What is macroeconomics about?

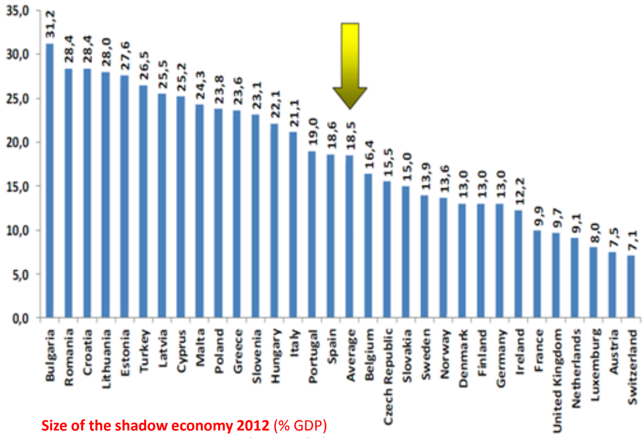
- Macroeconomics studies the aggregate effects of what people do.
- Most of what people do has to do with:
  (i) the production and use (allocation) of goods (goods means "goods and services");
  (ii) the issuance and allocation (resale, trading, exchange) of financial assets.
- The activities related to (i) give rise to the real sector of an economy. Those related to (ii) give rise to the financial sector.

Wealth

- Wealth refers to, and is measured in terms of, goods. More wealth means having a higher amount of goods (to consume or to produce more goods).
- Aggregate production generated in economy E during a given period t of time can be used to measure the aggregate wealth created in E during t.
- A common measure of aggregate production is the gross domestic product (GDP): (market) value of all the final goods (= not used to produce other goods) produced in an economy in a given period of time.

GDP and the size of an economy

- GDP is a crude measure of how rich and how big an economy is. It excludes black market activities (underground or shadow economy = legal economic activity that is not taxed) and does not value goods that are not exchanged in markets (quality of education, social institutions, leisure time…).
- Nominal GDP values production at current prices. Real GDP (GDP at constant prices or GDP adjusted for inflation) values production each period using the prices of one period (called "base period"). Changes in nominal GDP are misleading: they may reflect changes in production and prices.



Size of the shadow economy 2012 (% GDP)
Friedrich Schneider, www.econ.jku.at/members/.../ShadEcEurope31.pdf

"Good" or "bad" for the economy? /1

- The outcomes (or the state) of an economy are subject to assessment: is it "good" or "bad" to have more (or less) shadow economy?
- There is in general no clear-cut answer: some outcomes/states may be favourable to some people and, simultaneously, detrimental to other people.
- Shadow economy: favours those taking part (they do not pay taxes); is detrimental to the rest (unfair competition to rival firms and probably a higher tax burden for the non-participants in the shadow economy, to compensate tax evasion).

"Good" or "bad" for the economy? /2

- A high interest rate is more beneficial to lenders than a lower one, as they receive more for lending money. Yet, borrowers are worse off with a higher than with a lower interest rate, since they have to pay more for getting a loan of money. Better high or low depends on the importance of each group.
- It is easier for European exporters to export to the US the lower the exchange rate (expressed in \$/€), since the lower the rate, the more euros Americans get from 1 \$. But the lower the rate, the fewer the dollars Europeans consumers obtain from 1 €, so the more costs (in euros) buying American goods.

Computing GDP^n: an example

time t	p_1^t	q_1^t	p_2^t	q_2^t
1	4	6	2	8
2	9	5	3	5

- GDP^n (nominal GDP) at $t = 1$ is $p_1^1 \cdot q_1^1 + p_2^1 \cdot q_2^1 = 4 \cdot 6 + 2 \cdot 8 = 40$ (monetary units of $t = 1$).
- GDP^n at $t = 2$ is $p_1^2 \cdot q_1^2 + p_2^2 \cdot q_2^2 = 9 \cdot 5 + 3 \cdot 5 = 60$ (monetary units of $t = 2$). From $t = 1$ to $t = 1$, GDP^n has increased a 50%: $\frac{60-40}{40} \cdot 100$.

