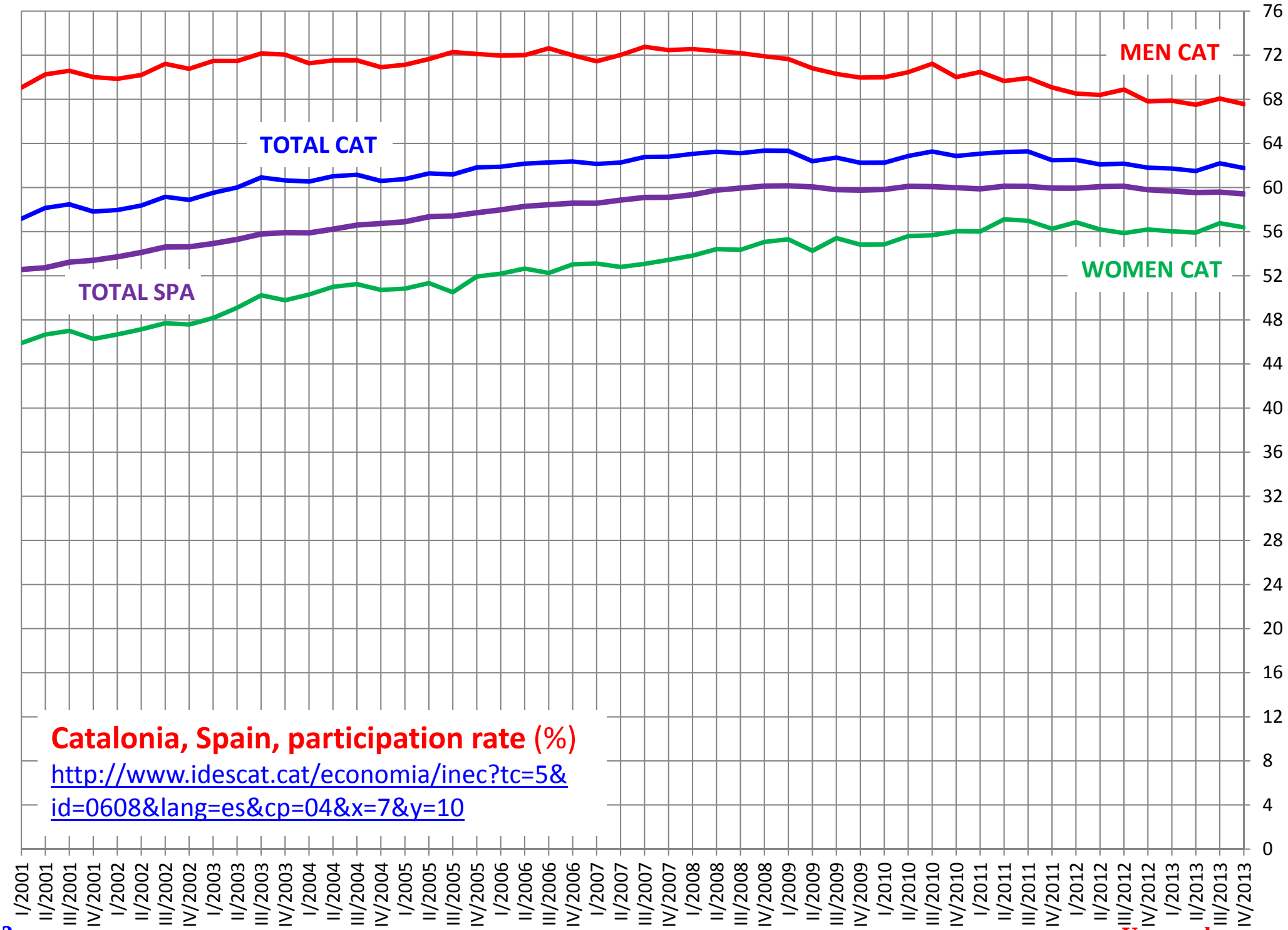
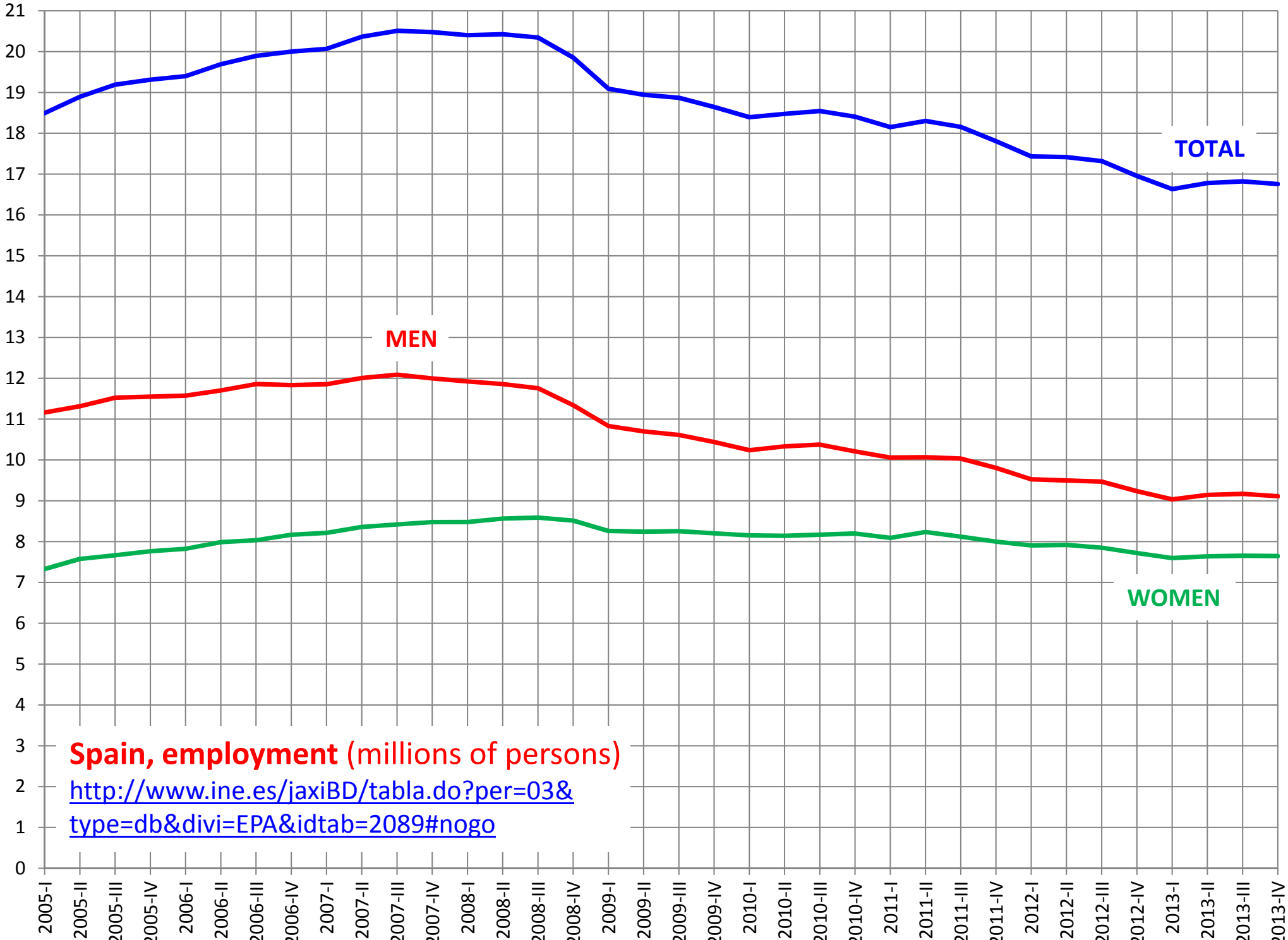
Unemployment rate

