Q1: How big is an economy?

- Macroeconomics is the area of economics that studies the overall economic activity in a country or region by means of indicators of that activity.
- That "overall economic activity in a country" will be called, for short, "an economy".
- One basic question with which Macroeconomics is concerned refers to the size of an economy.
- A simple measure of the size of an economy: to evaluate the aggregate production in the economy.

Gross domestic product (GDP)

- GDP is the value of all the final goods ("goods" will always mean "goods and services") produced in an economy (or territory) within a given period.
- Final good = not used to produce other goods
- Value = market value
- The rate y at which GDP varies is the growth rate of the economy, where GDP_{-1} is the GDP from the previous period (to get a percentage, add "×100").

$$y = \frac{\mathrm{GDP} - \mathrm{GDP}_{-1}}{\mathrm{GDP}_{-1}}$$

Nominal GDP (GDP^n)

- GDP^n, or GDP at current prices, is the value of the final goods produced in an economy during a given period when the value is computed using current prices (the prices of the period).
- GDP^n is obtained by adding up the quantities of final goods multiplied by their current prices.
- GDP^n may vary because prices change or because the quantities of final goods produced change.

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

Real GDP (GDP^r)

- GDP^r, or GDP at constant prices, is the value of the final goods produced in an economy during a given period when the value is computed using the prices of a given fixed period (the base period).
- GDP^r is obtained by adding up the quantities of final goods multiplied by their prices in the base period.
- GDP^r is also called GDP adjusted for inflation or GDP in the monetary units of the base period (for instance, real GDP of 2010 in 2005 euros).

Computing GDP^r: an example

- Continuing with the GDP^n example, GDP^r in $t = 1$ at constant prices of period $t = 1$ is $p_1^1 q_1^1 + p_2^1 q_2^1 = 4 \cdot 6 + 2 \cdot 8 = 40$ (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 $p_1^1 q_1^2 + p_2^1 q_2^2 = 4 \cdot 5 + 2 \cdot 5 = 30$ (monetary units of $t = 1$). Hence, GDP^r has fallen a 25%.

- If the base period is $t = 2$, GDP^r in $t = 1$ is $p_1^2 q_1^1 + p_2^2 q_2^1 = 9 \cdot 6 + 3 \cdot 8 = 78$ and GDP^r in $t = 2$ is $p_1^2 q_1^2 + p_2^2 q_2^2 = 9 \cdot 5 + 3 \cdot 5 = 60$. Now, GDP^r has fallen a 23%.

Objections to real GDP

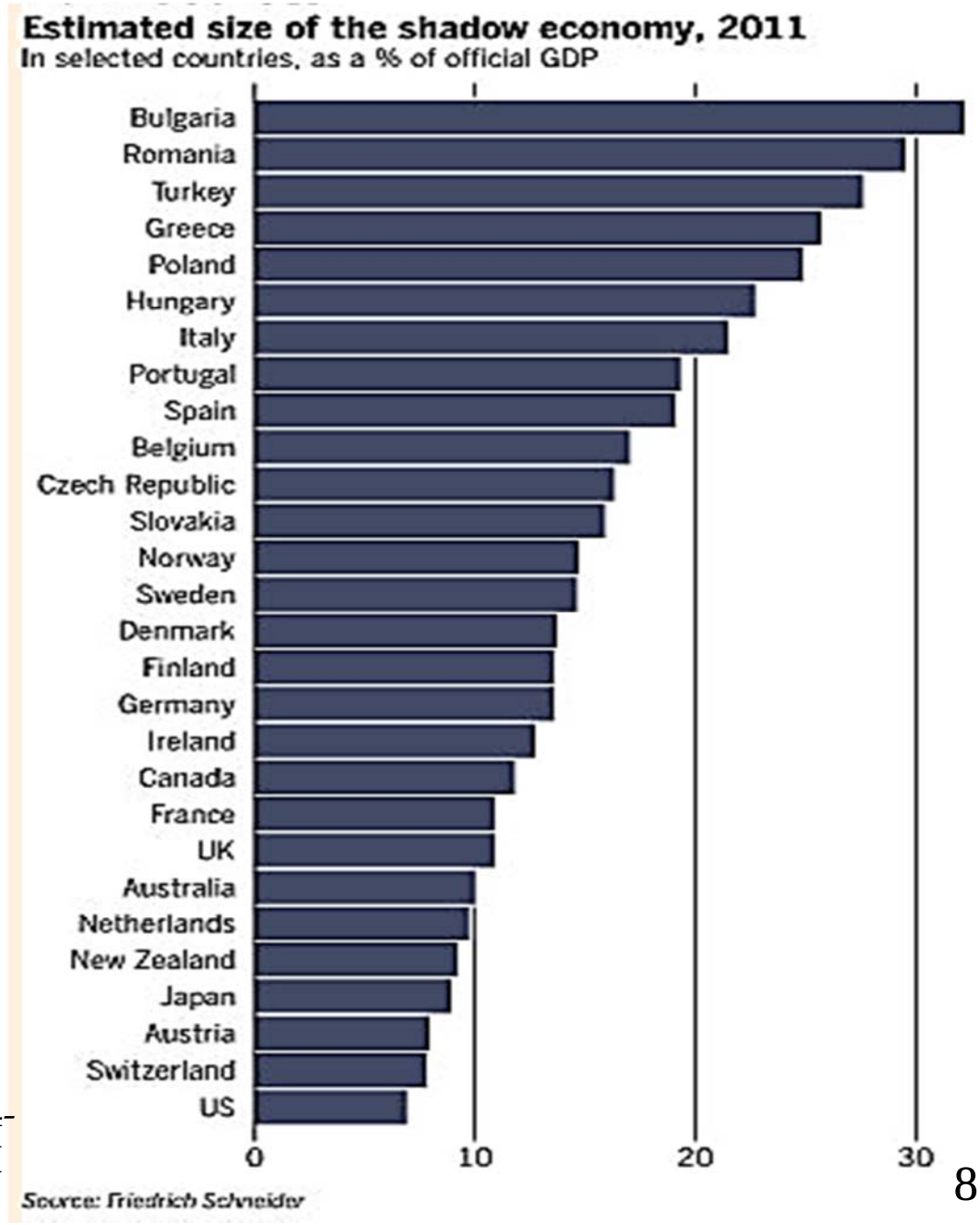
- Theoretical: depends on the prices of the base period, which is always an arbitrary choice.
- Practical: excludes black market activities (underground economy) and does not value goods that are not exchanged in markets, like
  - political institutions (democracy vs dictatorship)
  - social and cultural institutions (people's values)
  - the quality of education or of the environment
  - the leisure time
  - the way wealth is distributed among people…

Underground economy (estimation)

Country	Percentage of GDP
Bolivia	68 percent
Zimbabwe	63
Peru	61
Thailand	54
Mexico	33
Argentina	29
Sweden	18
Australia	13
United Kingdom	12
Japan	11
Switzerland	9
United States	8

Source: Friedrich Schneider. Figures are for 2002.

Source: Mankiw, *Principles*

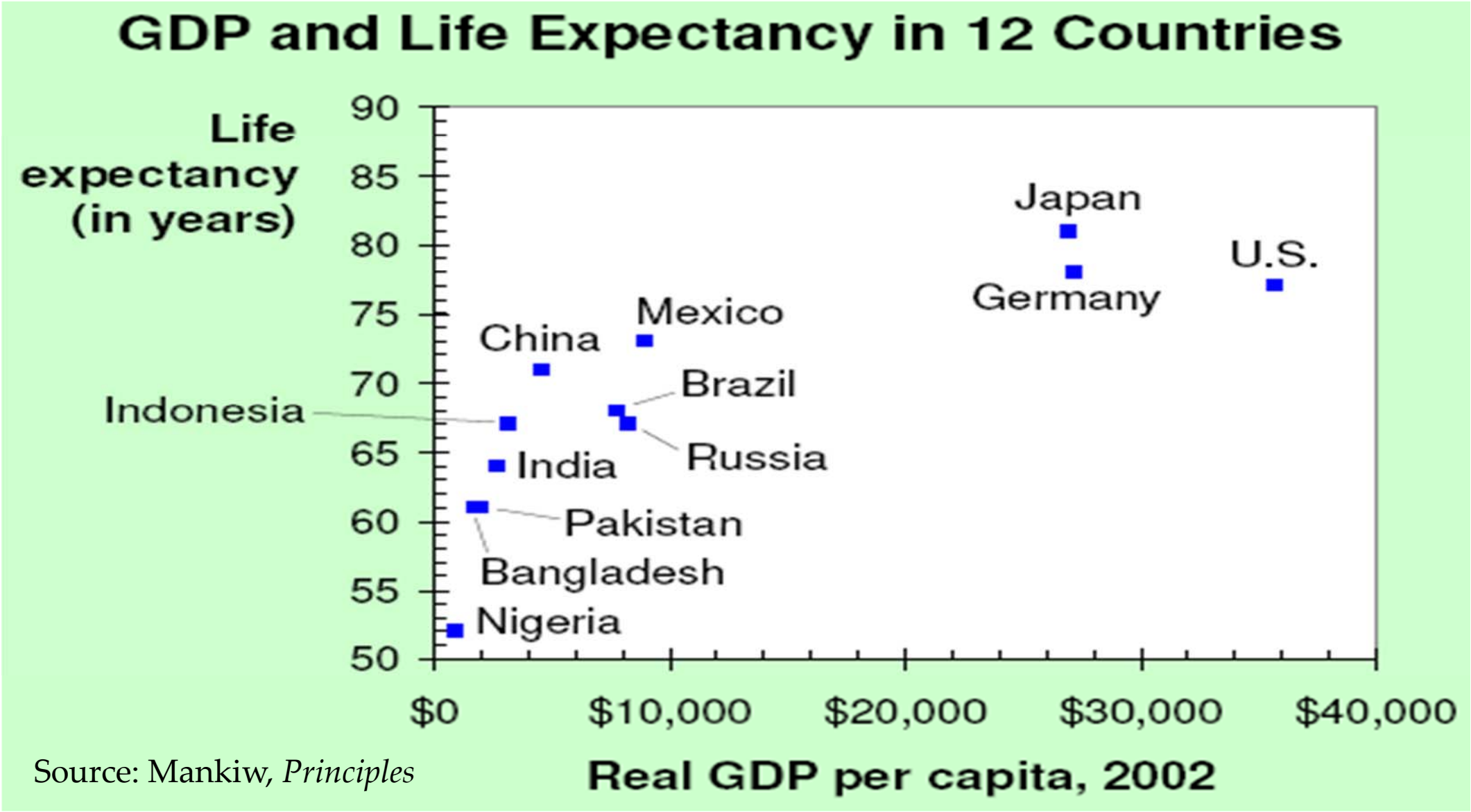


http://www.ft.com/intl/cms/s/0/efc3510e-9214-11e0-9e00-0144feab49a.html#axzz1lniNbpqM

Q2. How developed is an economy?

