Lecture 8

National accounts
GDP deflator and CPI

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

In this lecture, you will learn…

…the meaning and measurement of the **most important macroeconomic statistics:**

- Gross Domestic Product (GDP)
- The Consumer Price Index (CPI)
- Unemployment rate

Measures of economic activity

- Incomes and expenditures
- GDP and GNP

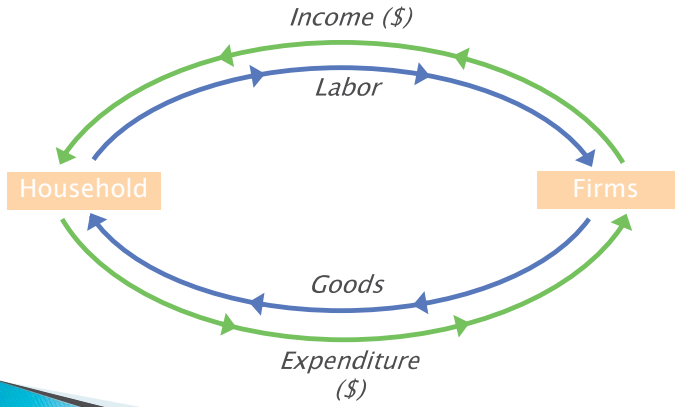
Gross Domestic Product (GDP): Expenditure and Income

Two approches:

- Total expenditure on domestically-produced final goods and services.
- Total income earned by domestically-located factors of production.

Expenditure equals income because every dollar spent by a buyer becomes income to the seller.

The Circular Flow



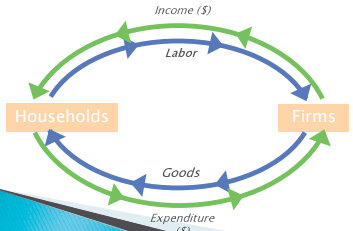
GDP

GDP (Gross domestic product) measures the flow of money in the economy

It measures the market value of all final goods and services produced within an economy in a given period of time.

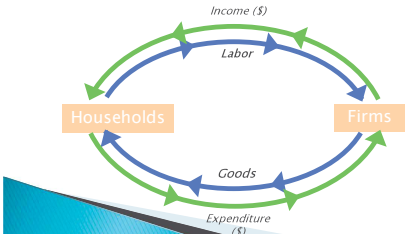
Components of expenditure

- Consumption (C)
- Government expenditure (G)
- Investments (I)
- Net export (difference between Export and Import) (NE)



Components of income

- Wages
- Rents
- Interests
- Profits



Components of GDP

1. Consumption
2. Government expenditure
3. Investments
4. Net export

→ Added value of the economy →

1. Wages
2. Rents
3. Interests
4. Profits

A firm's **value added** is the value of its output minus the value of the intermediate goods the firm used to produce that output.

Exercise:
compute and compare value added at each stage of production

- A farmer grows a bushel of wheat and sells it to a miller for $1.00.
- The miller turns the wheat into flour and sells it to a baker for $3.00.
- The baker uses the flour to make a loaf of bread and sells it to an engineer for $6.00.
- The engineer eats the bread.

Final goods, value added, and GDP

- GDP = value of final goods produced
  = sum of value added at all stages of production.
- The value of the final goods already includes the value of the intermediate goods, so including intermediate and final goods in GDP would be double-counting.

Consumption (C)

The value of all goods and services bought by households. Includes:

- ***durable goods***
  last a long time
  ex: cars, home appliances
- ***nondurable goods***
  last a short time
  ex: food, clothing
- ***services***
  work done for consumers
  ex: dry cleaning, air travel.