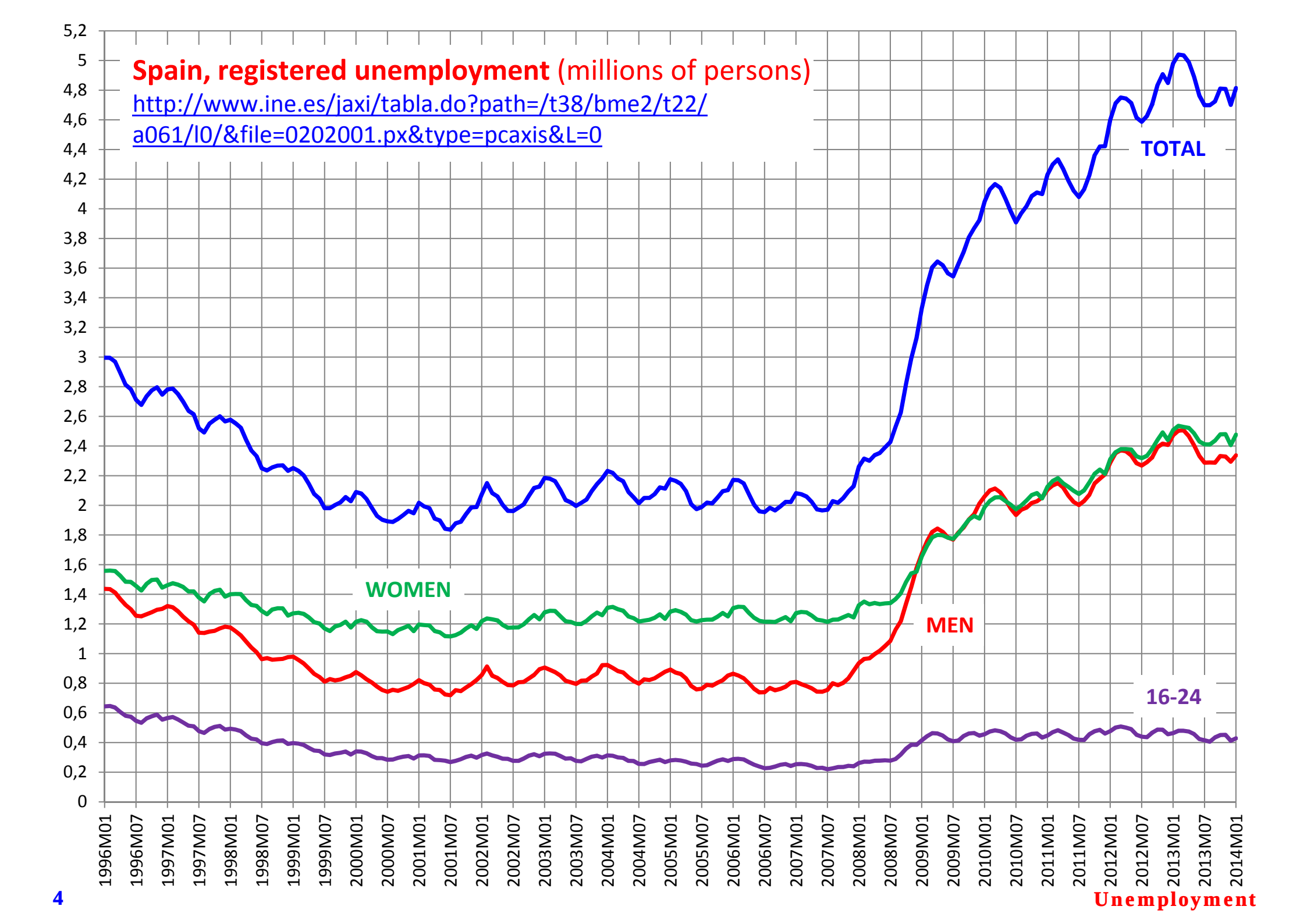
- Important rates in an economy: interest rate, exchange rate, inflation rate, and unemployment rate.
- Employment = number of people having a job.
- Unemployment = number of people not having a job but looking for one.
- Labour force = Employment + Unemployment
- $\text{Unemployment rate} = \dfrac{\text{Unemployment}}{\text{Labour force}}$
- $\text{Participation rate} = \dfrac{\text{Labour force}}{\text{Economically active population}}$



