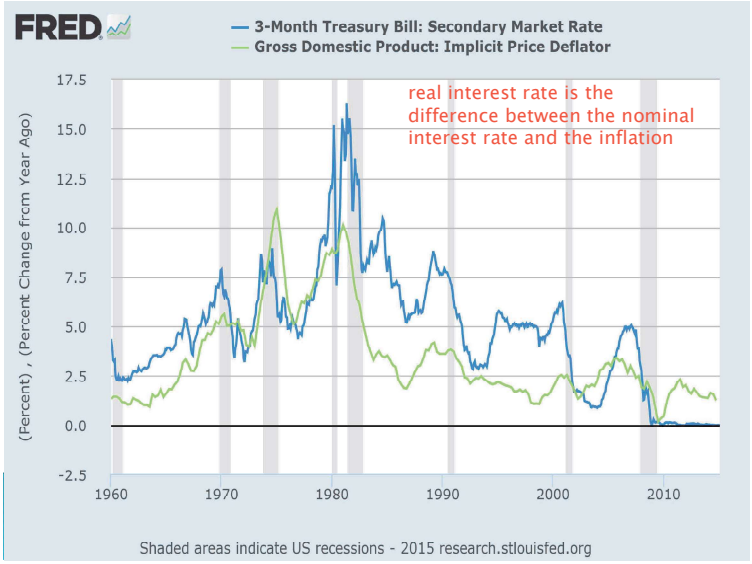


Real interest rate

Real interest rate takes into account inflation

- Increase together with nominal interest rate (i)
- Decreases with inflation (π)

$$r = i - \pi$$



Financial market

Savings and investments

Investments

Investments are common for:

- Market of goods and services
- Financial market

In the financial market:

- Determine the demand for loans

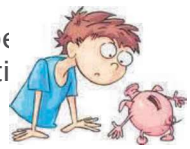
Savings

Savings:

- Determines the supply of loanable funds

Private savings are the difference be
disposable income and consumpti

$$S_P = (Y - T) - C$$



Public savings are the difference between collected taxes and government purchases.

$$S_G = T - G$$

Savings

How do private savings depend on the disposable income?

Disposable income increases by 1:

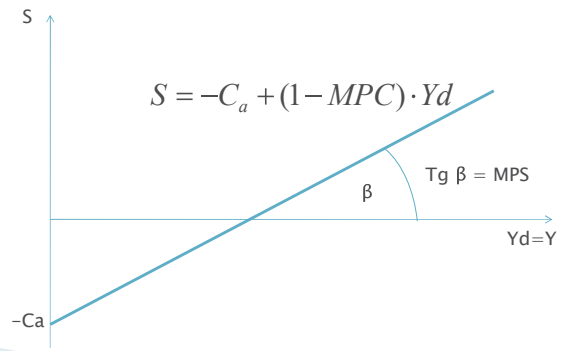
- Consumption: $\Delta C = MPC$
- Savings: $\Delta S_p = \Delta(Y - T) - \Delta C = 1 - MPC = MPS$

Savings

Marginal propensity to save: how much the private savings will change, when a disposable income increases by 1.

$$MPS = 1 - MPC$$

Savings function



Example

- Calculate income if the consumption function is given as C=80+0.8Y, and savings are equal zero?

Example

- Consumption function is given as: C=60+ 0.6Y.
- Draw the consumption and savings functions.
- Mark the area where savings are positive and negative.
- For what level of income, savings are equal zero?
- How will the consumption function change if the MPC is 0.9?

Savings

The **national savings** (S)

$$S = S_P + S_G$$

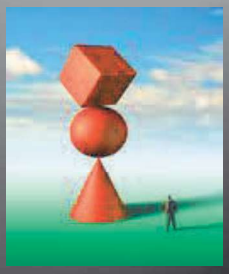
It can be shown that

$$S = Y - C - G$$

Remark: here we assume that savings do not depend on the interest rate.