Investment (I)

- Spending on newly produced capital goods
- Spending on goods bought for future use

Includes:

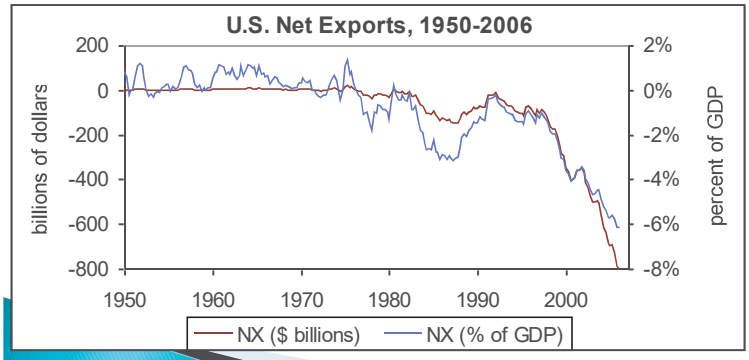
- ***business fixed investment***
  Spending on plant and equipment that firms will use to produce other goods & services.
- ***residential fixed investment***
  Spending on housing units by consumers and landlords.
- ***inventory investment***
  The change in the value of all firms' inventories.

Government spending (G)

- **G** includes all government spending on goods and services.
- **G** excludes transfer payments and welfare (e.g., unemployment insurance payments), because they do not represent spending on goods and services.
- People who receive transfer payments use these funds to pay for their consumption. Thus, we avoid double-counting by excluding transfer payments from **G**.

Net exports: NX = EX – IM

The value of total exports (**EX**)
minus the value of total imports (**IM**).



An important identity

$$Y = C + I + G + NX$$

value of total output

aggregate expenditure

GDP can be defined as the total expenditure on the economy's output of goods and services (as well as total income). We can also define GDP as (the value of) aggregate output, not just spending on output.

GDP:
An important and versatile concept

We have now seen that GDP measures

- total income
- total output
- total expenditure
- the sum of value-added at all stages in the production of final goods

This is why economists often use the terms **income**, **output**, **expenditure**, and **GDP** interchangeably.

GNP vs. GDP

- Gross **National** Product (GNP):
  Total income earned by the nation's factors of production, regardless of where located.
- Gross **Domestic** Product (GDP):
  Total income earned by domestically-located factors of production, regardless of nationality.

(GNP – GDP) = (factor payments from abroad)
– (factor payments to abroad)

A film:
http://www.investopedia.com/video/play/explaining-gdp-vs-gnp/

GNP ver. GDP...

- Difference: **location** of the economic activity, and **ownership** (domestic vs. foreign) of the factors of production.

From the perspective of Poland: factor payments from abroad	Factor payments to abroad
wages earned by Polish citizens working abroad	wages earned by foreign workers in Poland
profits earned by Polish -owned businesses located abroad	profits earned by foreign-owned businesses located in Poland
income (interest, dividends, rent) generated from the foreign assets owned by Polish citizens	income (interest, dividends, rent) that foreigners earn on Polish assets

(GNP – GDP) as a percentage of GDP

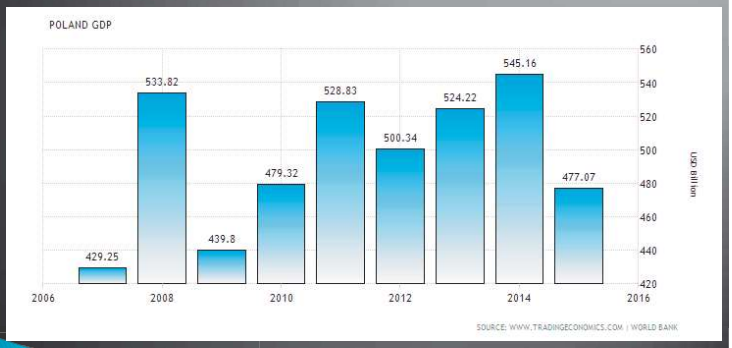
selected countries, 2002

In Canada, GNP is 1.9% smaller than GDP. It means that about 2% of all the income generated in Canada is taken away and paid to foreigners.