Computing GDP^r: an example

- GDP^r (real GDP) in period $t = 1$ at constant prices of period $t = 1$ is $p_1^1 \cdot q_1^1 + p_2^1 \cdot q_2^1 = 4 \cdot 6 + 2 \cdot 8 = 40$ (monetary units of $t = 1$). So GDP^r = GDP^n at the base period (this always happens).
- GDP^r in $t = 2$ at constant prices of period $t = 1$ is given by $p_1^1 \cdot q_1^2 + p_2^1 \cdot q_2^1 = 4 \cdot 5 + 2 \cdot 5 = 30$ (monetary units of $t = 1$). GDP^r has fallen a 25%.
- With base period $t = 2$: GDP^r in $t = 1$ is $p_1^2 \cdot q_1^1 + p_2^2 \cdot q_2^1 = 9 \cdot 6 + 3 \cdot 8 = 78$; GDP^{r}in $t = 2$ is $p_1^2 \cdot q_1^2 + p_2^2 \cdot q_2^2 = 9 \cdot 5 + 3 \cdot 5 = 60$. GDP^r has fallen a 23%.

Strategic use of data

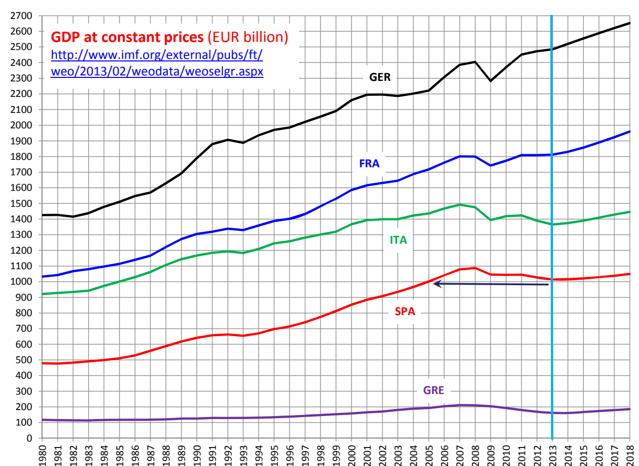
- Economic variables are meaningless without specifying its units of measurement (if any).
- On the other hand, people whose interests are affected by economic information may have an incentive to disclose information selectively.
- In the previous example, a government is interested in informing citizens of only the increase in nominal GDP . The opposition would instead like to point to the fall in real GDP. And if forced to mention real GDP, the government prefers to take period 2 as the base (smaller reduction of real GDP).

Nominal variable

- A nominal variable is measured in terms of current prices.
- Changes of current prices may affect the nominal variable.
- The typical nominal variable is measured in (current) monetary units.
- Examples: GDP at current prices, money stock, (nominal) interest rate, (nominal) exchange rate, and consumser price index (CPI).

Real variable

- A real variable measures physical quantities. Real variables are not affected by current prices.
- Some real variables, like total employment or the unemployment rate, need no price to be defined.
- Others are defined by fixing prices, like GDP at constant prices, which measures production using the prices of a base period.
- Still others come from nominal variables by removing the effects of prices, like the real interest rate.



Stock variable vs flow variable

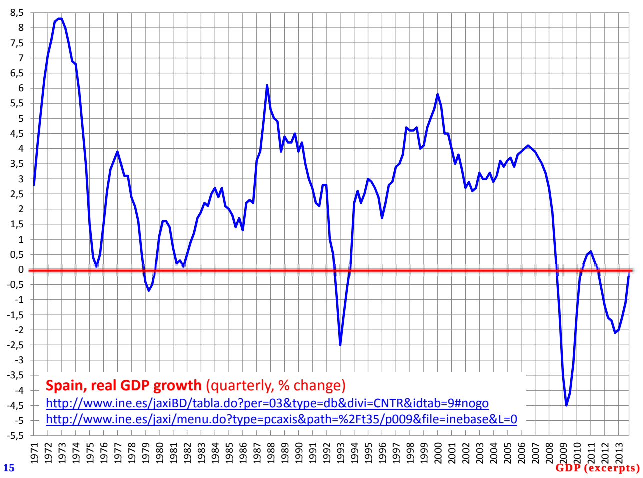
- A stock variable is measured in levels rather than rates of change.
- A flow variable is measured in rates per unit of time rather than levels.
- GDP is a flow variable, as it measures production during a period of time (so GDP is production per unit of time).
- Population at a given moment of time is a stock variable. Wealth is also a stock variable.

Rates

- The term "rate" in "GDP growth rate" refers to a relative (in percentage terms) change in GDP.