Catalonia, Spain, participation rate (%)

http://www.idescat.cat/economia/inec?tc=5&id=0608&lang=es&cp=04&x=7&y=10


TOTAL
MEN
WOMEN
Spain, employment (millions of persons)
http://www.ine.es/jaxiBD/tabla.do?per=03&type=db&divi=EPA&idtab=2089#nogo
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
2005-I
2005-II
2005-III
2005-IV
2006-I
2006-II
2006-III
2006-IV
2007-I
2007-II
2007-III
2007-IV
2008-I
2008-II
2008-III
2008-IV
2009-I
2009-II
2009-III
2009-IV
2010-I
2010-II
2010-III
2010-IV
2011-I
2011-II
2011-III
2011-IV
2012-I
2012-II
2012-III
2012-IV
2013-I
2013-II
2013-III
2013-IV


Spain, registered unemployment (millions of persons)
http://www.ine.es/jaxi/tabla.do?path=/t38/bme2/t22/a061/l0/&file=0202001.px&type=pcaxis&L=0
TOTAL
WOMEN
MEN
16-24
5,2
5
4,8
4,6
4,4
4,2
4
3,8
3,6
3,4
3,2
3
2,8
2,6
2,4
2,2
2
1,8
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
1996M01
1996M07
1997M01
1997M07
1998M01
1998M07
1999M01
1999M07
2000M01
2000M07
2001M01
2001M07
2002M01
2002M07
2003M01
2003M07
2004M01
2004M07
2005M01
2005M07
2006M01
2006M07
2007M01
2007M07
2008M01
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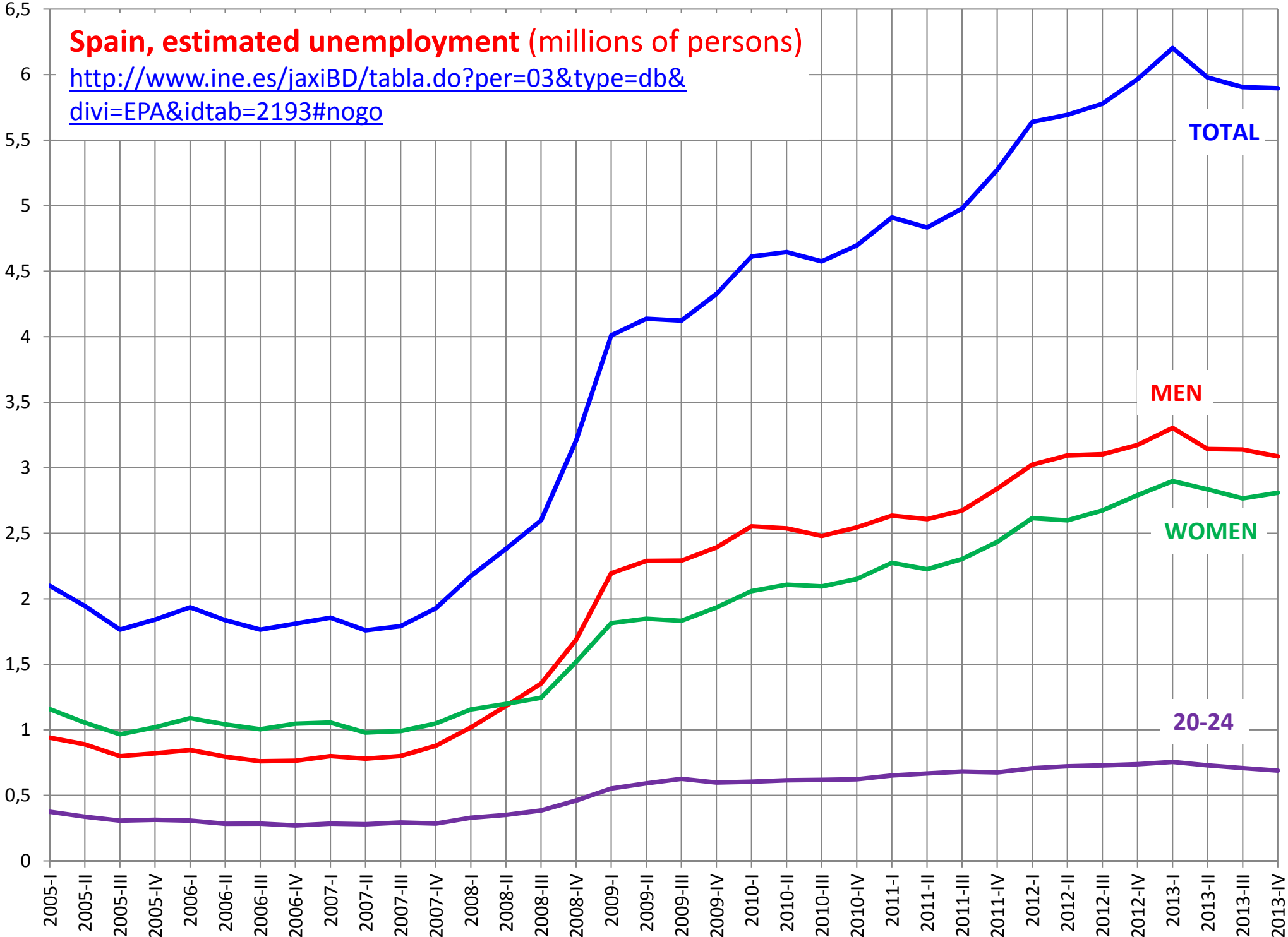
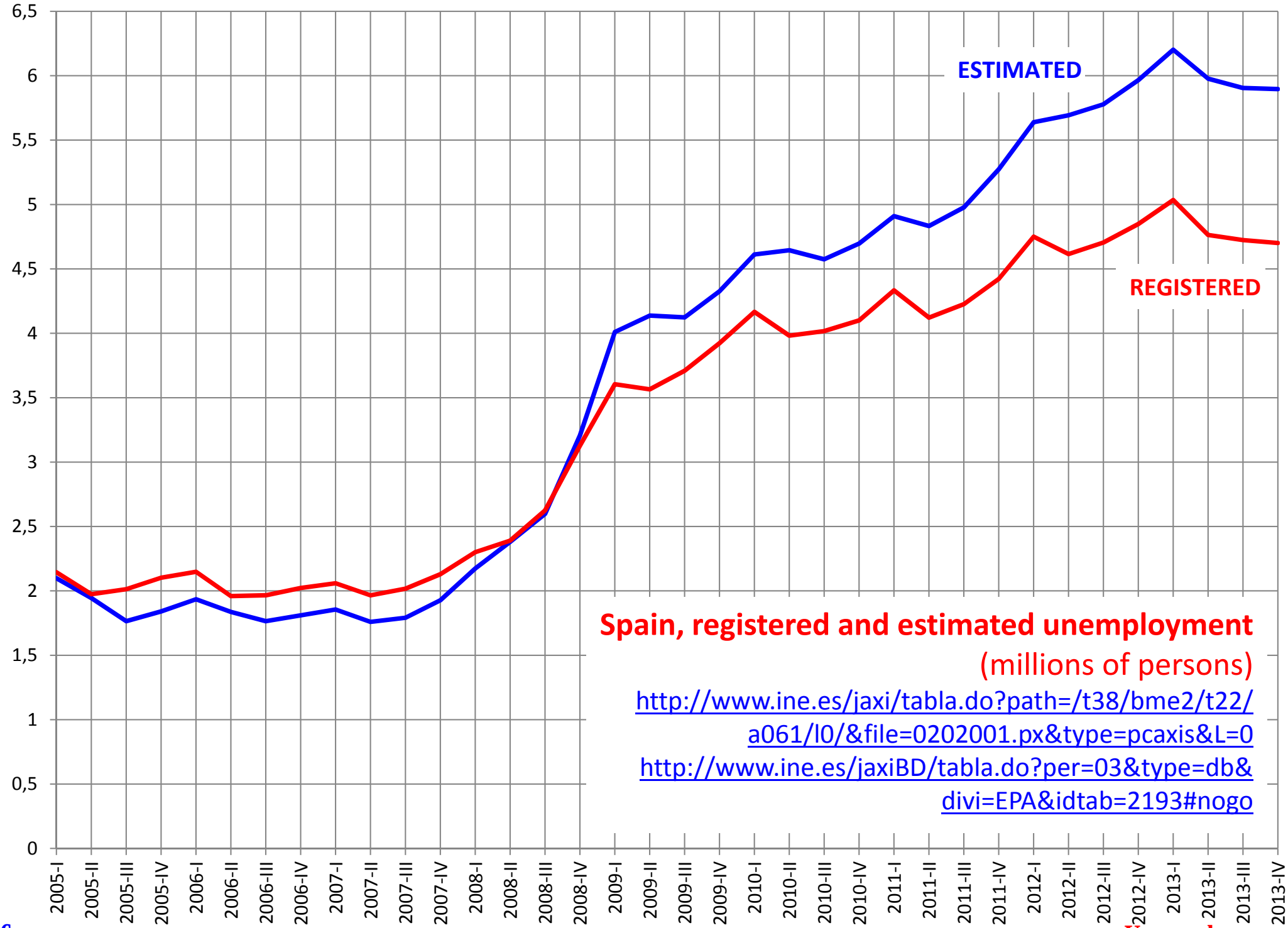
2010M07
2011M01
2011M07
2012M01
2012M07
2013M01
2013M07
2014M01