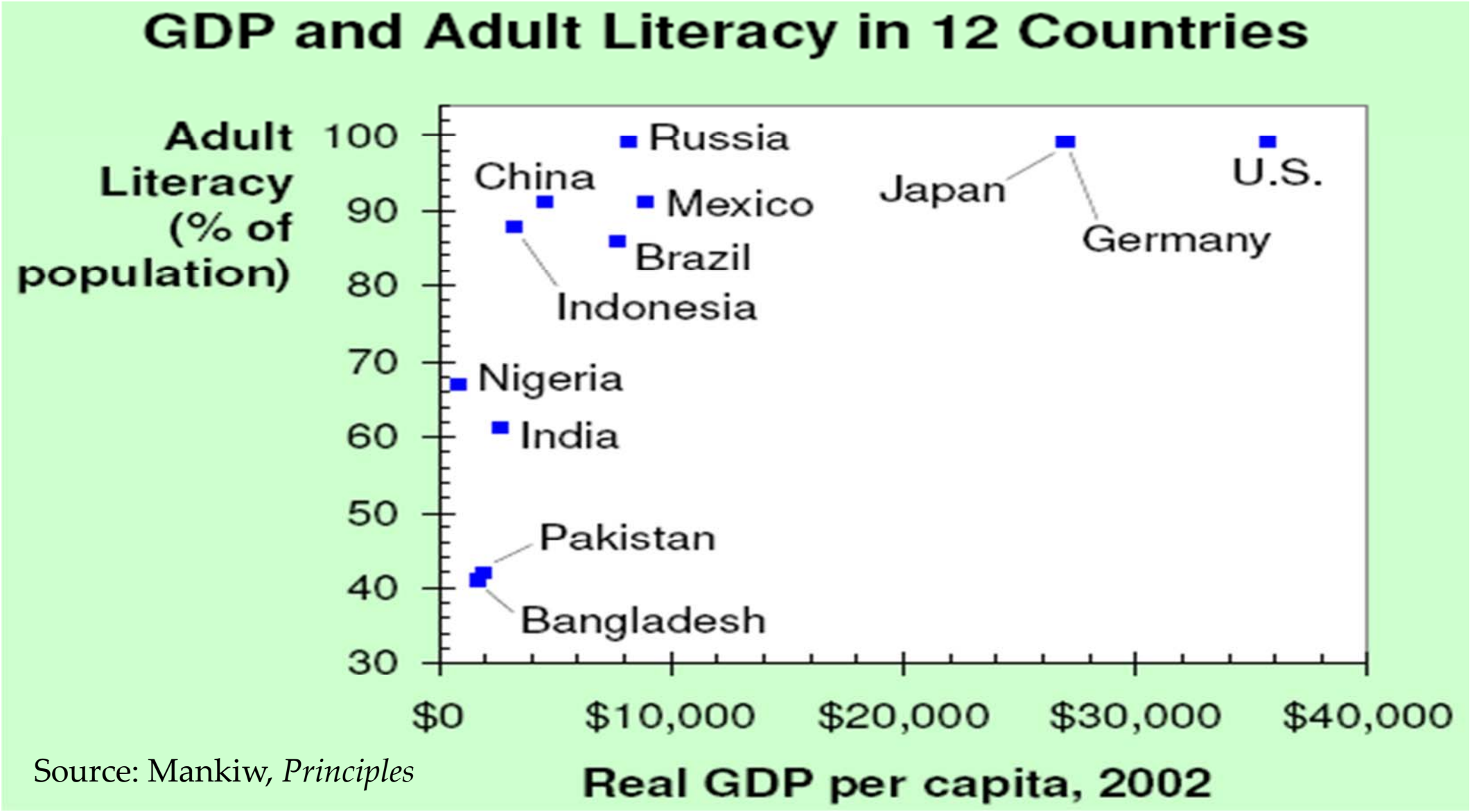
- Real GDP per capita provides a measure of how developed or "prosperous" an economy is. It is viewed as a measure of the average standard of living in the economy.
- Real GDP per capita is defined as the ratio of real GDP to the population of the economy.
- Real GDP per capita is positevely correlated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

GDP per capita & life expectancy



Source: Mankiw, *Principles*

GDP per capita & adult literacy



Source: Mankiw, *Principles*

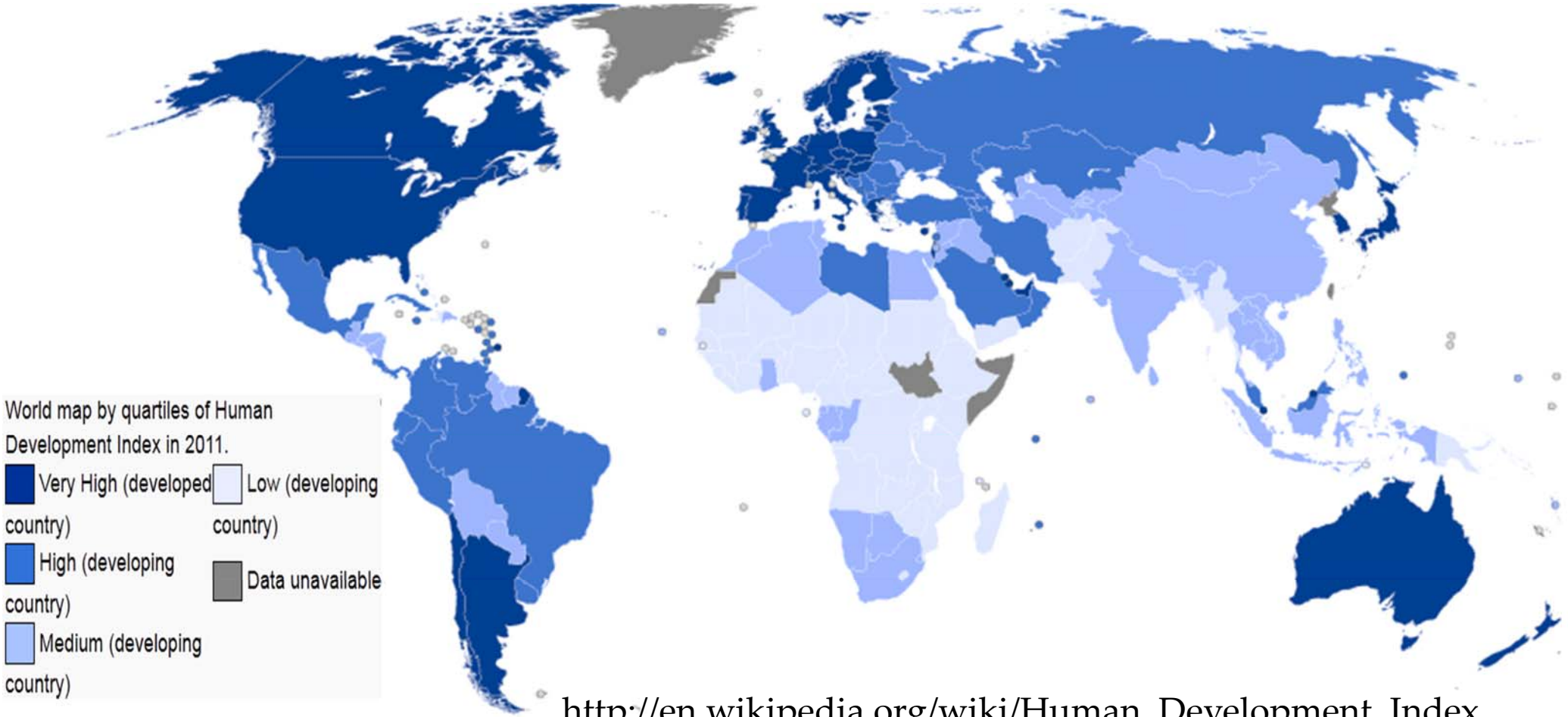
GDP per capita & Internet usage

Country	Real GDP per Person (2005)	Life Expectancy	Adult Literacy (% of population)	Internet Usage (% of population)
United States	$41,890	78 years	99%	63 %
Japan	31,267	82	99	67
Germany	29,461	79	99	45
Russia	10,845	65	99	15
Mexico	10,751	76	92	18
Brazil	8,402	72	89	19
China	6,757	72	91	9
Indonesia	3,843	70	90	7
India	3,452	64	61	3
Pakistan	2,370	65	50	7
Bangladesh	2,053	63	47	0.3
Nigeria	1,128	47	69	4

Source: Mankiw, *Principles*

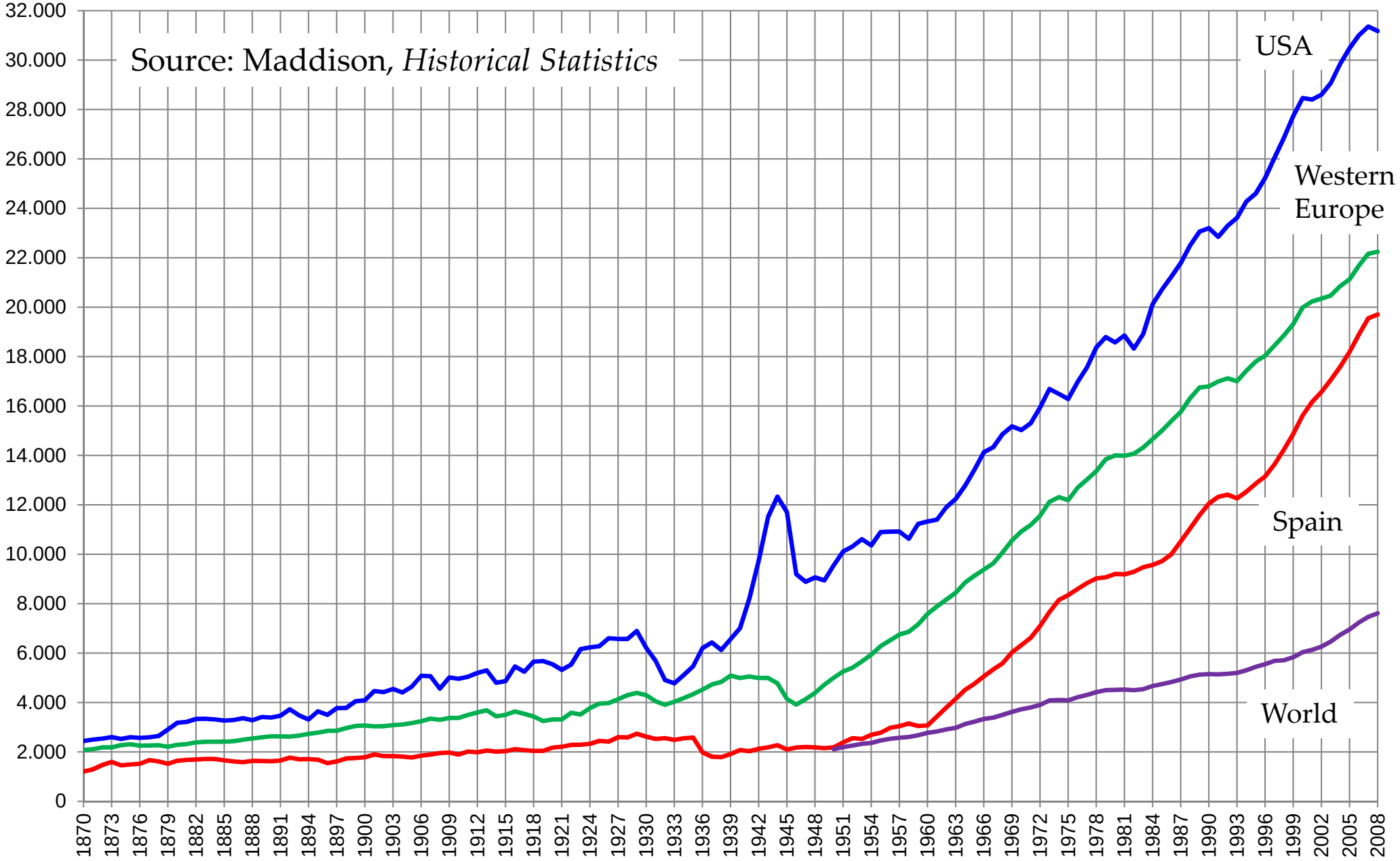
GDP per capita & HDI

- GDP per capita is strongly correlated with the Human Development Index.