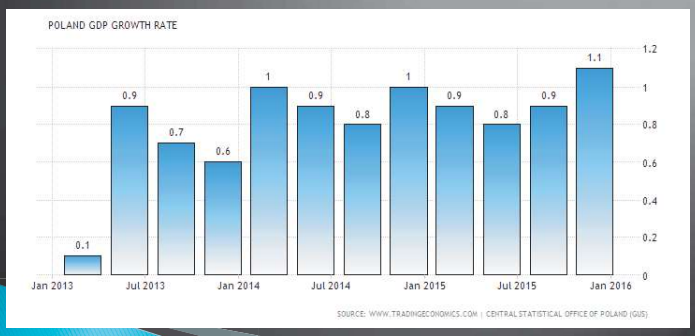
Kuwait's GNP is 9.5% bigger than its GDP. This means that the income earned by the citizens of Kuwait is 9.5% larger than the value of production occurring within Kuwait's borders.

U.S.A.	1.0%
Angola	-13.6
Brazil	-4.0
Canada	-1.9
Hong Kong	2.2
Kazakhstan	-4.2
Kuwait	9.5
Mexico	-1.9
Philippines	6.7
U.K.	1.6

GDP in Poland



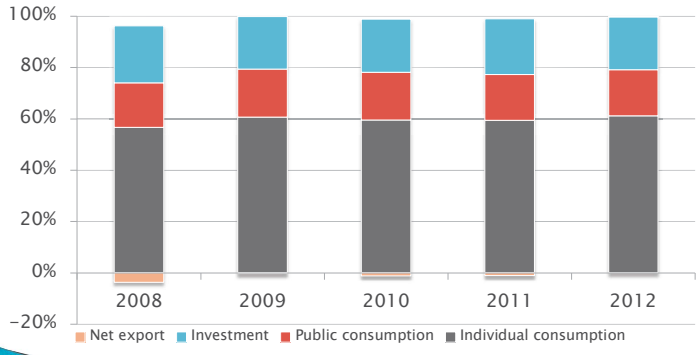
GDP growth rate



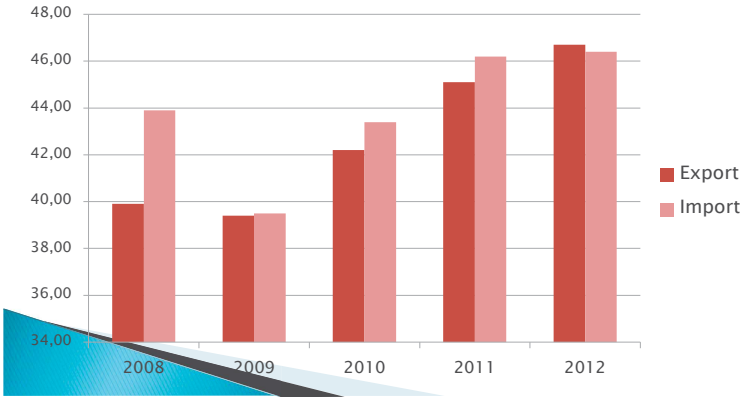
GDP structure in Poland

- Poland was the only country in Europe to avoid a recession through the 2008-09 economic downturn, and additionally has grown at the highest rate on the continent.
- The growth slowed in 2012 and 2013, in part due to the ongoing economic difficulties in the euro zone.
- GDP structure:
  - household consumption: 60%
  - gross fixed capital investment: 20%
  - government expenditure: 18%
  - net export: 1% (export 47% and import 46%)

GDP structure in Poland



Export and import – Relation to GDP

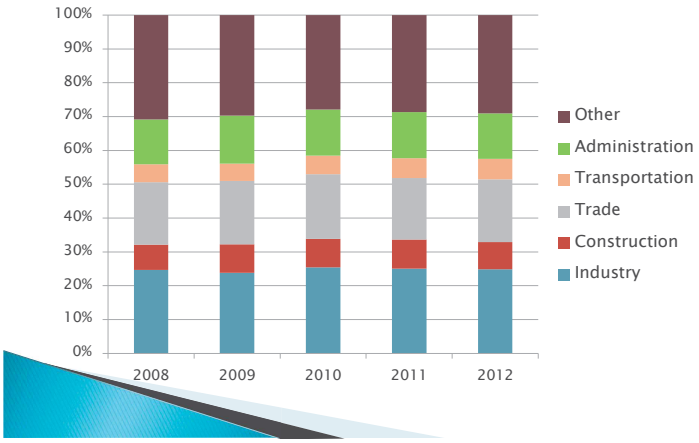


GDP structure

GDP can be divided according to the production sector.