Spain, estimated unemployment (millions of persons)
http://www.ine.es/jaxiBD/tabla.do?per=03&type=db&divi=EPA&idtab=2193#nogo
TOTAL
MEN
WOMEN
20-24
6,5
6
5,5
5
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
2005-I
2005-II
2005-III
2005-IV
2006-I
2006-II
2006-III
2006-IV
2007-I
2007-II
2007-III
2007-IV
2008-I
2008-II
2008-III
2008-IV
2009-I
2009-II
2009-III
2009-IV
2010-I
2010-II
2010-III
2010-IV
2011-I
2011-II
2011-III
2011-IV
2012-I
2012-II
2012-III
2012-IV
2013-I
2013-II
2013-III
2013-IV

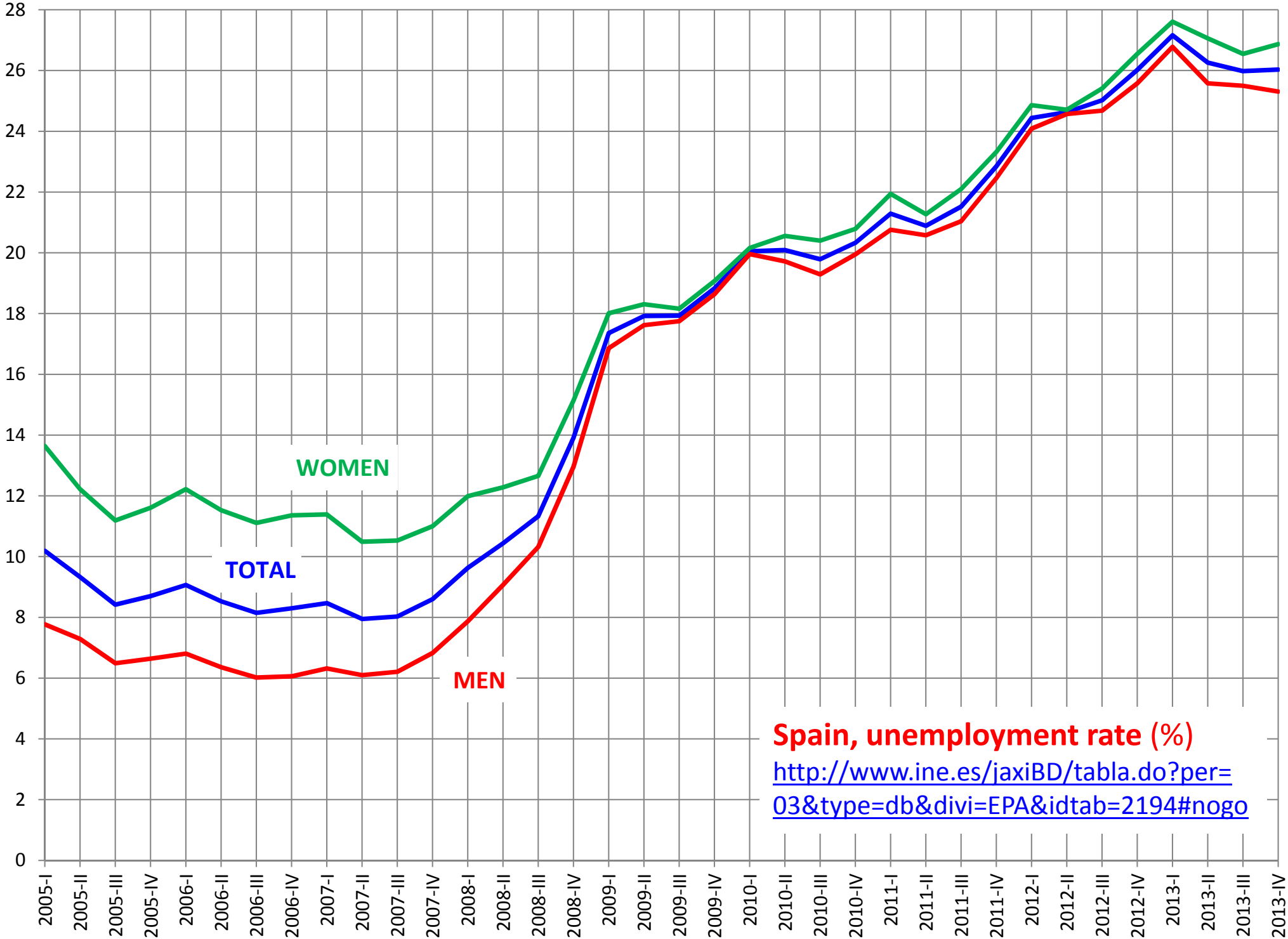


Spain, registered and estimated unemployment

(millions of persons)

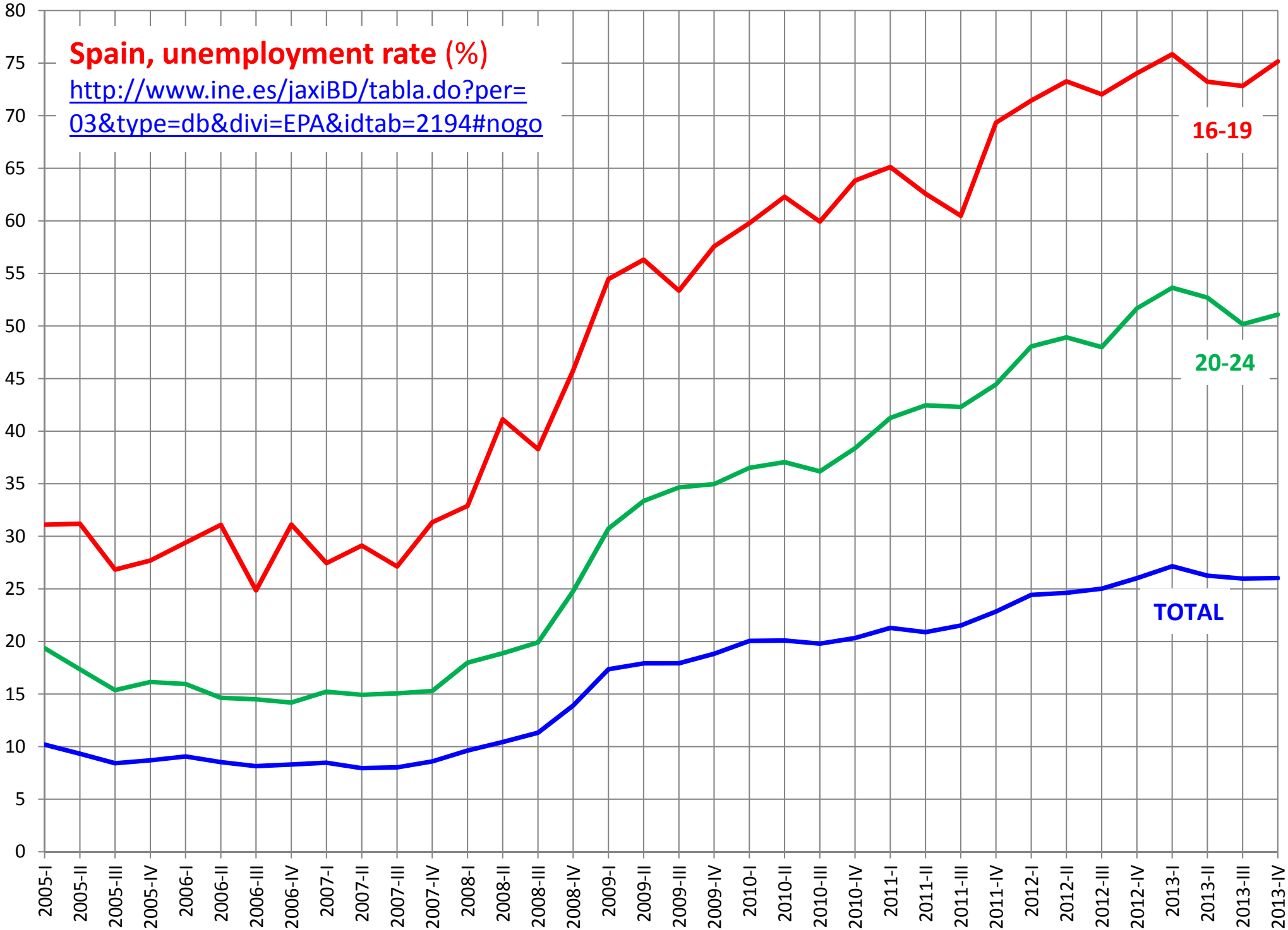
http://www.ine.es/jaxi/tabla.do?path=/t38/bme2/t22/a061/l0/&file=0202001.px&type=pcaxis&L=0