Equilibrium

- Goods/services and financial market



Market of goods and services

In the equilibrium *we have national income accounts identity:*

$$Y = C + I + G$$

We know that

- Consumption: $C = MPC(Y - T)$
- Investments: $I = I(r)$
- Government expenditures: $G = \bar{G}$
- Taxes: $T = \bar{T}$
- Y=f($\bar{K}$, $\bar{L}$)= $\bar{Y}$ (output supplied to the economy)

Market of goods and services – solution

- Capital and labor are given so is
$$Y = \bar{Y}$$
- Consumption
$$C = MPC(\bar{Y} - \bar{T}) = \bar{C}$$
- In the **equilibrium**

$$\boldsymbol{I(r) = \bar{Y} - \bar{C} - \bar{G}}$$

Equilibrium

Suppose, if the interest rate increases:

- Investments drop
- Total demand for goods and services falls

If interest rate falls:

- Investments and total demand increases

In the equilibrium: the interest rate is set to ensure that ***the demand meets the supply***

Financial markets

- Interest rate is the cost of borrowing and the return to lending in the financial markets.
- **I = Y – C– G = S**
- Output that remans after the demand for (C+G) is satisfied is called national saving.
- We devide national saving into private and public saving.
- (Y–T–C) + (T–G) = I

Financial market

In the equilibrium *demand and supply of loanable funds are equal*

$$S = I(r)$$

Hence

$$I(r) = \bar{Y} - \bar{C} - \bar{G}$$

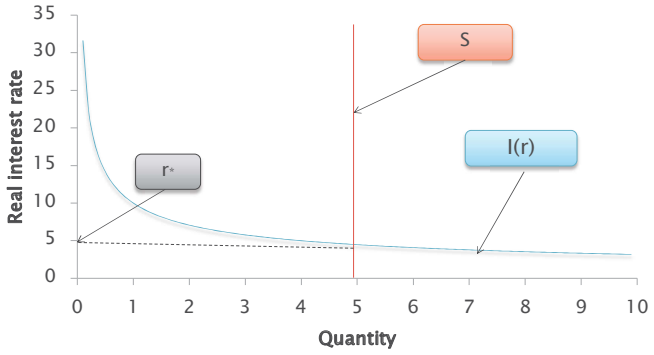
Remark: this condition is the same as in the market of goods and services!!!

When I(r) = S…

- S: supply of loanable funds → households lend their savings to investors or deposit them in a bank that then loans the funds out
- I: demand for loanable funds → investors borrow from the public directly by selling bonds or indirectly by borrowing from banks.

Equilibrium

In the equilibrium: households' desire to save balances the firms' desire to invest…

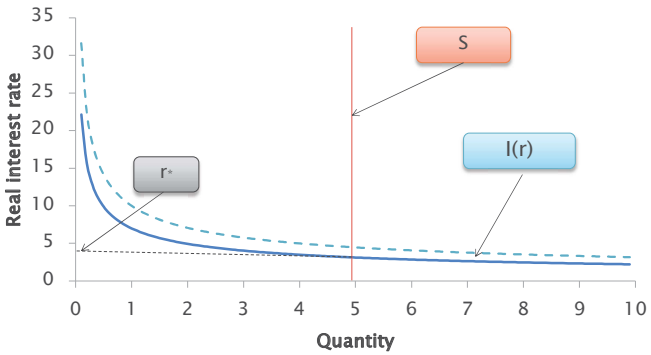


Changes in investment level

What will happen if entrepreneurs change their attitude toward investments and start consider them as more risky?

- The investment function will move to the left: for the same interest rate they will decide to borrow less money.
- The interest rate must fall.

Equilibrium



Examples

Analytical, Greece

Example 1: equilibrium interest rate

- Suppose, there is an economy with
  - Y=5000
  - G=1500
  - C = 1000 + 0.5(Y-T)
  - T = 1000
  - I = 1500-100r
- What is the equilibrium interest rate?

Example 1: equilibrium interest rate

- First, lets compute consumption level
  - C = 1000 + 0.5(5000-1000)=3000
- Then, savings level:
  - Private savings: (Y-T)-C = 1000
  - Public savings: T-G=-500
  - Total savings: 500
- Equilibrium condition:
  - I(r)=S
  - Interest rate: 10%

Example 1: equilibrium interest rate

- What will happen, if taxes increases to 1500 (no budget deficit)?
  - Consumption: 2750 (↓)
  - Private savings: 750 (↓)
  - Public savings: 0 (↑)
  - Total savings: 750 (↑)
  - Interest rate: 7.5% (↓)

Example 1: equilibrium interest rate

What happens, if for some exogenous reasons, the tax income falls to 500?