- Manufacturing
- Construction
- Trade
- Transport
- Public administration (public administration, education, national defense)

GDP structure in Poland



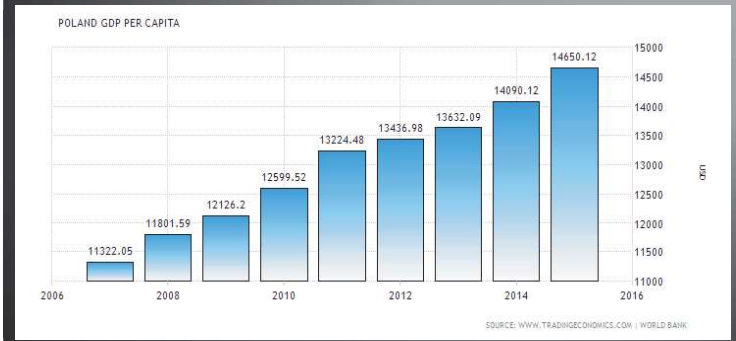
National income accounting

- GDP per capita

GDP per capita

GDP per capita: GDP divided by the number of citizens

GDP per capita



GDP per capita

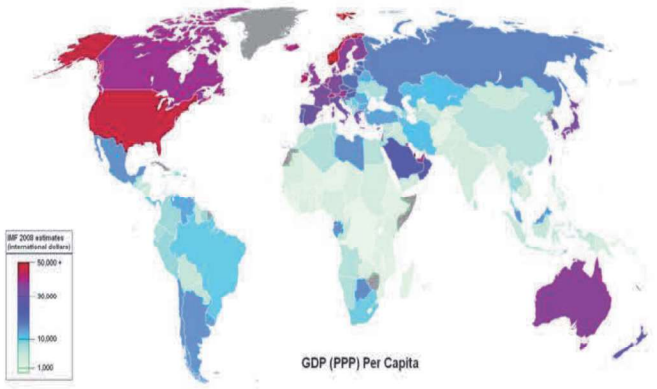
What does influence the GDP per capita?

1. Change of GDP (economic growth)
2. Population (demographic changes)

$$\%\Delta GDP_c \cong \%\Delta GDP - \%\Delta Population$$

Example: GDP grows by 5% and population increases by 1% …. Then GDP per capita rises by 4%

GDP per capita

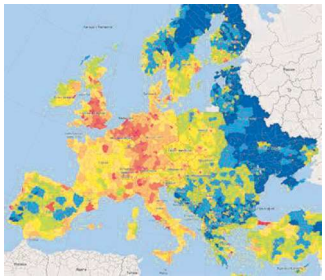


PPPs – Purchasing Power Parities

- indicators of price level differences across countries
- PPPs tell us how many currency units a given quantity of goods and services costs in different countries

http://www.gfk.com/insights/news/mom-1116/

http://ec.europa.eu/eurostat/statistics-explained/index.php/Purchasing_power_parities_in_Europe_and_the_world



Measures of economic activity

- prices

Prices

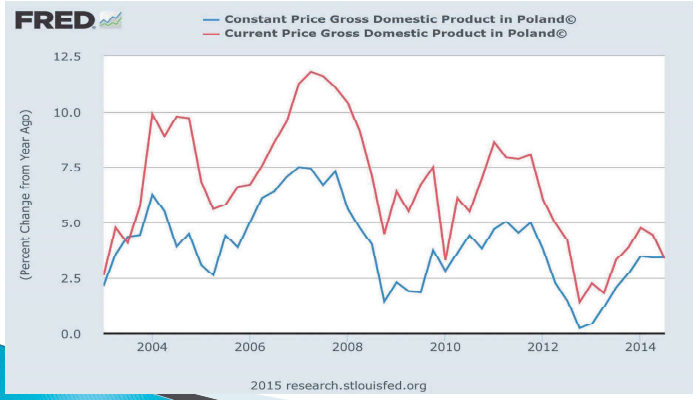
How to measure change of prices?