http://www.ine.es/jaxiBD/tabla.do?per=03&type=db&divi=EPA&idtab=2193#nogo



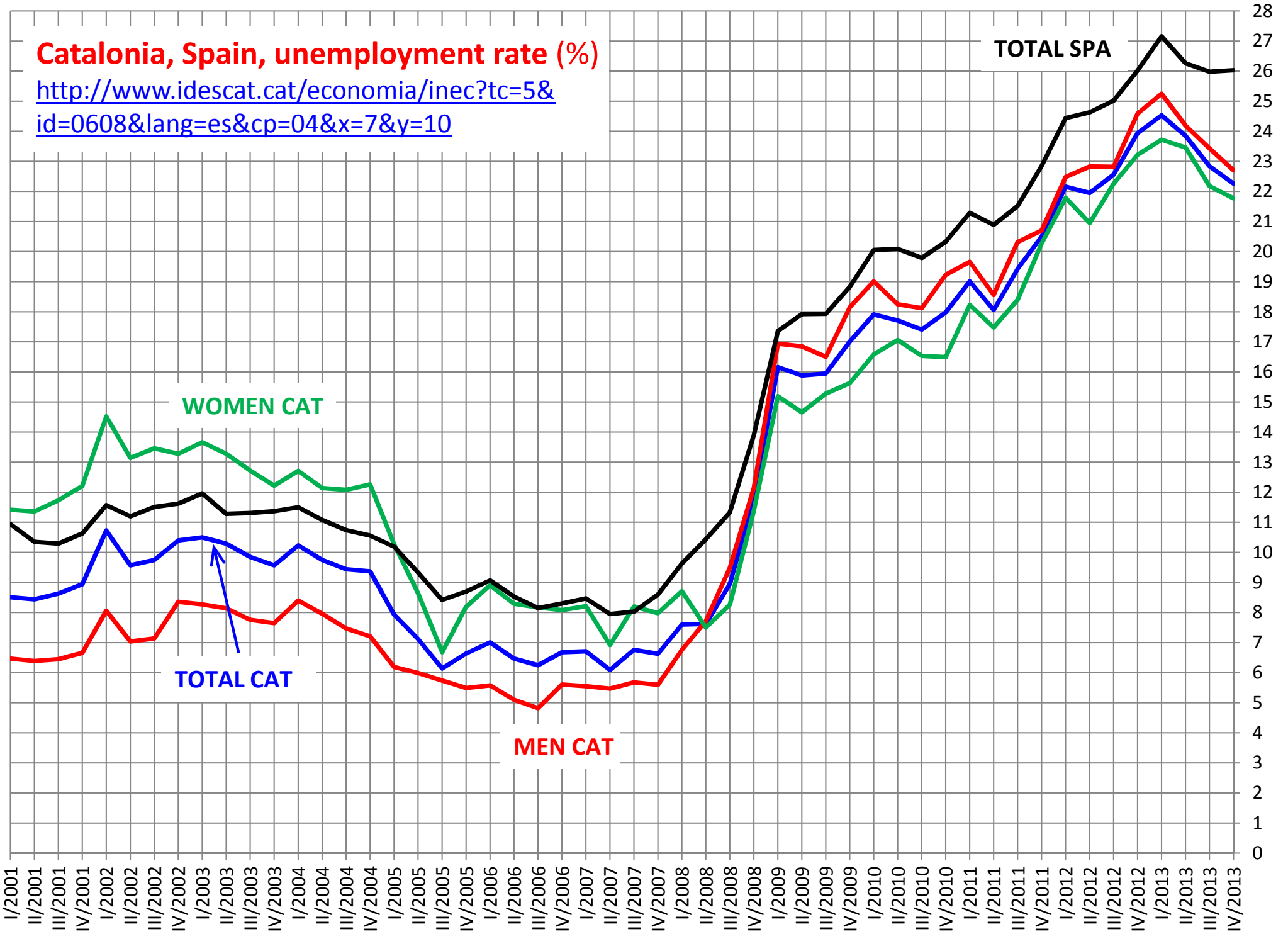
Spain, unemployment rate (%)

http://www.ine.es/jaxiBD/tabla.do?per=03&type=db&divi=EPA&idtab=2194#nogo


Spain, unemployment rate (%)
http://www.ine.es/jaxiBD/tabla.do?per=03&type=db&divi=EPA&idtab=2194#nogo
16-19
20-24
TOTAL
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
2005-I
2005-II
2005-III
2005-IV
2006-I
2006-II
2006-III
2006-IV
2007-I
2007-II
2007-III
2007-IV
2008-I
2008-II
2008-III
2008-IV
2009-I
2009-II
2009-III
2009-IV
2010-I
2010-II
2010-III
2010-IV
2011-I
2011-II
2011-III
2011-IV
2012-I
2012-II
2012-III
2012-IV
2013-I
2013-II
2013-III
2013-IV