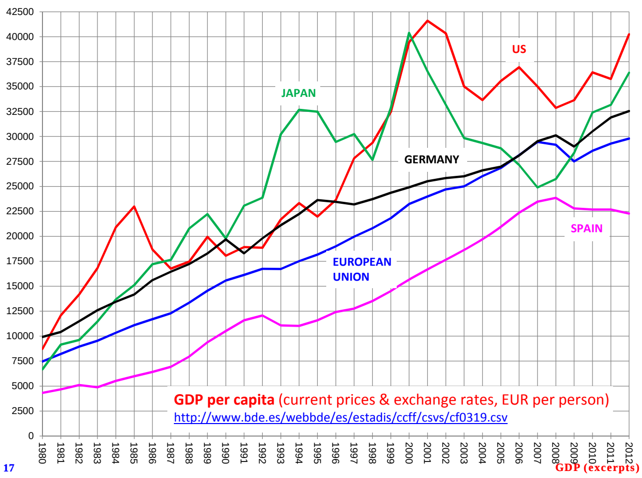
$$\underset{\text{(from period } t-1 \text{ to } t)}{\text{GDP growth rate}} = \frac{\text{GDP}_t - \text{GDP}_{t-1}}{\text{GDP}_{t-1}}$$

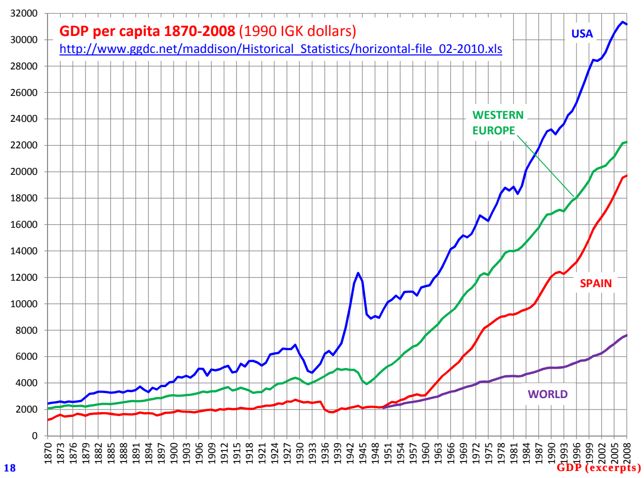
- This formula gives the rate of change per one. To get a percentage, multiply by 100. If $\text{GDP}_{t-1} = 40$ and $\text{GDP}_t = 50$, the rate of change is $\frac{50-40}{40} = \frac{10}{40} = \frac{1}{4} = 0.25$ (per one); that is, 25%.
- "Rate" in "exchange rate" means "ratio" (relative price) and "amount" in "interest (or wage) rate".



Average wealth

- Real GDP per capita provides a measure of how developed or "prosperous" an economy is. It can be interpreted as a measure of the average standard of living in the economy.
- Real GDP per capita is defined as the ratio of real GDP to the population of the economy.
- Real GDP per capita is positevely correlated with many indicadors of economic development and the quality of life: life expectancy, subjective well-being, education, health care expenditure…





Short run vs long run

- "Short run" refers to a relative short period of time (a few months to a couple of years). In that period it is presumed that some factors or variables (technology, population) are essentially constant.
- Short-run macroeconomics focuses on explaining the oscillations of real GDP (the business cycle).
- In the long run everything may change. Long-run macroeconomics tries to explain the evolution of real GDP per capita (long-run economic growth).

Competing conceptual frameworks

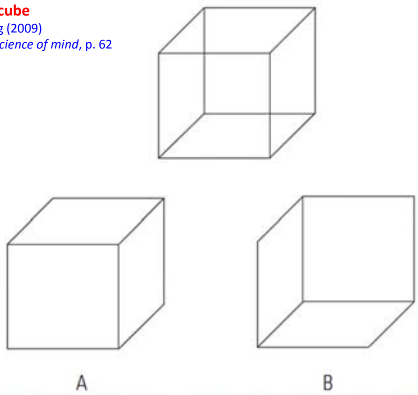
- (Neo)Classical economists contend that
  - markets work well by themselves (produce full employment without government help) in a world of rational and perfectly informed agents;
  - money is neutral (more money only means higher inflation) and exogenous;
  - only supply matters in the long-run.
- Post[-]Keynesians hold the opposite: crucial role of uncertainty; need to regulate markets (they are unstable); endogeneity of money; demand always matters; importance of the distribution of wealth.

On "economic reality"

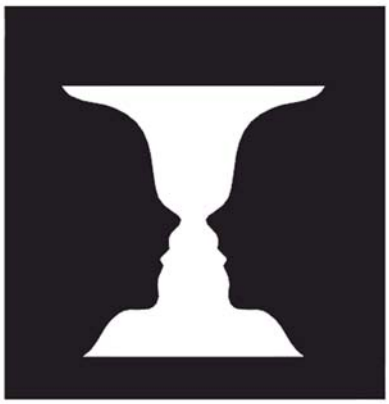
- Physicists face the problem that the act of knowing reality changes reality: "seeing" a particle requires interacting with it, and the interaction alters the (characteristics of the) particle.
- The understanding economic reality presumes a conceptual framework that guides our interaction with reality and within which reality is interpreted.
- The same reality may be interpreted differently in alternative frameworks. What is "actually" the change in real GDP on slide 10? What is "actually" depicted on the next three slides?