- Nominal vs real … GDP deflator
- Consumption expenditure … CPI
- Firms expenditure … PPI

Real vs. nominal GDP

- GDP is the value of all final goods and services produced.
- **nominal GDP** measures these values using **current prices** (rise of prices affects it).
- **real GDP** measure these values using the **prices of a base year** (reflect real changes in the production.

Real vs. nominal GDP



Practice problem, part 1

	2006		2007		2008	
	P	Q	P	Q	P	Q
good A	$30	900	$31	1,000	$36	1,050
good B	$100	192	$102	200	$100	205

- Compute nominal GDP in each year.
- Compute real GDP in each year using 2006 as the base year.

Answers to practice problem, part 1

nominal GDP *multiply Ps & Qs from same year*

2006: \$46,200 = \$**30** × 900 + \$**100** × 192

2007: \$51,400

2008: \$58,300

real GDP *multiply each year's Qs by 2006 Ps*

2006: \$46,200

2007: \$50,000

2008: \$52,000 = \$30 × 1050 + \$100 × 205

	2006		2007		2008	
	P	Q	P	Q	P	Q
good A	$30	900	$31	1,000	$36	1,050
good B	$100	192	$102	200	$100	205

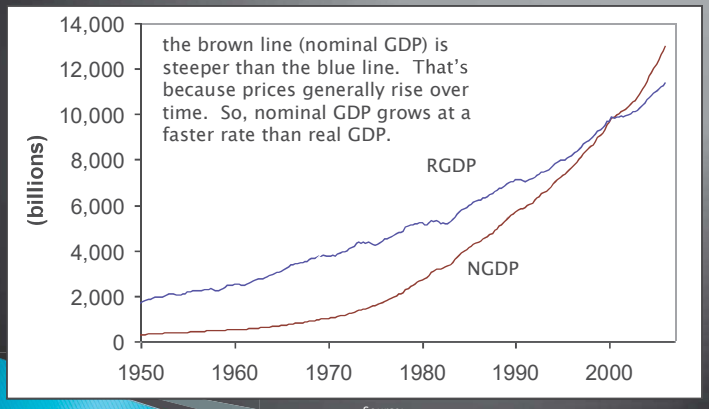
Real GDP controls for inflation

Changes in nominal GDP can be due to:

- changes in prices.
- changes in quantities of output produced.

Changes in real GDP can **only** be due to changes in quantities, because real GDP is constructed using constant base-year prices.

U.S. Nominal and Real GDP, 1950–2006, base year: 2000



GDP Deflator

- The **inflation rate** is the percentage increase in the overall level of prices.
- One measure of the price level is the **GDP deflator**, defined as

$$\text{GDP deflator} = 100 \times \frac{\text{Nominal GDP}}{\text{Real GDP}}$$

Practice problem, part 2

	Nom. GDP	Real GDP	GDP deflator	Inflation rate
2006	$46,200	$46,200		*n.a.*
2007	51,400	50,000		
2008	58,300	52,000		

- Use your previous answers to compute the GDP deflator in each year.
- Use GDP deflator to compute the inflation rate from 2006 to 2007, and from 2007 to 2008.