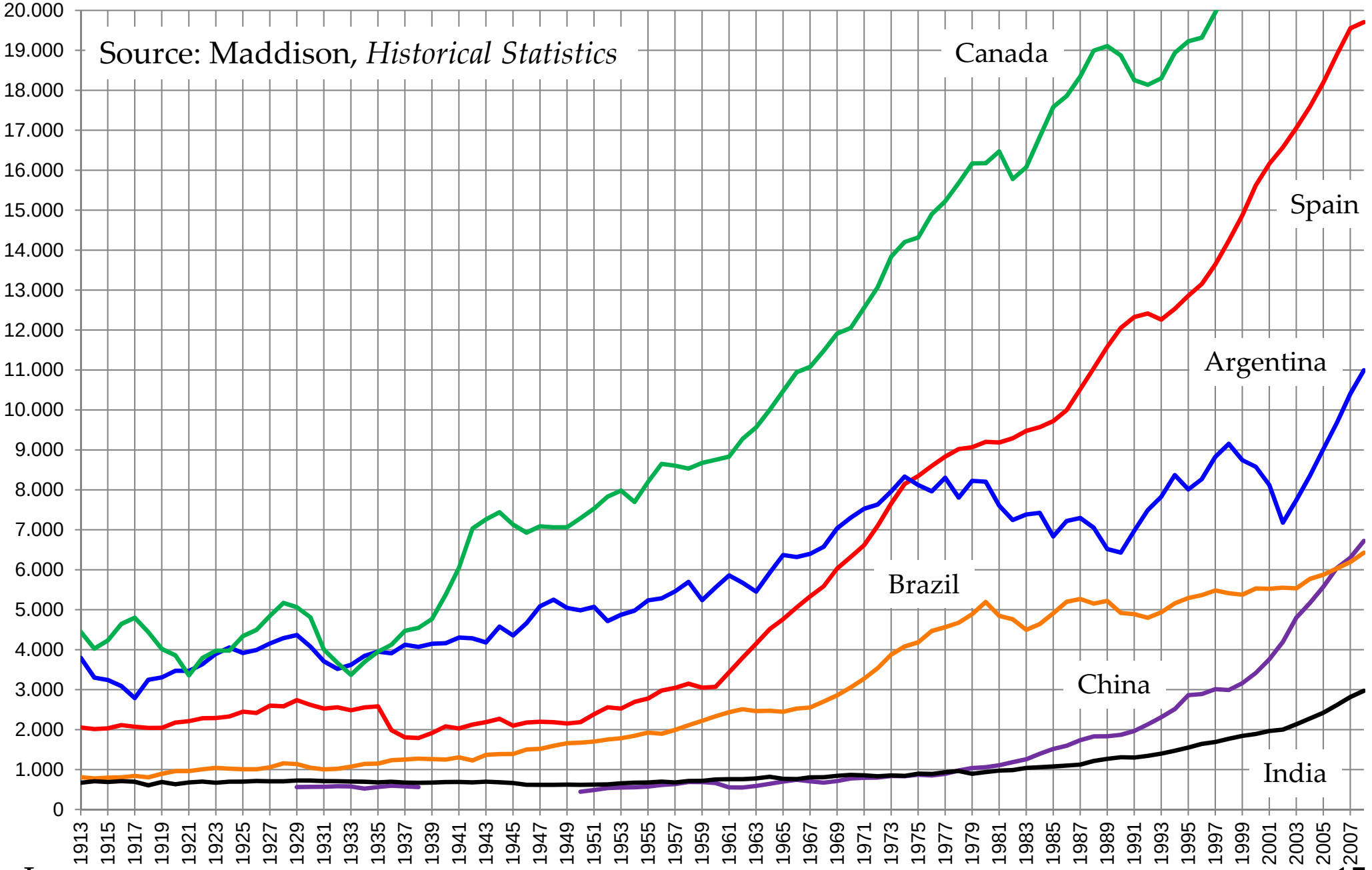


http://en.wikipedia.org/wiki/Human_Development_Index

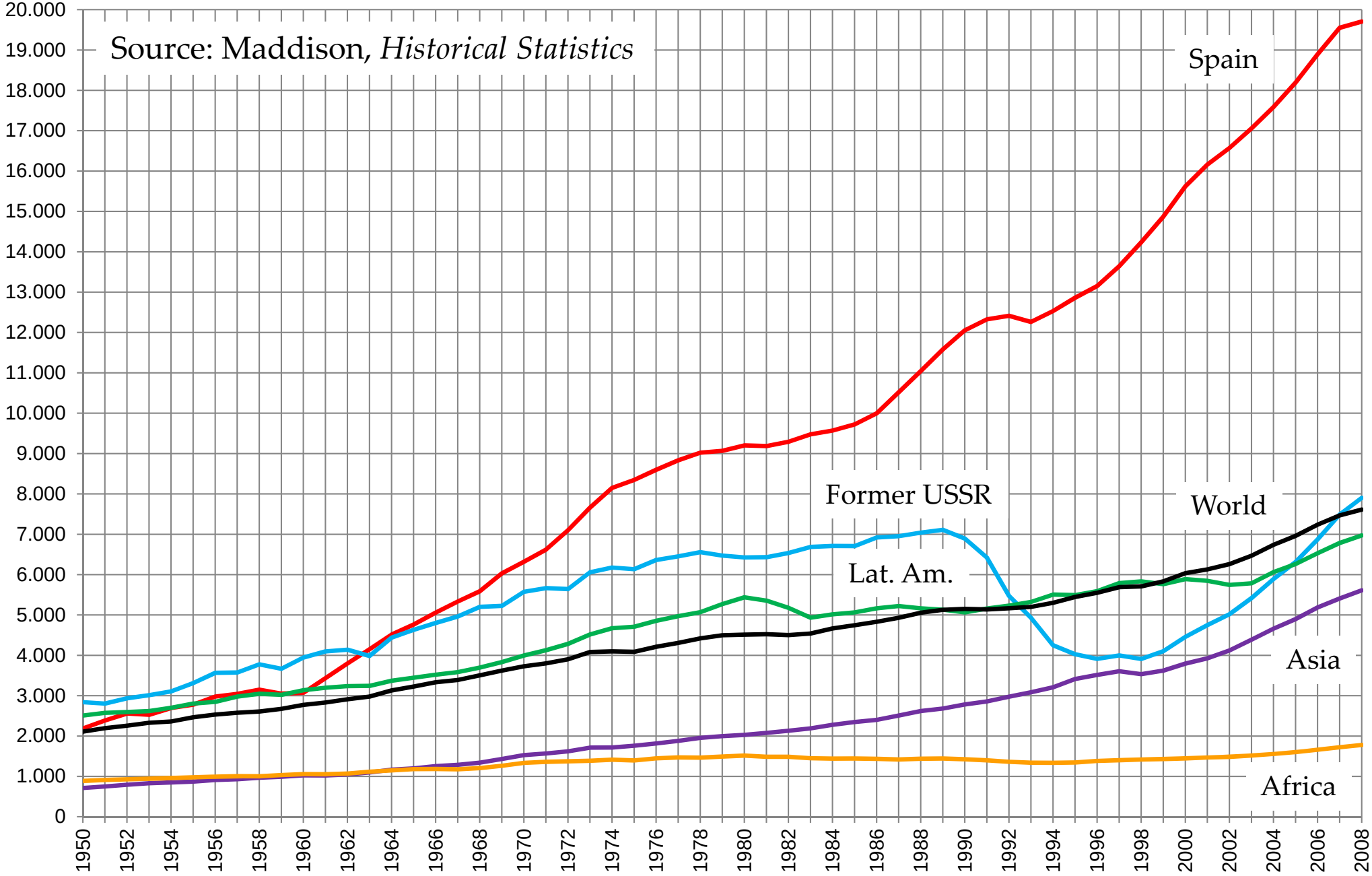
GDP per capita (1820-2008)



GDP per capita (1913-2008)



GDP per capita (1950-2008)



Q3: What purchasing power has the €?

- In essence, all the activities in an economy involve flows of either goods or money. A basic question in macroeconomics is how these flows are related.
- The purchasing power of an amount of money is its capacity to be exchanged for goods.
- Loosely speaking, the purchasing power of money is the "quantity" of goods that it can purchase.
- To quantify purchasing power it is common to define some sort of "average price" of an economy.

Price indices

- A price index is a measure of the general price level of an economy, which 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 (domestic product), if GDP measures the quantity of this good, then the price level would represent the price of that 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.

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 $GDP^n_{2009} = 100$, $GDP^r_{2009} = 80$, $GDP^n_{2010} = 135$, and $GDP^r_{2010} = 90$, then GDP_{2009} deflator = 1.25 and GDP_{2010} deflator = 1.5, indicating a price increase.