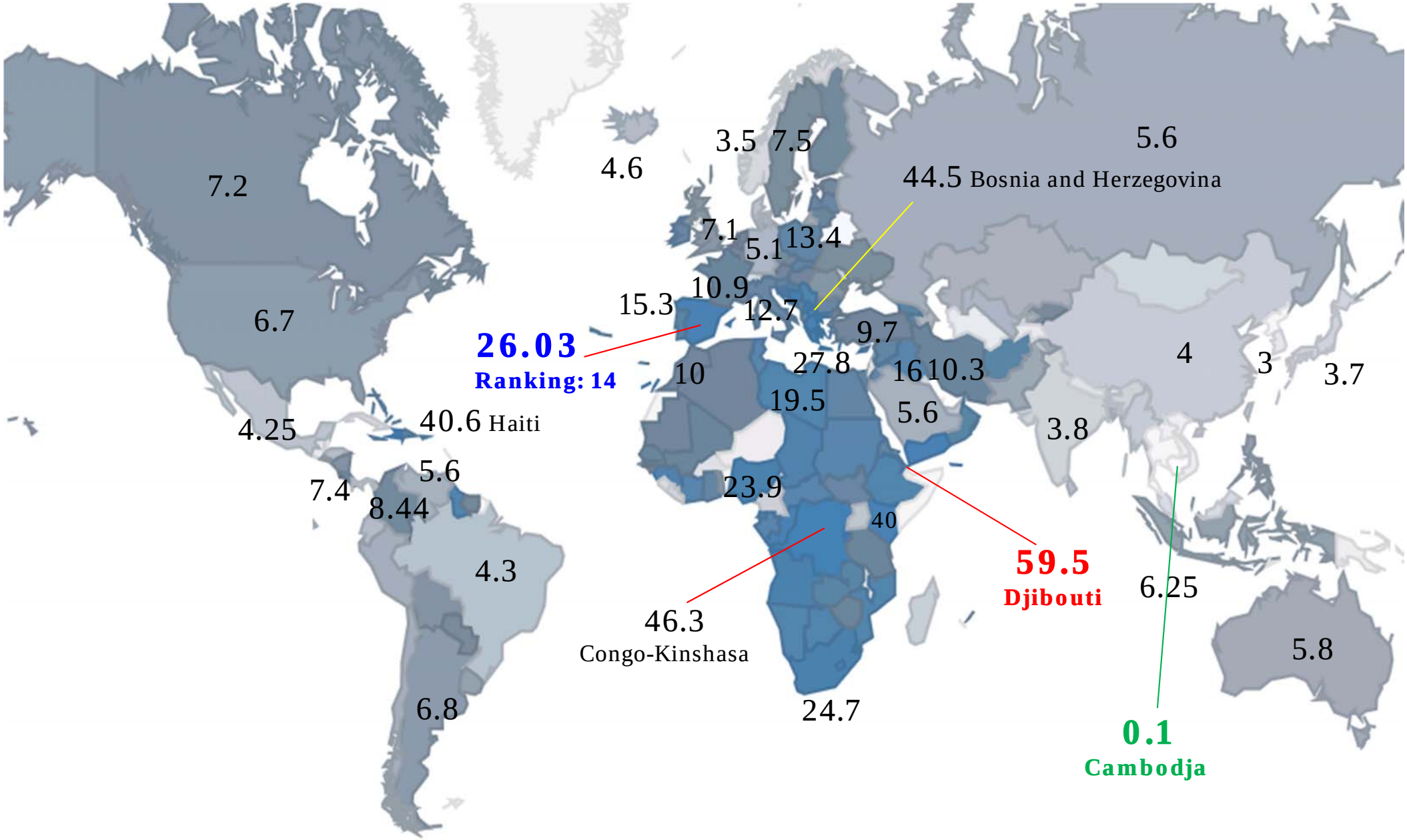
Catalonia, Spain, unemployment rate (%)

http://www.idescat.cat/economia/inec?tc=5&id=0608&lang=es&cp=04&x=7&y=10



Unemployment rate · 7 February 2014

http://www.tradingeconomics.com



	GDP BILLION USD	GDP YOY	GDP QOQ	INTEREST RATE	INFLATION RATE	JOBLESS RATE
CAMBODIA	14	7.20%		1.12%	4.12%	0.10%
QATAR	183	6.20%	4.30%	4.50%	2.70%	0.50%
BELARUS	63	0.70%		23.50%	15.33%	0.50%
THAILAND	366	2.70%	1.30%	2.25%	1.93%	0.72%
BENIN	8	3.50%		3.50%	-1.80%	1.00%
BRUNEI	17	-3.90%		5.50%	0.20%	1.10%
SEYCHELLES	1	4.00%		9.64%	3.40%	1.70%
SINGAPORE	275	4.40%	-2.70%	0.01%	1.50%	1.80%
MACAO	44	10.50%		0.50%	5.72%	1.90%
PAPUA NEW GUINEA	16	9.20%		6.25%	3.20%	1.90%
LAOS	9	7.90%		5.00%	6.65%	1.90%
VIETNAM	142	6.04%	5.54%	7.00%	5.45%	2.22%
NIGER	7	3.60%		3.50%	1.10%	2.25%
TAJIKISTAN	7	7.40%		4.80%	3.70%	2.50%
TURKMENISTAN	34	11.10%			6.00%	2.60%
KUWAIT	177	6.10%		2.00%	2.70%	2.72%
GUATEMALA	51	3.60%		5.00%	4.39%	2.90%
SOUTH KOREA	1130	3.90%	0.90%	2.50%	1.10%	3.00%
NEPAL	19	3.65%		8.00%	8.41%	3.00%
MALAWI	4	5.00%		25.00%	23.50%	3.00%

http://www.tradingeconomics.com · 7 February 2014

	GDP BILLION USD	GDP YOY	GDP QOQ	INTEREST RATE	INFLATION RATE	JOBLESS RATE
DJIBOUTI	1	4.50%		10.61%	4.88%	59.50%
CONGO	18	8.10%		2.00%	1.82%	46.30%
BOSNIA AND HERZEGOVIN	17	-0.50%		7.03%	-1.40%	44.50%
HAITI	8	2.80%		7.00%	3.40%	40.60%
KENYA	37	4.40%	1.60%	8.50%	7.21%	40.00%
BURUNDI	2	4.20%		11.45%	9.00%	35.00%
KOSOVO	6	2.50%			0.50%	30.90%
RWANDA	7	3.90%	9.90%	7.00%	3.65%	30.00%
YEMEN	36	0.10%		15.00%	8.60%	29.00%
MACEDONIA	10	3.30%	3.30%	3.25%	1.40%	28.70%
SWAZILAND	4	0.21%		5.00%	4.40%	28.20%
GREECE	249	-3.00%	0.20%	0.25%	-1.70%	27.80%
REPUBLIC OF THE CONG(	14	5.70%		3.25%	3.40%	26.60%
SPAIN	1349	-0.10%	0.30%	0.25%	0.20%	26.03%
LESOTHO	2	4.00%		10.12%	5.25%	25.30%
ANGOLA	114	7.40%	7.40%	9.25%	7.69%	25.00%
SOUTH AFRICA	384	1.80%	0.70%	5.50%	5.40%	24.70%
NIGERIA	263	7.67%	7.67%	12.00%	8.00%	23.90%
PALESTINE	7	2.60%			2.71%	23.70%
CHAD	11	7.20%		3.25%	3.10%	22.60%
EQUATORIAL GUINEA	18	4.00%		3.25%	3.10%	22.30%
GUINEA	7	3.90%		16.00%	10.30%	22.30%
CROATIA	56	-0.60%	-0.10%	6.25%	0.28%	21.60%
GUYANA	3	3.90%		5.00%	1.80%	21.00%
SERBIA	37	2.60%	1.40%	9.50%	2.20%	20.10%
LIBYA	82	95.50%		3.00%	1.70%	19.50%

http://www.tradingeconomics.com · 7 February 2014

Basic types of unemployment

- Actual unemployment is divided into three categories (the first two define "natural unemployment").
- Frictional. Occurs while workers are changing jobs.
- Structural. Due to structural changes in the economy that create and eliminate jobs and to the institutions that match workers and firms (firing and 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).