Answers to practice problem, part 2

	Nominal GDP	Real GDP	GDP deflator	Inflation rate
2006	$46,200	$46,200	100.0	*n.a.*
2007	51,400	50,000	102.8	2.8%
2008	58,300	52,000	112.1	9.1%

$$\pi = \left(\frac{PI_{t+1}}{PI_t} - 1\right) \times 100$$

Consumer Price Index (CPI)

- A measure of the overall level of prices
- Published by the Bureau of Labor Statistics (BLS)
- Uses:
  - tracks changes in the typical household's cost of living
  - adjusts many contracts for inflation
  - allows comparisons of dollar amounts over time

How CPI is constructed?

1. Survey consumers to determine composition of the typical consumer's "basket" of goods.
2. Every month, collect data on prices of all items in the basket; compute cost of basket
3. CPI in any month equals

$$100 \times \frac{\text{Cost of basket in that month}}{\text{Cost of basket in base period}}$$

Exercise: *Compute the CPI*

Basket contains 20 pizzas and 10 compact discs.

prices:		
	pizza	CDs
2012	$10	$15
2013	$11	$15
2014	$12	$16
2015	$13	$15

For each year, compute
- the cost of the basket
- the CPI (use 2012 as the base year)
- the inflation rate from the preceding year

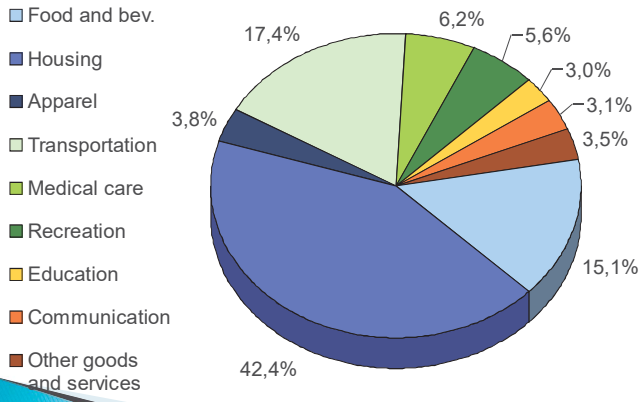
Since the basket contains twice as many pizzas as CDs, a given change in the price of pizza will have a bigger impact on the basket's cost (and CPI) than the same sized price change in CDs.

Answers:

	Cost of basket	CPI	Inflation rate
2002	$350	100.0	*n.a.*
2003	370	105.7	5.7%
2004	400	114.3	8.1%
2005	410	117.1	2.5%

$$\pi = \left(\frac{PI_{t+1}}{PI_t} - 1\right) \times 100$$

The composition of the CPI's "basket"



source: Bureau of Labor Statistics, http://www.bls.gov/cpi/

Inflation measure

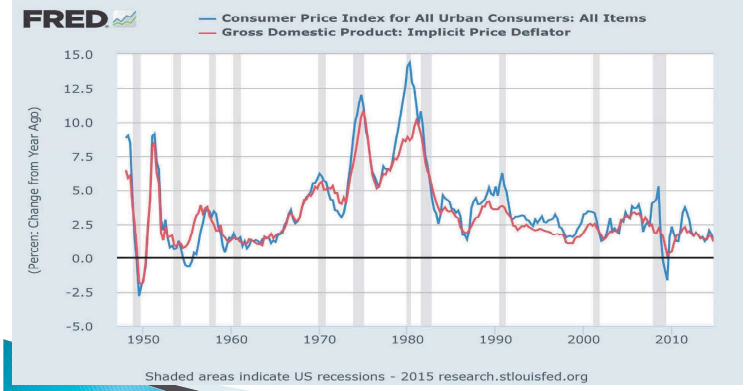
Inflation is the growth of prices:

- Can be computed with CPI, GDP deflator (or other price index).

$$\pi = \left(\frac{PI_{t+1}}{PI_t} - 1\right) \times 100$$

- Loss of money value
- Used for updating pensions etc.