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 at period t is defined as

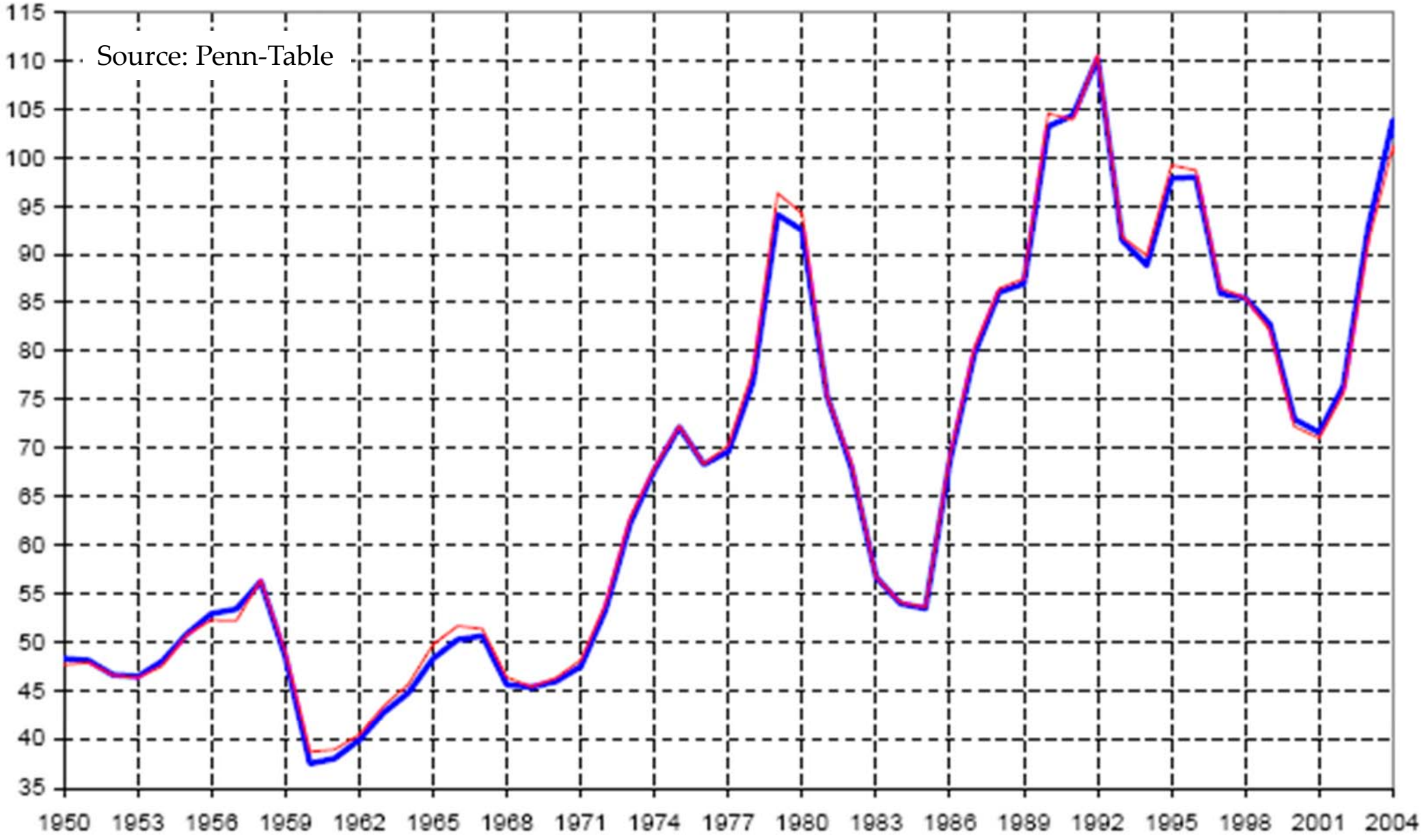
$$\text{CPI}_t = \frac{\text{Value of the basket at prices in period } t}{\text{Value of the basket at prices in the base period}}.$$

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

Difference between CPI & 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 this, both indices are strongly correlated.

GDP deflator and CPI, Spain



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 = *value of the basket at 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, $\text{CPI}_1 = V_1/V_1 = 1$; $\text{CPI}_2 = V_2/V_1 = 16/16 = 1$; $\text{CPI}_3 = V_3/V_1 = 12/16 = 0.75$; and $\text{CPI}_4 = V_4/V_1 = 20/16 = 1.25$.

Inflation rate

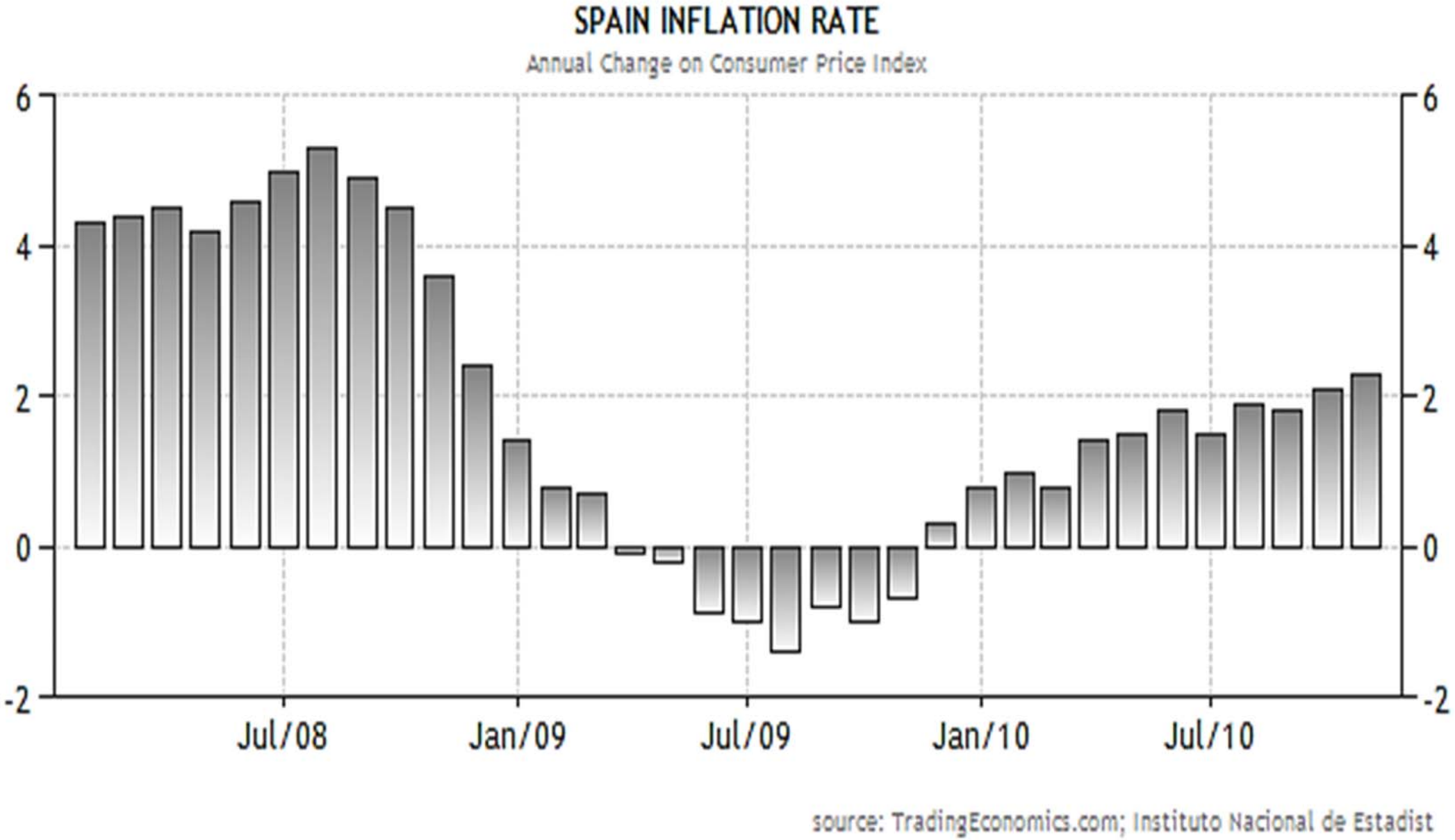
- The inflation rate π associated with the price index P is the rate of change in the price index P:

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

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 $\pi = ¼ = 0.25$ (= 25%): the price index has been pushed up a 25%.

Inflation rate, Spain (Feb08–Nov10)



Inflation rate, Spain (Feb10–Jan12)

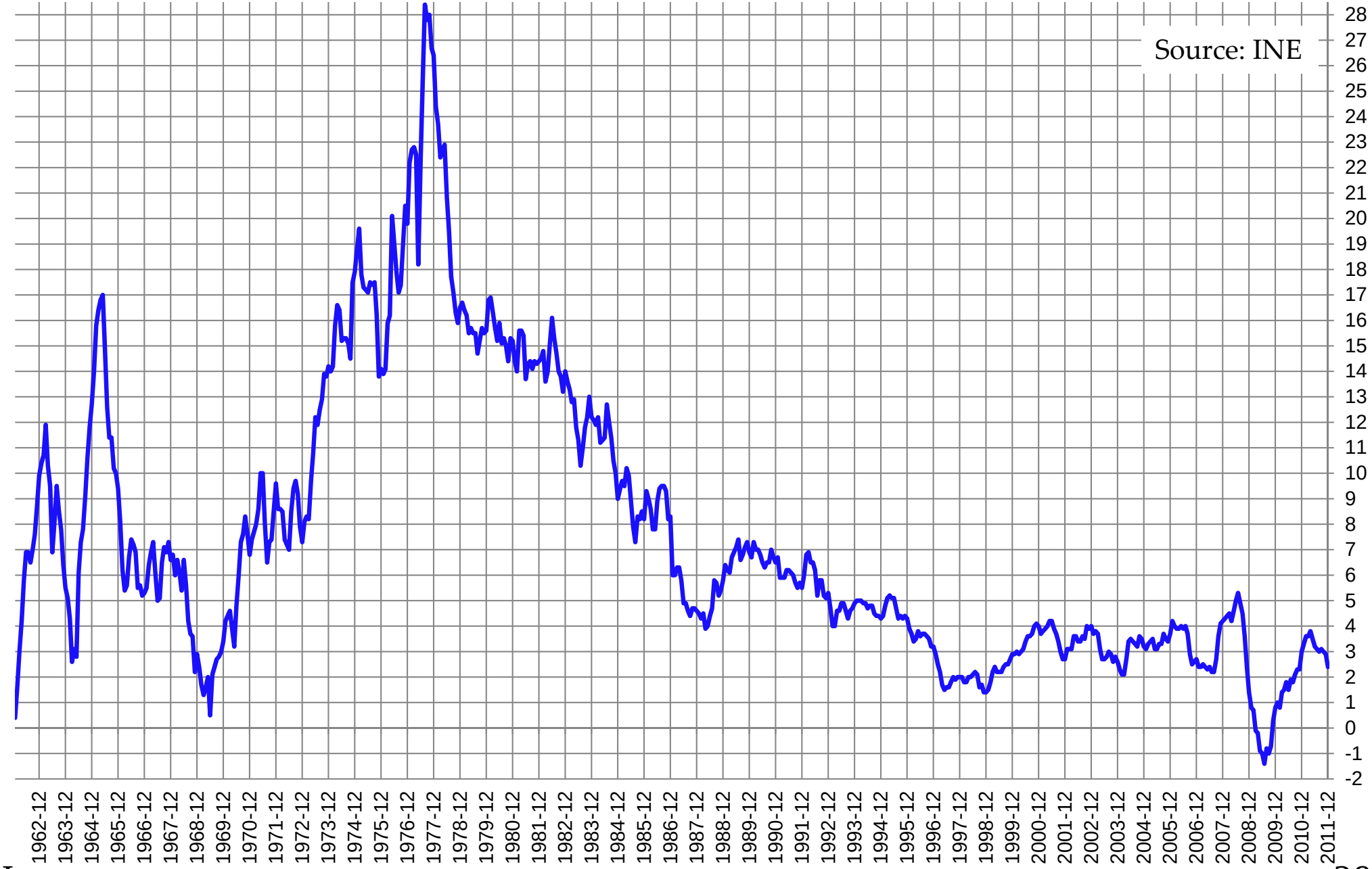
Inflation rate: an example

- Let π be the inflation rate associated with the CPI of the previous example.
- In this case:
  - π_1 is not defined (since there is no CPI_0)
  - $\pi_2 = (CPI_2 - CPI_1)/CPI_1 = (1 - 1)/1 = 0$
  - $\pi_3 = (CPI_3 - CPI_2)/CPI_2 = (.75 - 1)/1 = -.25 = -25\%$
  - $\pi_4 = (CPI_4 - CPI_3)/CPI_3 = (1.25 - .75)/.75 = 66.6\%$.
- If π is calculated, for instance, from $t = 1$ to $t = 4$, then $\pi = (CPI_4 - CPI_1)/CPI_1 = (1.25 - 1)/1 = .25 = 25\%$.

