

# 1 Introduction to Macroeconomics

## 1.1 Definition and questions of Macroeconomics

**Macroeconomics** = study of economy as a whole, where macroeconomists try both to explain economic events (positive) and to devise policies to improve or enhance economic performance (normative).

Basic questions it aims to answer (+ time horizon):

1. Long term: What are the factors behind the differences in economic growth, and how can we control them? => GROWTH theories
2. Short term: Why do countries observe periods of recessions and depressions and how can government reduce the severity of these episodes? => BUSINESS CYCLE theories
3. Medium term problems: long period of unemployment in Europe, transition in Central and Eastern Europe - different nature of shocks (pace of technological progress, demographic evolution, changes in institutions) => NEW

## 1.2 Models as basic analytic tool:

**MODELS** = simplified theories that show key relationships among economic variables. They explain how changes in the exogenous variables affect the endogenous variables.

- **exogenous** variables: variables that model take as given
- **endogenous** variables: variables that model wants to explain
- in different models, same variable can be endogenous as well as exogenous (e.g. saving rate in Solow versus Ramsey model)
- model is as good as its assumptions (think critically!)

### 1.3 Microfoundations

**Microeconomics** - studies how households and firms make decisions and how they interact in the marketplace

- main concept = **optimization**, e.g. doing their best given the objectives they have set for themselves and constraints they face
- e.g. household try to maximize their utility (happiness, satisfaction) which they derive from consumption + free time + ..., while facing the financial constraints

**Macroeconomics** - studies how decisions of households and firms aggregate into the whole economy

- modern macroeconomic models: define agents (HHs, firms, governments, banks, etc.) + define their decision problems (consumption, work, taxes, profits, etc.) + define existing markets + study interaction and aggregation

## 2 Macroeconomic Aggregates

We need some **qualitative measures** to summarize the state of economy (where we are) and measure its evolution (how did we get there).

- baseline facts that we try to explain and model
- build a theory - evaluate how it fits data

### 2.1 Gross Domestic Product - GDP

Summary of economic activity in a given period of time (flow variable):

*Ex: HH (sell labor + buy bread) + firms (sell bread + pay wages)*

- **total income** of everyone in the economy
  - *HH - wage, Firms - revenues*
- **total expenditures** on the economy's output of goods and services
  - *HH - purchase of bread, Firms - paid wages*
- **total income = total expenditure**

### 2.1.1 Production method - rules:

**Gross Domestic Product (GDP)** = *market value of all final goods and services produced within an economy in a given period of time*

- valued at **market prices** - how much people are willing to pay for the particular good or service
- resale of **used goods** not included (reflects transfer of asset, no addition to economy's income)
- **increase in inventory** = increase in GDP, sale out of inventory = no change in GDP (already produced, no addition to overall income)
- only the value of final goods - value of **intermediate goods** + **value added** at each stage of production
- **imputed values** for goods and services that are not sold in the market place
  - people living in their own homes (imputed rent)
  - government services (police, firefighters)
- output that is **left out** from GDP - home production (cooking, cleaning), imputed rent on durable goods (cars, etc.), underground economy

### 2.1.2 Real vs. Nominal GDP

- **Nominal GDP:** value of goods and services measured at **current prices**

$$GDP_{2008} = \sum_i^N P_{i,2008} \times Q_{i,2008}$$

- problem - change in GDP can be due to change in quantities (OK) or prices (not OK)

- **Real GDP:** value of goods and services measured at **constant prices**

$$GDP_{2008} = \sum_i^N P_{i,BASE} \times Q_{i,2008}$$

- choose base year + prevailing prices
- we can now compare economic activity across years (mainly growth!)
- ! always check the units (very common mistake)

- **GDP deflator:** price of output today relative to its price in the base year

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

- for the current values of Macroeconomic aggregates see file HLMACRO.xls.

### 2.1.3 Expenditure method - components:

national income accounts identity

$$GDP = C + I + G + NX$$

- **Consumption (C)** - goods and services bought by households
  - nondurable goods - bought for immediate consumption, e.g. food and clothes
  - durable goods - long term consumption, e.g. car, TV
  - services
- **Investment (I)** - goods bought for future use; condition = creation of new capital, not merely a relocation of assets between individuals (e.g. stock markets)
  - business fixed investment - new plant + new equipment
  - residential investment - new housing (HHs + landlords)
  - inventory investment - increase in inventories of goods
- **Government Purchases (G)** - goods and services bought by government; does not include transfer payments (Social security and welfare)
- **Net Exports (NX)** - exports - imports
- note to *seasonal adjustment*

In the Czech reporting system (mil. CZK, current prices):

	1995	2000	2007
Final Consumption Expenditure (C + G)	1 052 305	1 610 173	2 416 130
- Households	736 087	1 134 714	1 669 273
- General government	306 326	460 933	718 516
- Nonprofit org.	9 892	14 526	28 341
Gross capital formation (I)	477 684	645 116	936 485
- Gross fixed capital formation	461 825	612 469	857 726
- Changes in inventories	13 732	29 740	75 625
- Net change of valuables	2 127	2 907	3 134
Exports	744 094	1 387 370	2 830 305
Imports	807 561	1 453 490	2 652 671
GDP	1 466 522	2 189 169	3 530 249