Old woman or young lady?
Steven Mark Cohn (2006) *Reintroducing macroeconomics*, p. 5

The Necker cube
Daniel Reisberg (2009)
Exploring the science of mind, p. 62



The top cube can be perceived as if viewed from above (in which case it is a transparent version of Cube A) or as if viewed from below (i.e., a transparent version of Cube B).



The vase/profiles figure
Daniel Reisberg (2009) *Exploring the science of mind*, p. 63

Price indices

- A price index is a measure of the general price level of an economy. This level can be thought of as a weighted average of the prices of all the goods.
- By assuming the fiction that there is a unique good in the economy (the domestic product), if GDP measures the quantity of the good, then the price level would represent the price of the good.
- As distinguished from GDP, price indices have no units and the value by itself means nothing. It is the rate of change of the index that is informative.

25 GDP (excerpts)

The GDP (implicit price) deflator

- The GDP deflator is a price index defined as

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

- It measures the changes in prices in all the goods produced in an economy between the base period used in the real GDP and the current period.
- If $\text{GDP}^n_{2012} = 100$, $\text{GDP}^r_{2012} = 80$, $\text{GDP}^n_{2013} = 135$, and $\text{GDP}^r_{2013} = 90$, then GDP_{2012} deflator $= 100/80 = 1.25$ and GDP_{2012} deflator $= 135/90 = 1.5$, indicating a general price increase.

26 GDP (excerpts)

Consumer price index (CPI)

- The CPI is a measure on the cost of purchasing a fixed basket of goods of a consumer considered representative.
- The CPI_t in period t is defined as

$$\text{CPI}_t = \frac{\text{value of the basket at prices of period } t}{\text{value of the basket at prices of the base period}}.$$

- For the index to have base 100, just multiply the right-hand side by 100.

27 GDP (excerpts)

Differences between CPI and deflator

- The CPI generally includes imported goods.
- The GDP deflator does not: it only includes the goods produced in the economy, not abroad.
- The basket of goods in the GDP deflator may vary from period to period.
- The basket in the CPI generally does not.
- Despite all that, both indices are strongly correlated and tend to move in parallel.

28 GDP (excerpts)

Computing a CPI: an example

- The basket is given by $(x, y, z) = (3, 2, 1)$

time	p_x	p_y	p_z	V_t = *basket value in period t*
1	1	4	5	$3 \cdot 1 + 2 \cdot 4 + 1 \cdot 5 = 16$
2	2	1	8	$3 \cdot 2 + 2 \cdot 1 + 1 \cdot 8 = 16$
3	3	1	1	$3 \cdot 3 + 2 \cdot 1 + 1 \cdot 1 = 12$
4	2	5	4	$3 \cdot 2 + 2 \cdot 5 + 1 \cdot 4 = 20$

- Taking $t = 1$ as the base period, $\text{CPI}_1 = V_1/V_1 = 1$; $\text{CPI}_2 = V_2/V_1 = \frac{16}{16} = 1$; $\text{CPI}_3 = V_3/V_1 = \frac{12}{16} = 0.75$; and $\text{CPI}_4 = V_4/V_1 = \frac{20}{16} = 1.25$.

29 GDP (excerpts)

Inflation rate

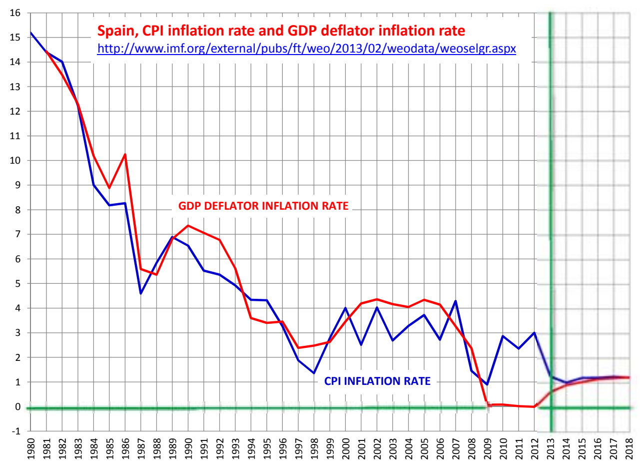
- The inflation rate π associated with the price index P is the rate of change of the price index P:

$$\pi = \frac{P - P_{-1}}{P_{-1}}$$

where P is the price index in the current period and P_{-1} is the one in the immediately preceding period.