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 hyperinflation, inflation is out of control.

Inflation rate, Spain (1962M1–2011M12)



Core inflation rate

- The core inflation rate is the inflation rate computed, typically from a CPI, 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.
- Headline inflation rate refers to the inflation rate initially defined (takes into account all prices).

Q4: Is the economy doing well or badly?

- Potential (or "natural") GDP refers to the maximum GDP level that an economy can sustain over time (potential GDP can be associated with a point in the production possibilities frontier).

- When GDP is below potential, some production inputs must lie idle (remain unused).

- Since labour services constitute one of the main inputs, its rate of employment is a measure of the degree to which an economy is performing well.

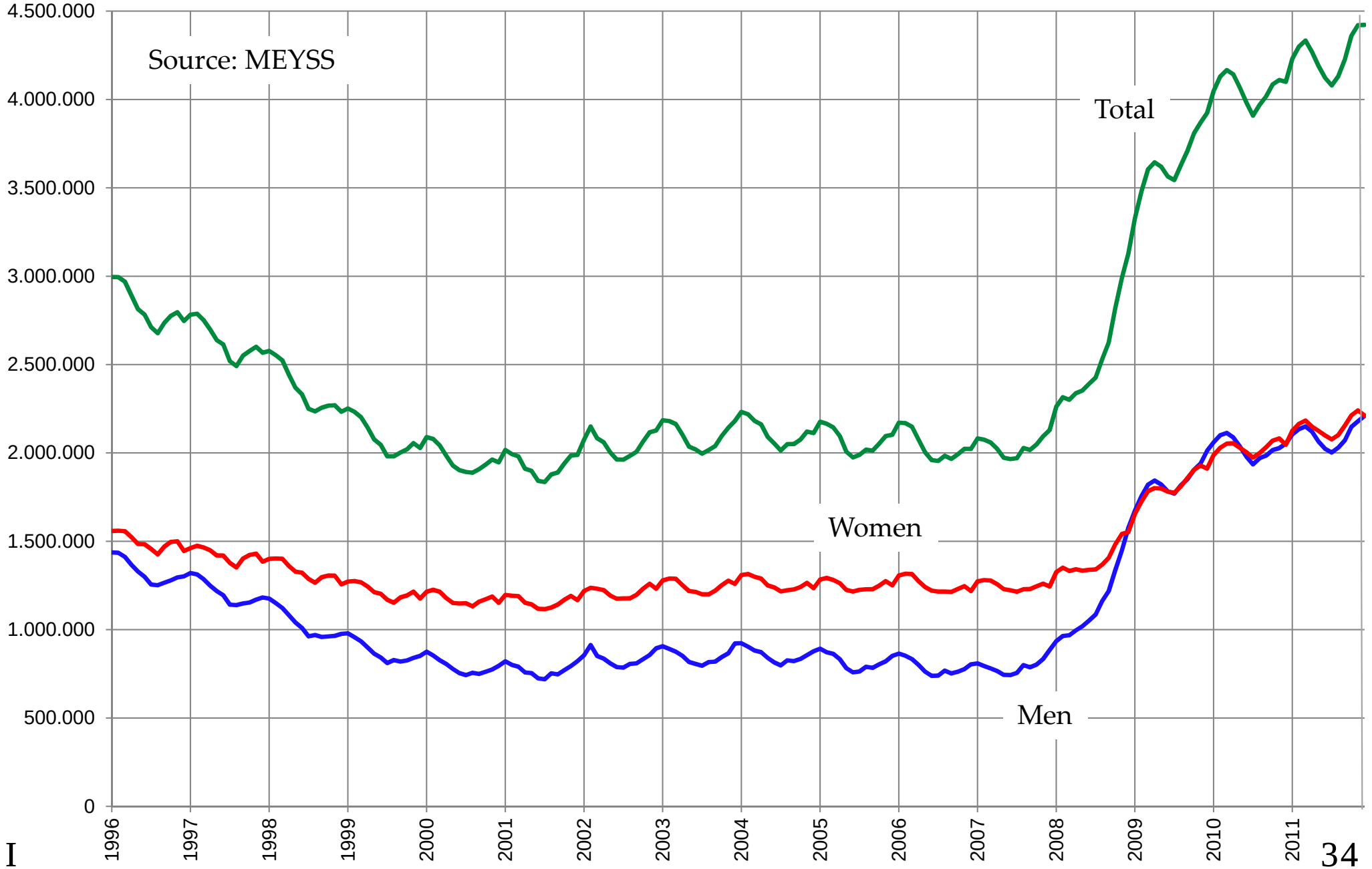
Unemployment rate

- Employment = number of people having a job
- Unemployment = number of people not having a job but looking for one
- Labour force = Employment + Unemployment
- $\text{Unemployment rate} = \dfrac{\text{Unemployment}}{\text{Labour force}}$
- $\text{Participation rate} = \dfrac{\text{Labour force}}{\text{Total population of working age}}$

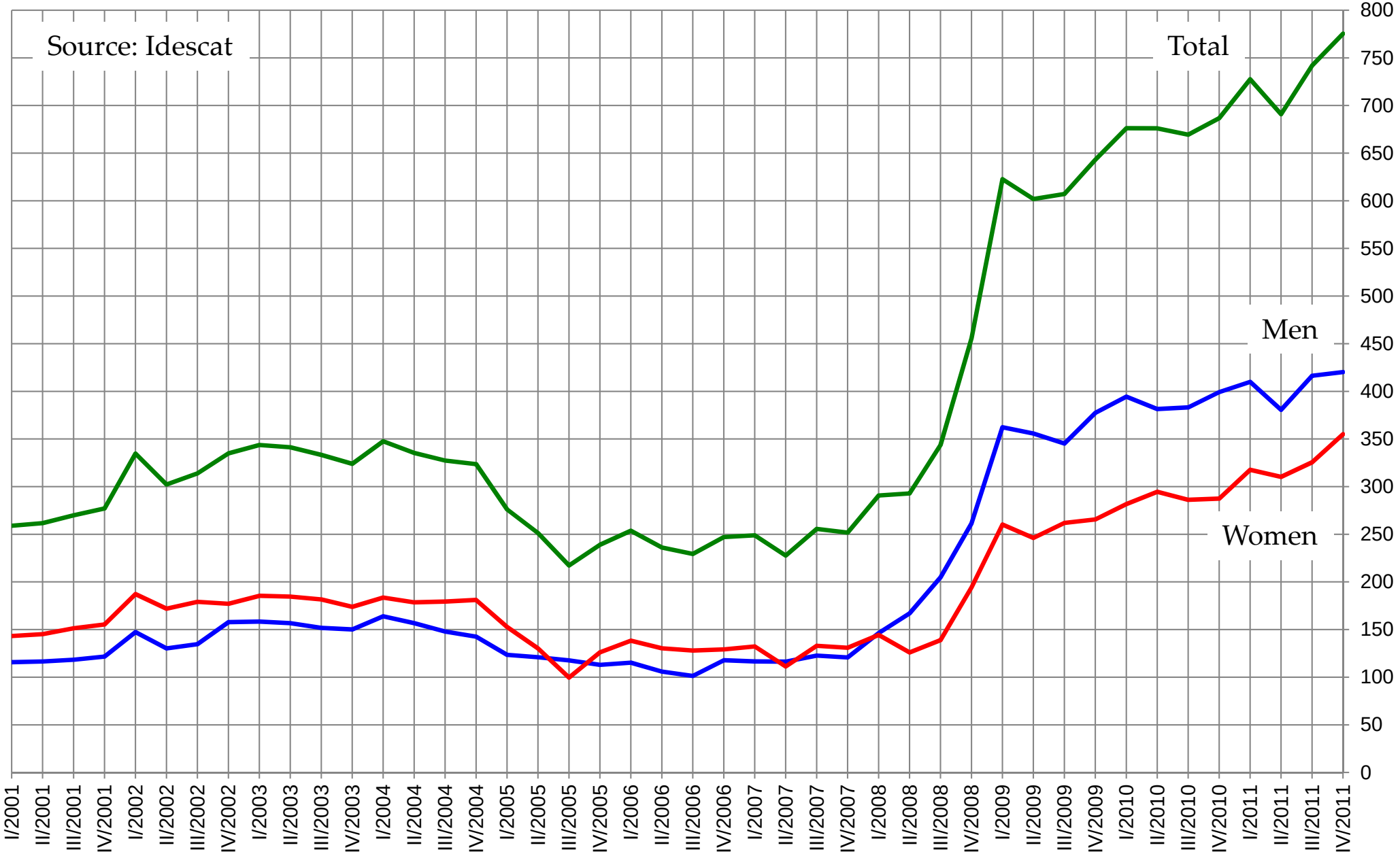
Types of unemployment

- Actual unemployment is divided into 3 categories (the first two define "natural unemployment").
- Frictional. Occurs while workers are changing jobs.
- Structural. Due to structural changes in the economy that create & eliminate jobs and to the institutions that match workers and firms (firing & hiring costs, minimum wages, unemployment benefits, mobility restrictions, lack of training…).
- Cyclical. Generated by the short-run fluctuations of GDP (rises with recessions, falls with booms).