### 2.1.4 Other measures of income

- **Gross National Product (GNP):** income earned by national (even abroad) *in CR - 94.95% GDP (2004)*

$$\text{GNP} = \text{GDP} + \underbrace{\text{factor payments from abroad}}_{\text{wages, profits \& rent}} - \text{factor payments to abroad}$$

- **Net National Product (NNP):** net outcome of economic activity

$$\text{NNP} = \text{GNP} - \underbrace{\text{depreciation of fixed capital}}_{\text{cost of production in economy}}$$

- **National Income:** how much everyone in economy has earned

$$\text{National Income} = \text{NNP} - \underbrace{\text{Indirect Business Taxes}}_{\text{e.g. sales tax}}$$

- **Personal Income:** income received by households

$$\begin{aligned} \text{Personal Income} &= \text{National income} \\ &\quad - \text{corporate profits} \\ &\quad + \text{dividends} \\ &\quad + \text{government transfers to individuals} \\ &\quad - \text{social insurance contribution} \\ &\quad + \text{personal interest income} \\ &\quad - \text{net interest} \end{aligned}$$

- **Disposable Personal Income:** income available to spend (budget constraint)

$$\text{Disposable Personal Income} = \text{Personal Income} - \text{Personal Tax and Nontax Payments}$$

## 2.2 Consumer Price Index - CPI

- measuring changing costs of living - change in overall price level = **inflation**
- inflation = % change of **Consumer Price Index**
  - Source: Czech Statistical office
  - basket of 750 goods and services purchased by consumers <sup>1</sup>

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<sup>1</sup>For full account of all goods and services, visit  
[http://www.czso.cz/csu/redakce.nsf/i/spotrebni\\_kos\\_2009/\\$File/spot\\_kos09.xls](http://www.czso.cz/csu/redakce.nsf/i/spotrebni_kos_2009/$File/spot_kos09.xls)

- baseline price level = year 2005
- weighted average of individual price indices (weights according to structure of household expenditures)

$$\text{CPI} = \frac{\sum_i^{750} Q_i P_{i,2009}}{\sum_i^{750} Q_i P_{i,BASE=2005}}$$

- Czech republic - inflation 1994 - 2008 (yearly, avg.) :

94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08
10.0	9.1	8.8	8.5	10.7	2.1	3.9	4.7	1.8	0.1	2.8	1.9	2.5	2.8	6.3

- Czech republic - inflation January - December 2008:

Year/Month	1	2	3	4	5	6	7	8	9	10	11	12
2008	3.4	3.9	4.3	4.7	5.0	5.4	5.8	6.1	6.4	6.6	6.5	6.3

### 2.2.1 Differences between CPI and GDP deflator

both measure change in price level, what are differences?

CPI	GDP Deflator
1. prices of goods & services bought by consumers 2. domestic + imported goods 3. fixed basket of goods  => <b>Laspeyres</b> index overstates inflation (neglects income effect)	1. prices of all goods & services produced 2. domestically produced 3. changing goods basket (based on composition of GDP)  => <b>Paasche</b> index understates inflation (neglects substitution effect)

Other reported price indices include: producer price index (PPI)- industry, construction work, market services, agricultural products, ... <sup>2</sup>

### 2.3 Unemployment rate

- most important resource in economy = willing workers
- **unemployment rate** = % of the people who want to work but who do not have the job
- Source: Czech Statistical office - **Labor Force Survey** <sup>3</sup>

- sample: 25 000 households = 59 000 respondents, age 15+

<sup>2</sup>More about price indices [http://en.wikipedia.org/wiki/Price\\_index](http://en.wikipedia.org/wiki/Price_index)

<sup>3</sup>Vyberove setreni pracovnich sil - [http://www.czso.cz/csu/redakce.nsf/i/zam\\_vsps](http://www.czso.cz/csu/redakce.nsf/i/zam_vsps).

- **employed** = spent min. 1 hour of reference week working for some form of remuneration (doesn't matter if temporary, seasonal, more jobs, part-time student, etc.)
- **unemployed** = everybody age 15+ who 1.) is not employed, 2.) is ready to work, 3.) is looking for a job

**Labor force** = # of employed + # of unemployed

$$\text{Unemployment rate} = \frac{\# \text{ of unemployed}}{\text{Labor force}} \times 100$$

$$\text{Labor Force participation rate} = \frac{\text{Labor Force}}{\text{Adult population}} \times 100$$

- Czech republic in numbers as of 3<sup>rd</sup> quarter of 2008:
  - # of employed: 5 014 800
  - # of unemployed: 223 900
  - unemployment rate: 4.3% (men - 3.3%, women - 5.6%)
  - Labor Force participation: 58.5% (men - 68.3%, women - 49.3%)
- **Okun's Law:** negative relationship between unemployment and real GDP
  - empirical estimate:
 
$$\% \text{ change in real GDP} = 3\% - 2 \times \text{change in the unemployment rate}$$