- To express the inflation rate as a percentage, multiply by 100 the right-hand side. For instance, if $P = 50$ and $P_{-1} = 40$, then $\pi = \frac{50-40}{40} = \frac{1}{4} = 0.25$ (= 25%): the price index has been pushed up a 25%.

30 GDP (excerpts)



31 GDP (excerpts)

Inflation rate: an example

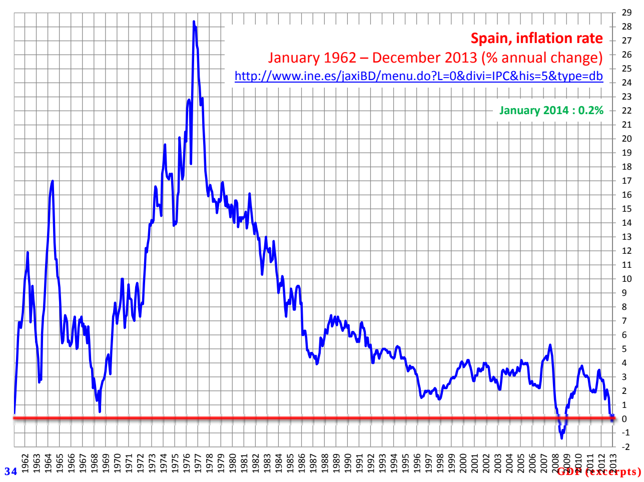
- Let π_t be the inflation rate associated with the CPI of the previous example (slide 57). In this case:
  - π_1 is not defined (since there is no CPI_0)
  - $\pi_2 = \dfrac{\text{CPI}_2 - \text{CPI}_1}{\text{CPI}_1} = \dfrac{1-1}{1} = 0$
  - $\pi_3 = \dfrac{\text{CPI}_3 - \text{CPI}_2}{\text{CPI}_2} = \dfrac{0.75-1}{1} = -0.25$ (or -25%)
  - $\pi_4 = \dfrac{\text{CPI}_4 - \text{CPI}_3}{\text{CPI}_3} = \dfrac{1.25-0.75}{0.75} = \dfrac{2}{3}$ (or 66.6%)
- If π is calculated, for instance, from $t = 1$ to $t = 4$, then $\pi_{1\to4} = \dfrac{\text{CPI}_4 - \text{CPI}_1}{\text{CPI}_1} = \dfrac{1.25-1}{1} = 0.25$ (25%).

32 GDP (excerpts)

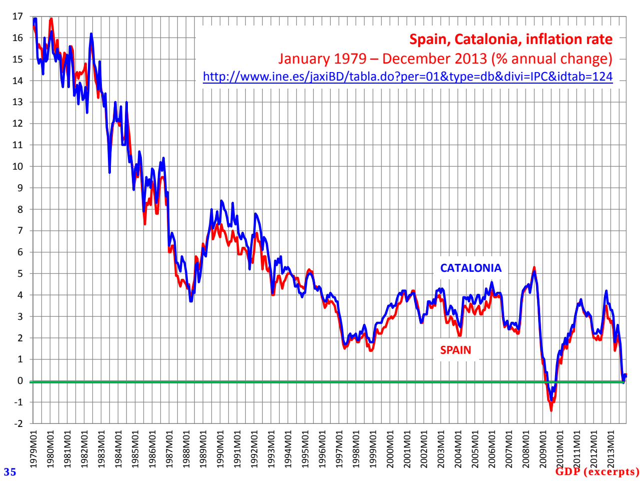
Inflation concepts

- As an economic phenomenon, inflation refers to the sustained increase of the CPI. It occurs for periods during which the inflation rate is positive.
- Deflation is the opposite phenomenon: sustained decrease of the CPI (negative inflation rates).
- Disinflation takes place when, during inflation, the inflation rate diminishes (but remains positive).
- Hyperinflation occurs with astronomical inflation rates (montly inflation rates of at least 50%). Under a hyperinflation, inflation is out of control.

33 GDP (excerpts)



34 GDP (excerpts)



35 GDP (excerpts)

Core inflation rate

- The core (as opposed to headline) inflation rate is computed by excluding the prices of food and energy prices, which tend to be very volatile.
- It is a measure of underlying long-term inflation. It can also be used as an indicator of future inflation.

36 GDP (excerpts)