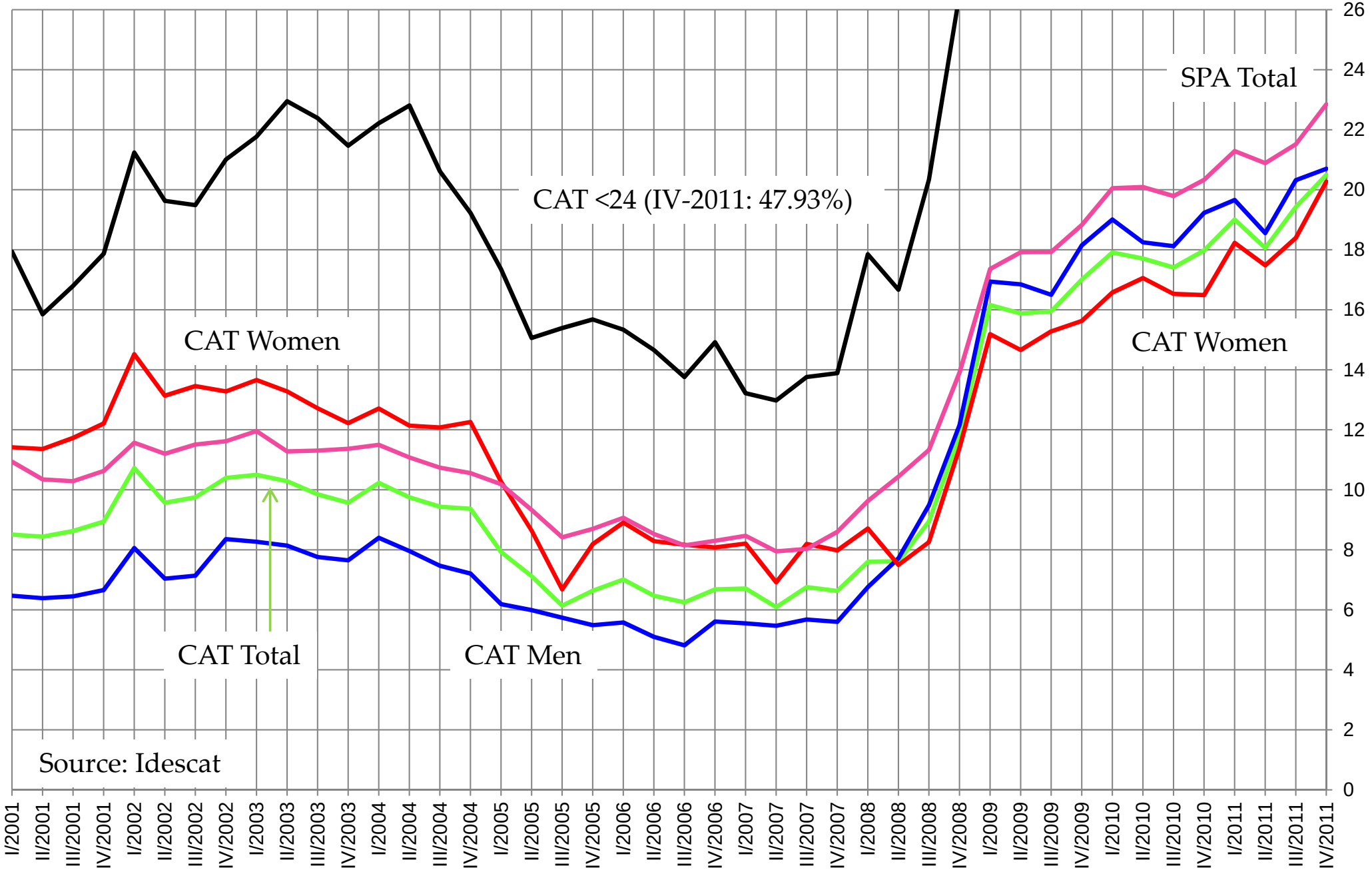
Registered unemployment, Spain



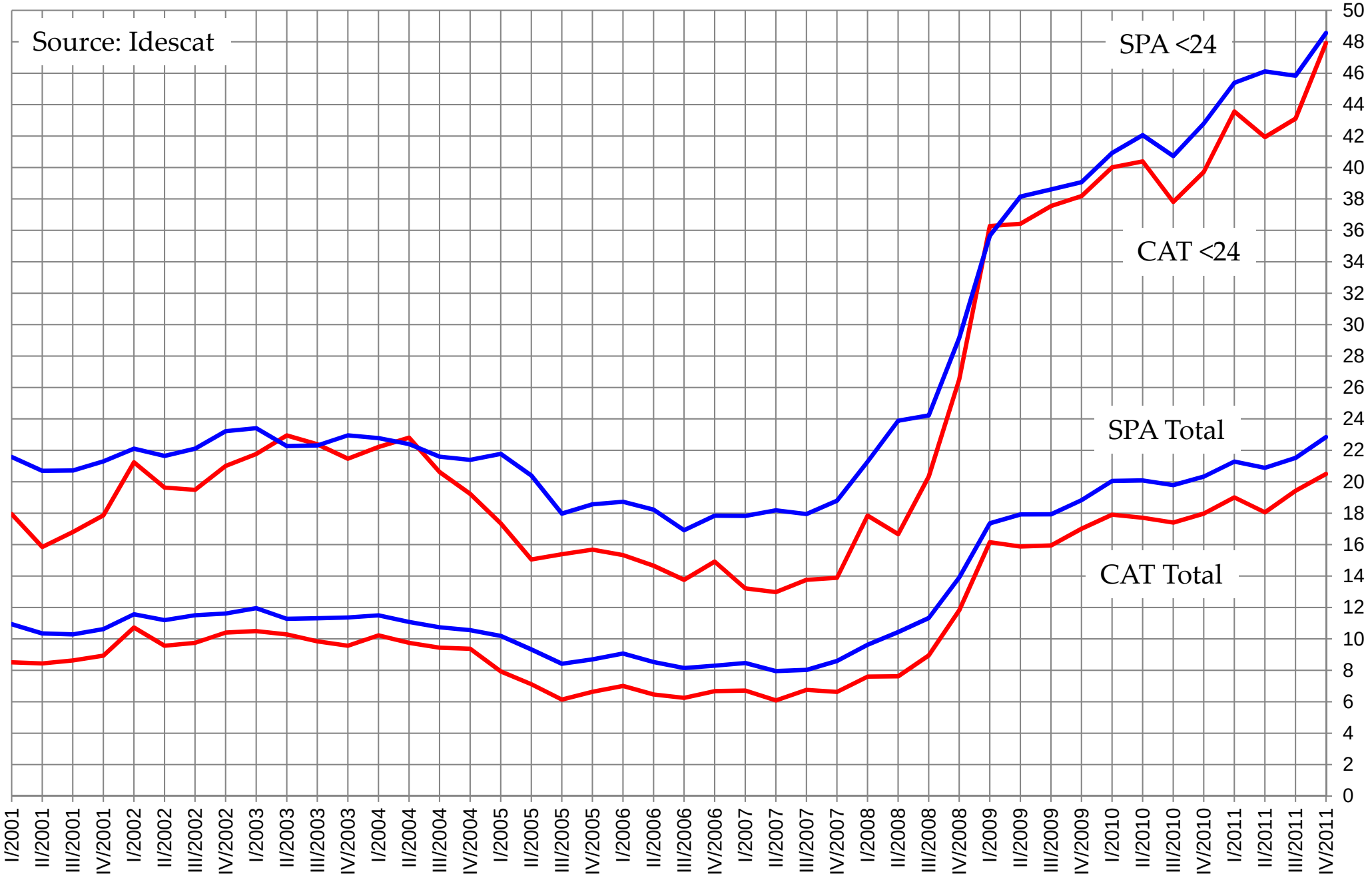
Estimated unemployment, Catalonia



Unemployment rate, Spain, Catalonia



Unemployment rate, Spain, Catalonia



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 monetary units.
- Examples: the GDP at current prices, the stock of money, the (nominal) interest rate, the (nominal) exchange rate, and the CPI.

Real variable

- A real variable measures physical quantities. Real variables are not affected by current prices.
- Some real variables need not prices to be defined, like total employment or the unemployment rate.
- 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.

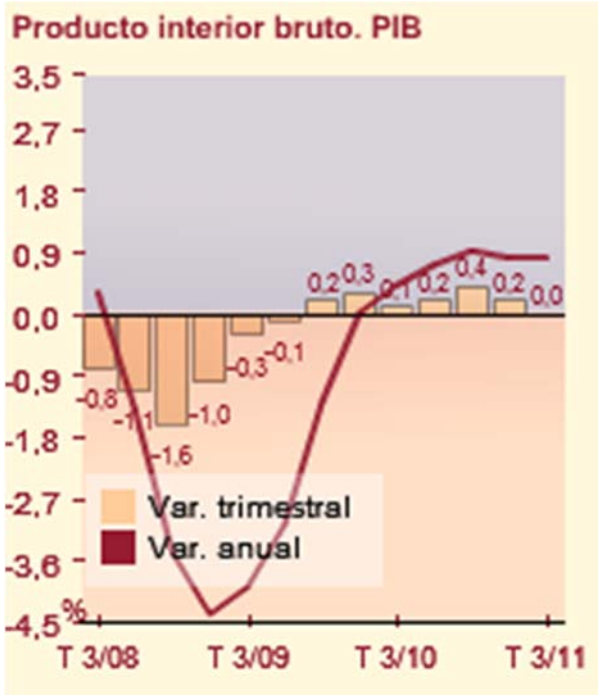
Stock variable & flow variable

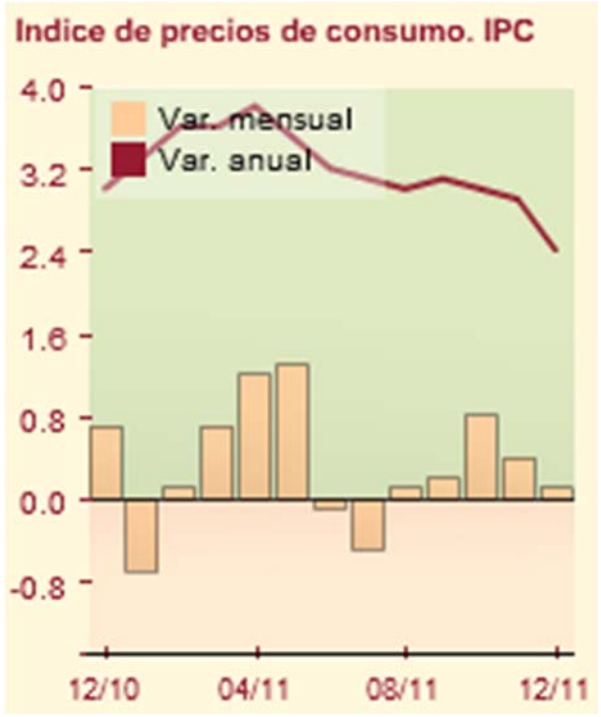
- A stock variable is measured in levels rather than rates of change.
- A flow variable is measured in rates per unit of time rather than levels.
- GDP is a flow variable, since it measures production during a period of time (so GDP is production per unit of time).
- Unemployment at a given moment of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

