# 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 device 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 in order to improve well being of population? => GROWTH theories [1]

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

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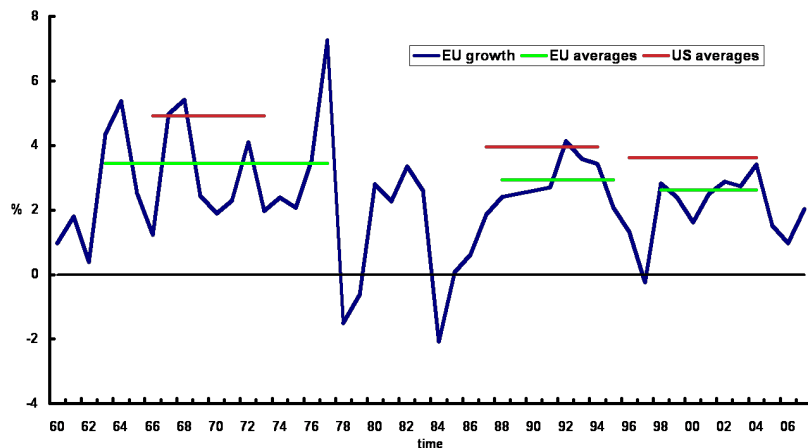
[1]For graphical illustration of worldwide differences in the living standards see diagram of the level real GDP per capita diagram of real GDP growth, both for year 2008.
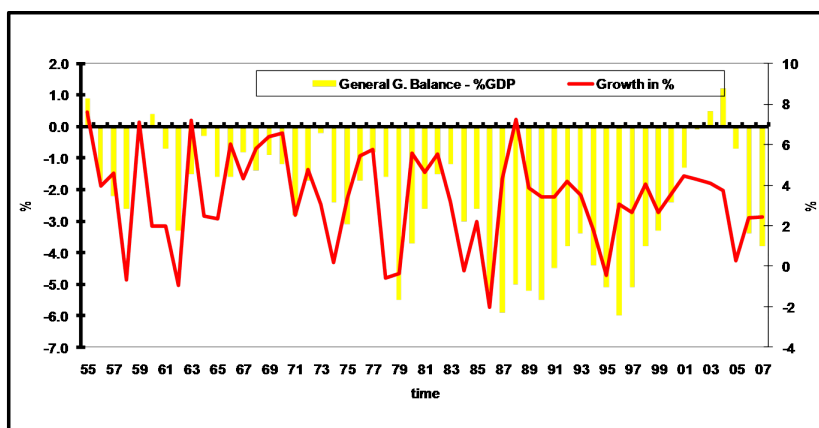
Figure 1: Real GDP growth and public deficit, USA 1951-2003

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
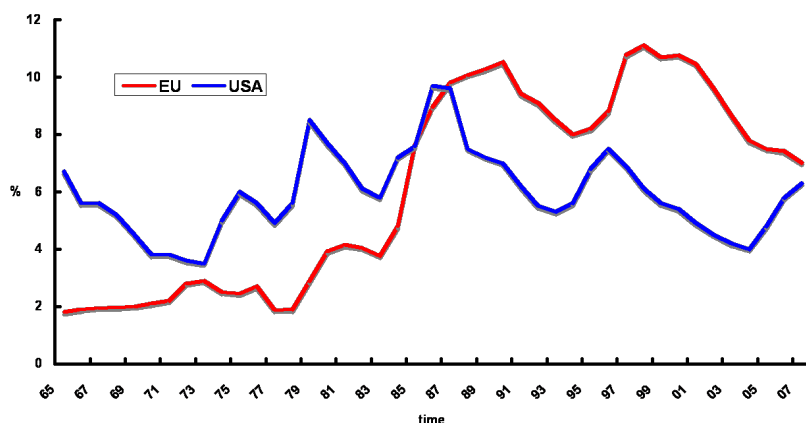

Figure 2: Comparison of unemployment in EU15 and USA, 1965-2007

4. Crucial question: How much governmental intervention is needed to achieve these goals? Examples:

   • Was the growth difference between 0-1800 and 1801-2000 result of some organized „governmental" activities?