CPI vs. GDP deflator (inflation), US



Reasons why the CPI may overstate inflation

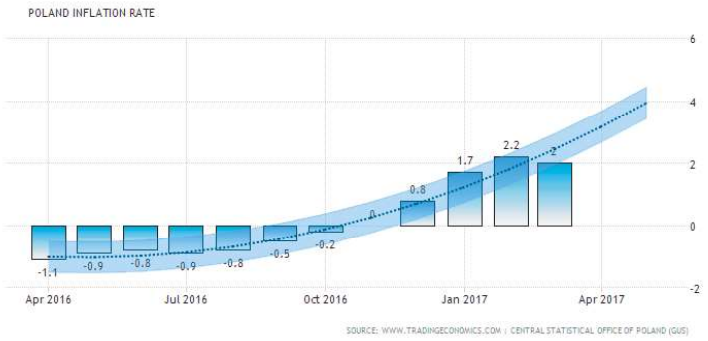
- **Substitution bias**: The CPI uses fixed weights, so it cannot reflect consumers' ability to substitute toward goods whose relative prices have fallen.
- **Introduction of new goods**: The introduction of new goods makes consumers better off and, in effect, increases the real value of the dollar. But it does not reduce the CPI, because the CPI uses fixed weights.

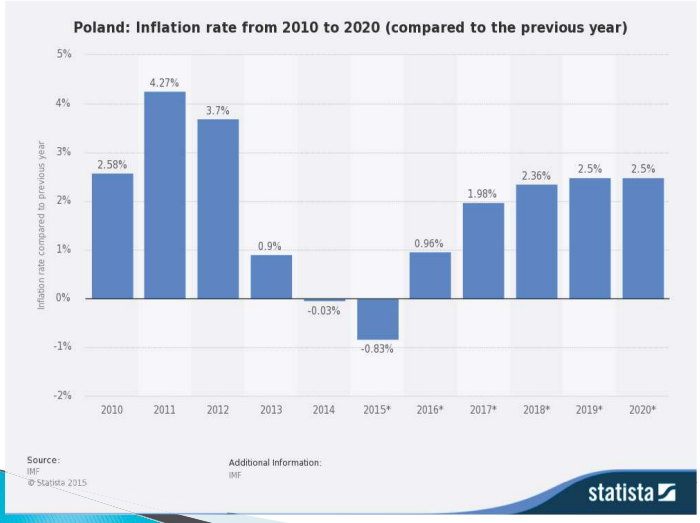
CPI vs GDP deflator

	GDP deflator	CPI
Type of goods in the baskey	All goods (consumer, firms, government)	Only consumer goods
Place of produciton	Domestic	Domestic and international
Weights in the basket	Changing	Constant

CPI, Poland

Inflation rate, Poland





Measures of economic activity

- Labor market

Labor market

How to describe the labor market?

- Unemployment
- Employed
- Labor force
- Wage/ real wage

Unemployment

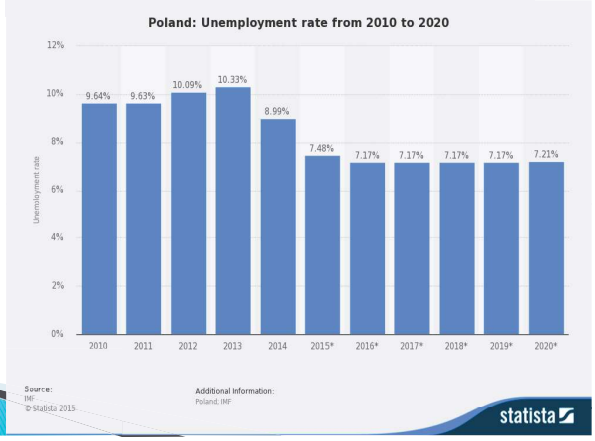
Unemployment relates:

- Number of unemployed (U)
- Number of people willing and able to work (Labor, L)
- **Unemployment rate**

$$u = \frac{U}{L}$$

- Natural unemployment

Registered unemployment rate – Poland



Summary

Economic performance can be described by:

- GDP (real, nominal, per capita)
- Inflation (based on CPI, GDP deflator)
  - Deflator: nominal vs. real GDP
  - CPI: basket of consumption goods and services
- Unemployment rate