- Consumption: 3250 (↑)
- Private savings: 1250 (↑)
- Public savings: -1000 (↓)
- Total savings: 250 (↓)
- Interest rate: 12.5% (↑)

Example 1: equilibrium interest rate

The results of more loose or tight fiscal policy:

- Increase of budget deficit leads to higher interest rate and higher consumption
- Decrease of budget deficit leads to lower interest rate and higher savings

Example 2: fall of production

- Suppose now that taxes are proportional to income:
  - T=0.2Y
  - In previous example: T=0.2*5000=1000
- What will happen, if for some exogenous reasons, the production falls (to 4000) but the government expenditure remains unchanged?

Example 2: fall of production

Lets consider the economy with Y=4000

- Taxes: 800
- Consumption: 2600 (↓)
- Private savings: 600 (↓)
- Public savings: -700(↓)
- Total savings: -100 (↓)
- Interest rate: 16% (↑)

Example 2: fall of production

- When budget expenditure doesn't change according to the total income, a negative shock to the production (as in crises), leads to:
  - Lower level of consumption and investment
  - Higher budget deficit
  - Higher interest rate
- What will happen, when the economy unexpectedly grows?

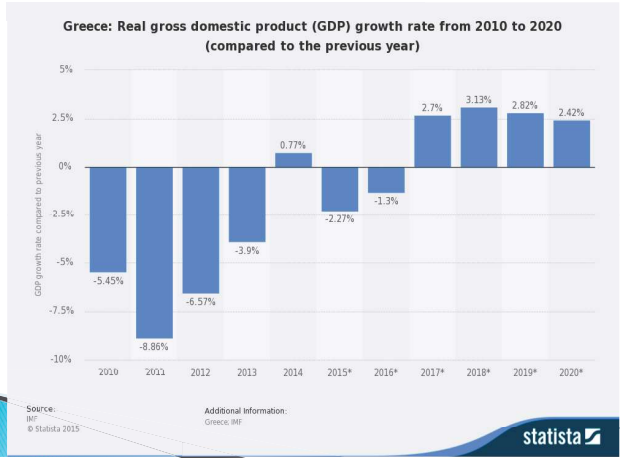
Example 3 – Greece

Since 2009 Greece is in crisis:

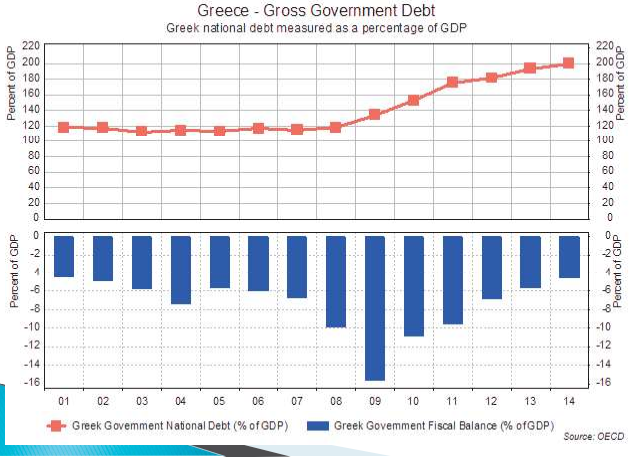
- Falling GDP
- Huge budget deficit
- Large unemployment

According to presented theory, how the crisis could affect the interest rate?

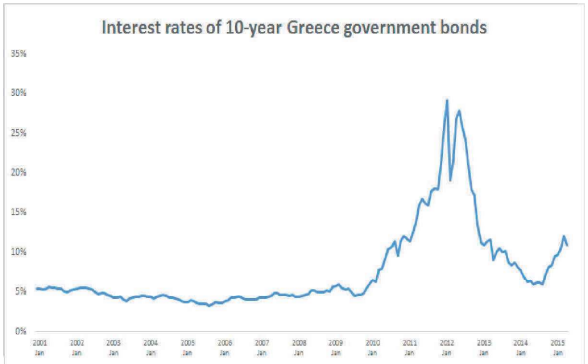
Greece – GDP growth



Greece –budget deficit



Greece – the total debt relative to the GDP



https://en.wikipedia.org/wiki/Greek_government-debt_crisis

Summary

- There are two main markets: a market of goods and services and a financial market.
- The equilibrium for a market of goods and services

$$I(r) = \bar{Y} - \bar{C} - \bar{G}$$

- The equilibrium for a financial market

$$S = I(r)$$

- Interest rate brings the market into a balance. It is affected by:
  - Fiscal policy
  - Budget deficit