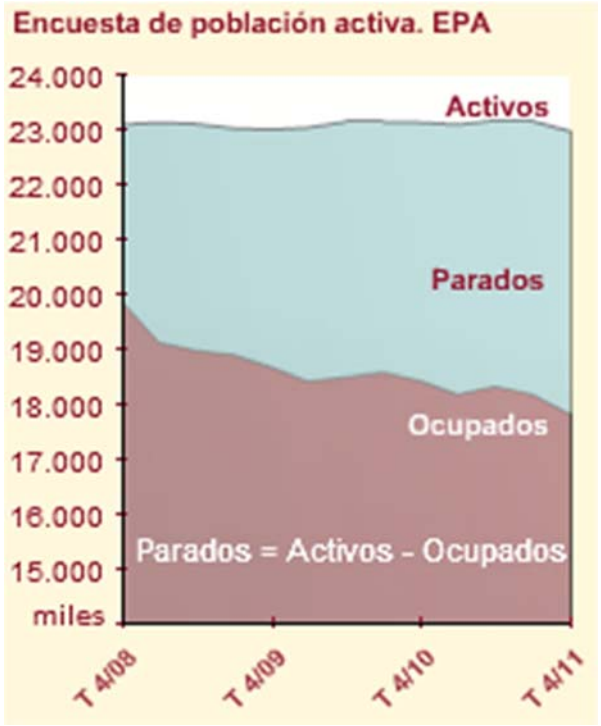
Source: Tradingeconomics.com, accessed the 8th of February, 2012

Country	GDP Billion USD	GDP QoQ	GDP YoY	Interest rate	Inflation rate	Jobless rate	Gov. Budget	Debt to GDP
United States	14582	2.80%	1.60%	0.25%	3.00%	8.30%	-10.30	93.20
Euro Area	12456	0.20%	1.40%	1.00%	2.70%	10.40%	-6.20	85.10
China	5879	2.00%	8.90%	6.56%	4.10%	4.10%	-2.50	17.70
Japan	5498	1.40%	-0.70%	0.00%	-0.20%	4.60%	-8.20	220.30
Germany	3310	0.50%	2.50%	1.00%	2.00%	6.60%	-4.30	83.20
France	2560	0.30%	1.55%	1.00%	2.50%	9.70%	-7.10	81.70
United Kingdom	2246	-0.20%	0.80%	0.50%	4.20%	8.40%	-10.30	80.00
Brazil	2088	0.00%	2.10%	10.50%	6.50%	4.70%	2.20	66.10
Italy	2051	-0.20%	0.20%	1.00%	3.20%	8.90%	-4.60	119.00
India	1729	6.90%	6.90%	7.50%	6.49%	9.40%	-5.10	69.20
Canada	1574	0.90%	2.40%	1.00%	2.30%	7.60%	-2.10	84.00
Russia	1480	0.40%	4.80%	8.00%	4.20%	6.30%	-3.90	9.90
Spain	1407	-0.30%	0.30%	1.00%	2.40%	22.85%	-9.30	60.10
Mexico	1040	1.30%	4.50%	4.50%	3.82%	5.04%	-2.30	42.70
South Korea	1014	0.40%	3.40%	3.25%	3.40%	3.10%	-1.10	30.86
Australia	925	1.00%	2.10%	4.25%	3.10%	5.20%	-4.30	22.30
Netherlands	783	-0.20%	1.10%	1.00%	2.40%	5.80%	-5.10	63.70
Turkey	735	1.70%	8.20%	5.75%	10.61%	9.40%	-3.60	41.70
Indonesia	707	-1.30%	6.50%	6.00%	3.65%	6.56%	-0.62	26.90
Switzerland	524	0.20%	1.30%	0.00%	-0.70%	3.40%	-1.30	55.00
Poland	469	1.00%	4.20%	4.50%	4.60%	12.10%	-7.80	55.00
Belgium	467	-0.20%	0.90%	1.00%	3.20%	7.20%	-4.10	96.80
Sweden	458	1.60%	4.60%	1.75%	2.30%	7.50%	0.20	39.80
Taiwan	431	-0.98%	1.90%	1.88%	2.40%	4.18%	-3.20	39.70
Norway	414	1.40%	3.80%	1.75%	0.20%	3.40%	10.60	44.70
Venezuela	388	0.00%	4.20%	15.55%	26.00%	6.50%	-4.02	38.70

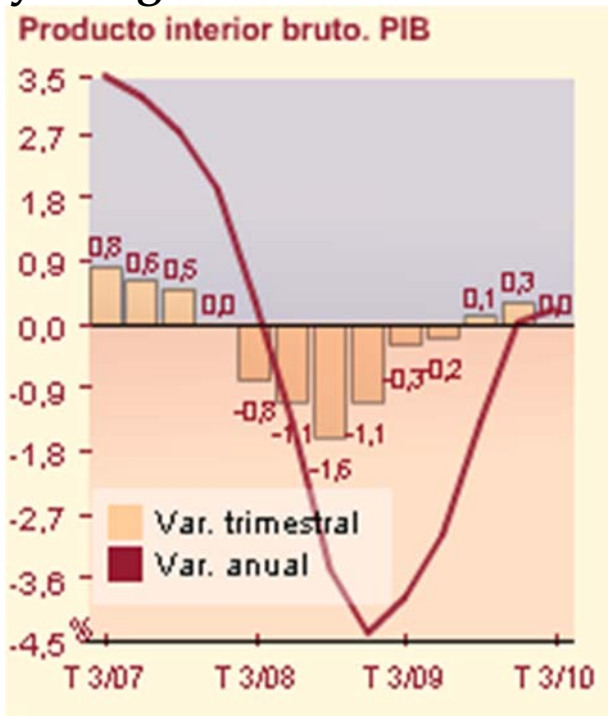
Source: INE

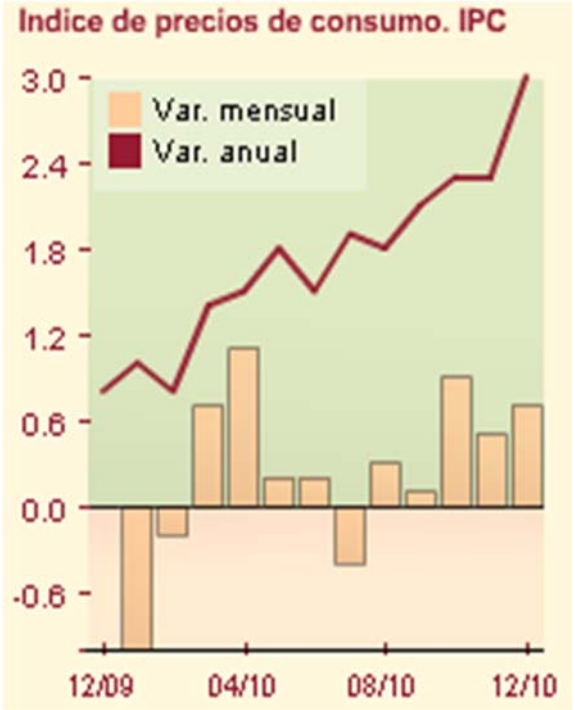


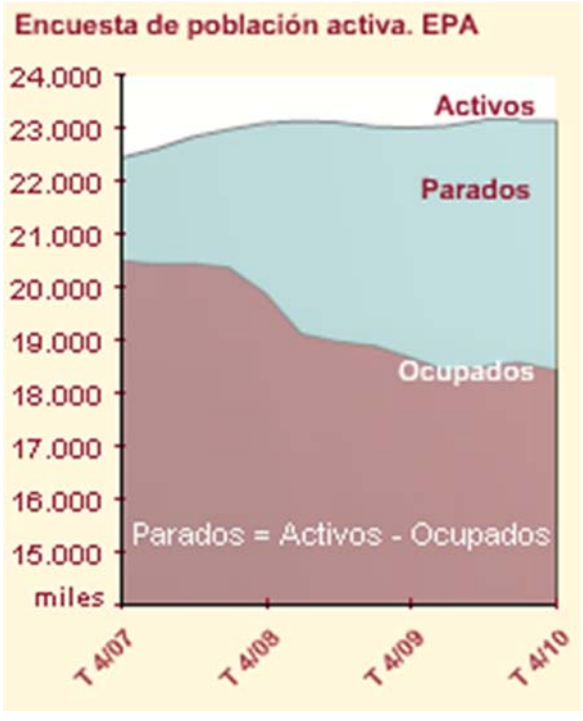




A year ago







1st fundamental accounting identity

- With all variables being real, the fundamental national income accounting identity states that

$$\underbrace{Y}_{\text{ex-post supply of output}} \equiv \underbrace{C + I + G + NX}_{\text{ex-post demand for output}}.$$

C = consumption spending by households

I = investment spending by firms and households

G = government purchases of goods

NX = net exports of goods = exports – imports

EX IM

2nd fund. accounting identity/v1

- T = taxes paid by households and firms
- TR = transfers paid to households and firms
- S = private saving (saving by households & firms)
- $C + S \equiv Y_D$ (disposable income) $\equiv Y + TR - T$
- By adding $TR - T$ to each side of $Y \equiv C + I + G + NX$ and rearranging, the following identity obtains:

$$\underbrace{I}_{\text{investment}} \equiv \underbrace{S}_{\substack{\text{private}\\ \text{saving}}} + \underbrace{(T - TR - G)}_{\substack{\text{government}\\ \text{saving}}} + \underbrace{(IM - EX)}_{\substack{\text{foreign}\\ \text{saving}}}.$$

2nd fund. accounting identity/v2

- The identity says that <u>domestic investment must be financed by private saving, public saving, or foreign saving</u>. It can also be expressed as follows:

$$\underbrace{(S - I)}_{\text{net private saving}} \equiv \underbrace{(G + TR - T)}_{\substack{\text{government} \\ \text{budget} = \\ \text{spending} - \text{receipts}}} + \underbrace{NX}_{\substack{\text{trade} \\ \text{balance} \\ \text{or} \\ \text{net} \\ \text{exports}}} .$$

lending capacity =

trade surplus if $NX > 0$

trade deficit if $NX < 0$

= *financial need*

budget surplus if $T > G + TR$

budget deficit if $T < G + TR$

(can also be defined the other way round)

Where do savings go?