   • Was the Great Depression a result of the market failure?

   • Was an extraordinary growth after WWII a result of a careful economic policy of the governments?

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- Was the state intervention responsible for the high US inflation in 60's, EU high unemployment till today or Japanese problems in the 90's?

- Was the lack of market coordination, wrong policies and insufficient regulation of banking and financial sector behind today's sharp fall of output?

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*

- valuated at **market prices** - how much people are willing to pay for the particular good or service

- resale od **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**

$$GDP_{2008} = \sum_i^N P_{i,\,2009} \times Q_{i,\,2009}$$

   - 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**

$$GDP_{2008} = \sum_i^N P_{i,\,BASE} \times Q_{i,\,2009}$$

   - 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

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

- still, prices are more and more dated (e.g. computers):
   - sol 1.: update base year every 5 years
   - sol 2.: chain-weighted measures - chain of between-years price changes

- 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 rellocation 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, 2000 constant prices):

	1995	2000	2008
Final Consumption Expenditure (C + G)	1 443 212	1 610 173	2 084 993
- Households	991 628	1 134 714	1 513 913
- General government	439 393	460 933	557 239
- Nonprofit org.	13 753	14 526	19 530
Gross capital formation (I)	604 206	645 116	894 961
- Gross fixed capital formation	586 347	612 469	843 694
- Changes in inventories	14836	29 740	48 055
- Net change of valuables	3 023	2 907	3 212
Exports	894 328	1 387 370	3 210 259
Imports	917 790	1 453 490	3 144 160
GDP	2 033 699	2 189 169	3 055 035

2.1.4 Other measures of income

- **Gross National Product (GDP):** 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

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

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

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\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 [2]
  - baseline price level = year 2005
  - weighted average of individual price indices (weights according to structure of household expenditures)

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\text{CPI} = \frac{\sum_i^{750} Q_i P_{i,2010}}{\sum_i^{750} Q_i P_{i,BASE=2005}}
$$

- Czech republic - inflation 1995 - 2009 (yearly, avg.) :

95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09
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	1.0

- Czech republic - inflation January - December 2009:

Year/Month	1	2	3	4	5	6	7	8	9	10	11	12
2009	5.9	5.4	5.0	4.6	4.1	3.7	3.1	2.6	2.1	1.6	1.3	1.0

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[2]For full account of all goods and services, visit
http://www.czso.cz/eng/redakce.nsf/i/consumer_basket_2010/$File/c_basket2010.pdf

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

Other reported price indices include: producer price index (PPI)- industry, construction work, market services, agricultural products, ... [3]

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** [4]

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

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

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

- Czech republic in numbers as of 3rd quarter of 2008:

  - # of employed: 4 921 700

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[3]More about price indiceshttp://en.wikipedia.org/wiki/Price_index

[4]Vyberove setreni pracovnich sil - http://www.czso.cz/csu/redakce.nsf/i/zam_vsps.

- # of unemployed: 387 000

- unemployment rate: 4.3 % (men - 4.4 %, women - 4.2 %)

- Labor Force participation: 58.9 % (men - 68.5 %, women - 49.7 %)

- **Okun's Law:** negative relationship between unemployment and real GDP

  - empirical estimate (Abel and Bernanke, 2005:

    $$\% \text{ change in real GDP} = -2 \times \text{change in the unemployment rate}$$

  - imperfect relationship (changes in labor force, working hours, productivity)

Okun's Law This figure is a scatterplot of the change in the unemployment rate on the horizontal axis and the percentage change in real GDP on the vertical axis, using data on the U.S economy. Each point represents one year. The negative correlation between these variables shows that increases in unemployment tend to be associated with lower-than-normal growth in real GDP.

Source: U.S. Department of Commerce, U.S. Department of Labor.