- The identity can also be formulated as

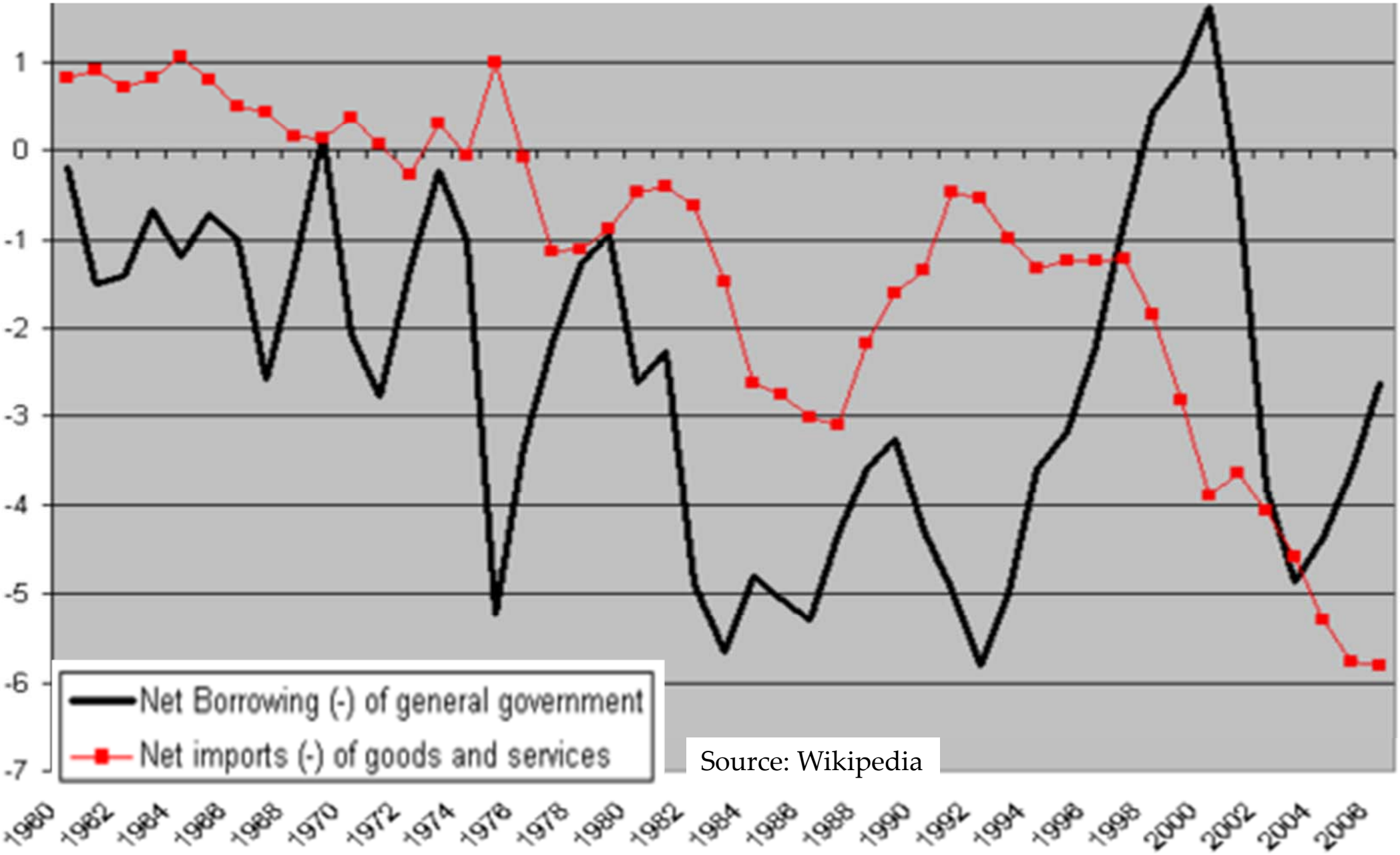
$$S \equiv I + (G + TR - T) + NX \ .$$

- This says that there are three ways of disposing of the savings of an economy.
- Savings can go to firms to finance investment…
- … to the government to finance a budget deficit…
- … or to foreigners, when they buy more from the economy than the economy buys from them.

Twin deficits: twice the fun

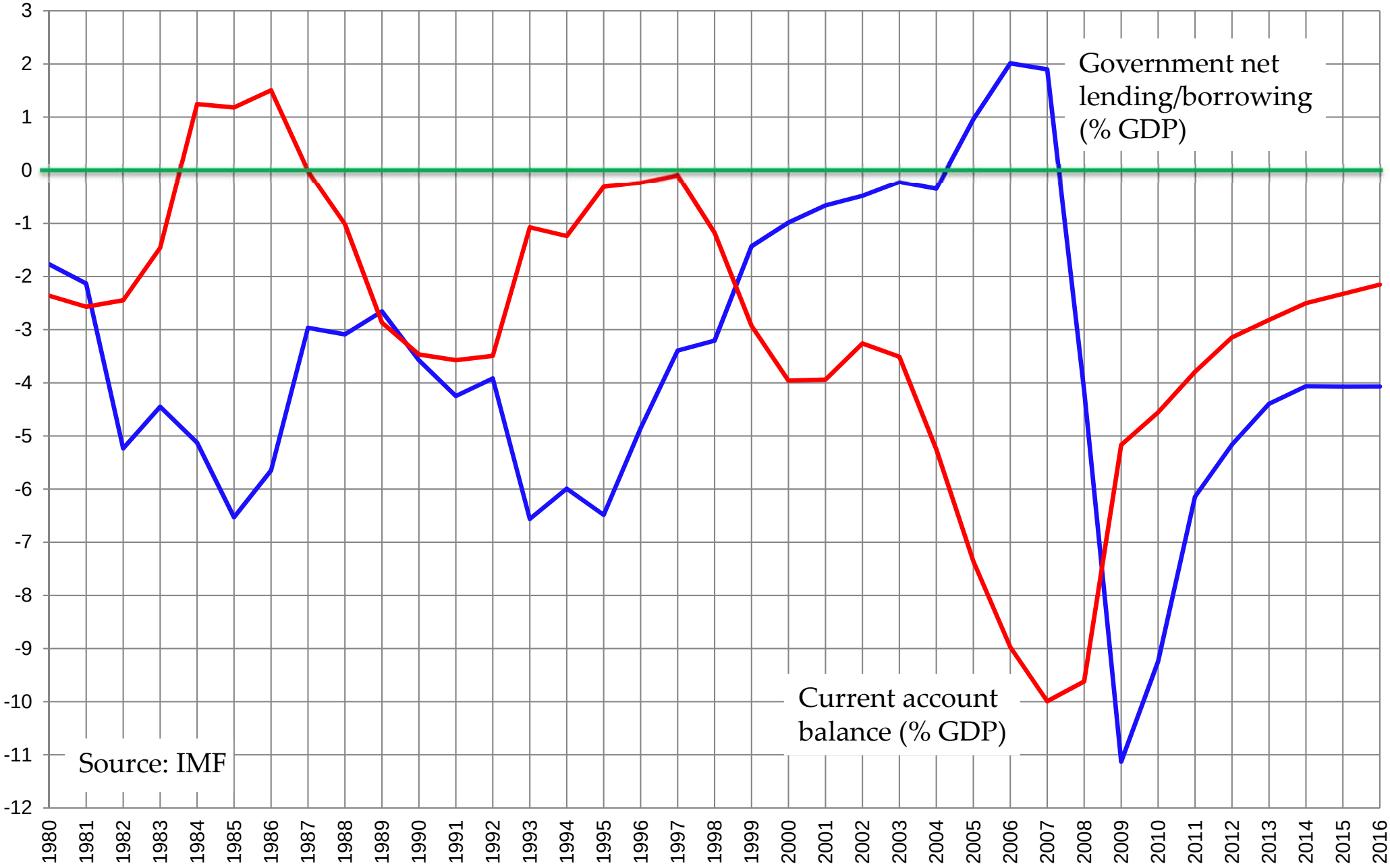
- If investment equals savings, so $I = S$, the 2nd identity (version 2) implies that the government budget deficit equals the trade balance.
- This means that if the government runs a budget deficit, then it must be financed by foreigners: if $I = S$, then $G + TR - T > 0$ implies $NX < 0$.
- In sum, the government spends more without having to increase taxes and the rest of members of the economy buy from abroad more goods than they sell; see the US case during the 80s and 90s.

Twin deficits: the US case (% of GDP)



Source: Wikipedia

Twin deficits: the Spanish case



From expenditure to GDP

- According to national income accounting, GDP equals expenditure, income, and value added.
- The expenditure approach to measure GDP splits GDP into four components (C, I, G, and NX) according to the identity of the purchaser (or according to the purpose of the expenditure).
- The expenditure approach leads to the identity $Y \equiv C + I + G + NX$: everything that is produced is purchased by consumers to be consumed, by firms to be invested, by the government, or by foreigners. Hence, production ≡ expenditure.

GDP, Spain, expenditure approach

	2011Q1	2010Q1	2011Q2	2010Q2	2011Q3	2010Q3
C	162.8	153.3	153.8	156	151.4	156.5 58.8% 61.1
I	58.8	65.3	64.4	62.9	55.3	51.8 21.4% 20.2
G	47.4	46.2	57.5	58.4	48	48.7 18.6% 19
EX	75.7	62.3	81.4	70.1	83.4	72.5 32.4% 28.3
IM	82.9	70	82.3	76.2	80.8	73.6 –31.3% –28.7
GDP	261.9	257.3	275.2	271.5	257.4	255.9 100%

Source: INE http://www.ine.es/daco/daco42/daco4214/tabcntr.xls billions of €

From income to GDP

- The income approach to measure GDP obtains GDP as the sum of the payments made to all the factors of production (inputs).
- Inputs are aggregated into two categories: labour (workers) and capital (firms). The government is a third category, because it collects taxes.
- The income approach leads to the identity $Y \equiv$ wages + profits + taxes: everything that is produced becomes the income of workers (wages), of firms (profits), or of the government (taxes). Summing up, production ≡ income.

GDP, Spain, income approach

	2011Q1 2010Q1	2011Q2 2010Q2	2011Q3 2010Q3
wages	119.3 119.7	130.1 132.3	118.9 121.3 (46.1%)
profits	115.8 109.8	122.6 118.2	114.9 110 (44.6%)
taxes	26.6 27.7	22.4 20.9	23.5 24.6 (9.1%)
GDP	261.9 257.3	275.2 271.5	257.4 255.9 (100%)

Source: INE http://www.ine.es/daco/daco42/daco4214/tabcntr.xls billions of €

From value added to GDP

- The value added approach to measure GDP views GDP as the sum of the value that each producer adds to the production purchased by the producer.
- If the reprographic industry buys paper worth 100 and energy worth 200 to make copies worth 600, then the added value of the industry is 600 – 200 – 100 = 300. If that value were 600, the production of paper and energy would be counted twice.
- Value added = value of the final (new) goods produced – value of the intermediate goods. In this case, production ≡ total value added.

GDP, Spain, value added approach

	2011Q1	2011Q2	2011Q3	
Agriculture &c.	5.6	7.9	4.9	(1.9%)
Industry (Manufactures)	45.9 (35.3)	40.8 (32.9)	38 (30.5)	(14.7%) (11.8%)
Construction	25.9	28.4	30	(11.6%)
Services	159.9	177.6	163.5	(63.5%)
Taxes	24.5	20.3	20.8	(8.08%)
GDP	261.9	275.2	257.4	(100%)

Source: INE http://www.ine.es/daco/daco42/daco4214/tabcntr.xls billions of €

A stockpile of definitions

- Government budget: $GB = T - TR - G$.
- A budget surplus occurs when $GB > 0$.
- A budget deficit occurs when $GB < 0$.

- Trade balance: $NX = EX - IM$.
- A trade surplus occurs when $NX > 0$.
- A trade deficit occurs when $NX < 0$.

- Domestic demand for GDP = $C + I + G$
- Net foreign demand for GDP = $NX = EX - IM$
- Disposable income = $Y + TR - T$ (which must equal $C + S$)