Okun's law

- Okun's law is an empirical relationship suggested in 1962 by the US economist Arthur Okun (1928-80).
- Okun's law: there is a negative relationship between the change $\Delta u = u - u_{-1}$ in the unemployment rate and $y = \frac{Y - Y_{-1}}{Y_{-1}}$, the rate of growth of real GDP Y. A simple formal expression of the law is

$$\Delta u = a - b \cdot y$$

where a and b are positive constants that depend on the economy considered and the period with respect to which the variables are measured.

Okun's law (US version) /1

- Expressing the variables as annual percentages, in the US, $a \approx 1.5$ and $b \approx 0.5$. Therefore:

$$\Delta u = 1.5 - y/2 \qquad \text{or} \qquad u = u_{-1} + 1.5 - y/2.$$

- a represents the increase in u that occurs when the economy does not grow: if $y = 0$, then $\Delta u = a$.

- For instance, if $u_{-1} = 2\%$ and $y = 0$, then $u = u_{-1} + a - y/2 = 2 + 1.5 - 0/2 = 3.5$. Hence, if the unemployment rate at the beginning of the year is 2% and the economy does not grow, at the end of the year the rate is 3.5%.

Okun's law (US version) /2

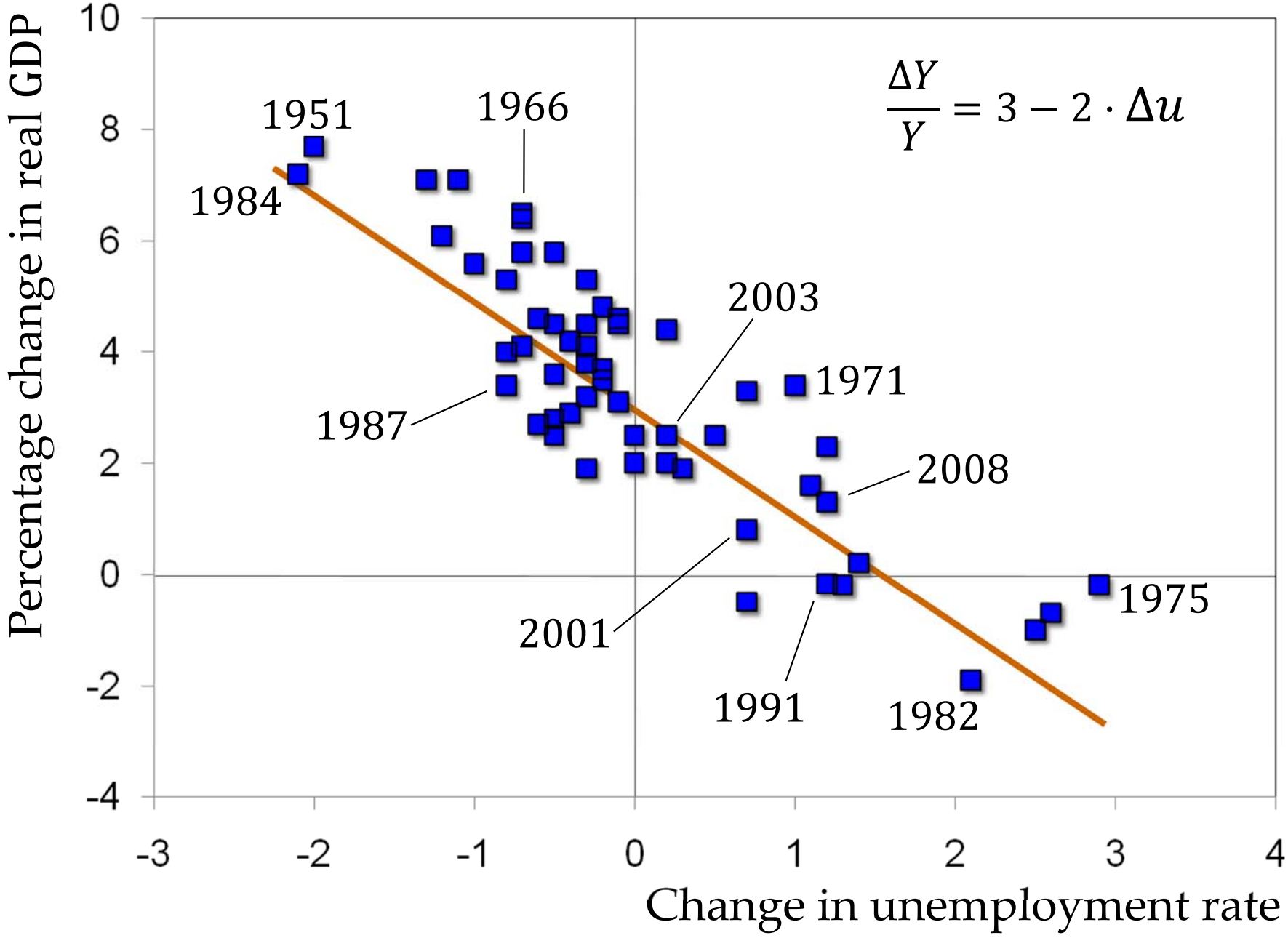
- b measures the ability of the economy to transform GDP growth into a smaller unemployment rate: $b \approx 0.5$ means that increasing y by one point reduces u by 0.5 points.

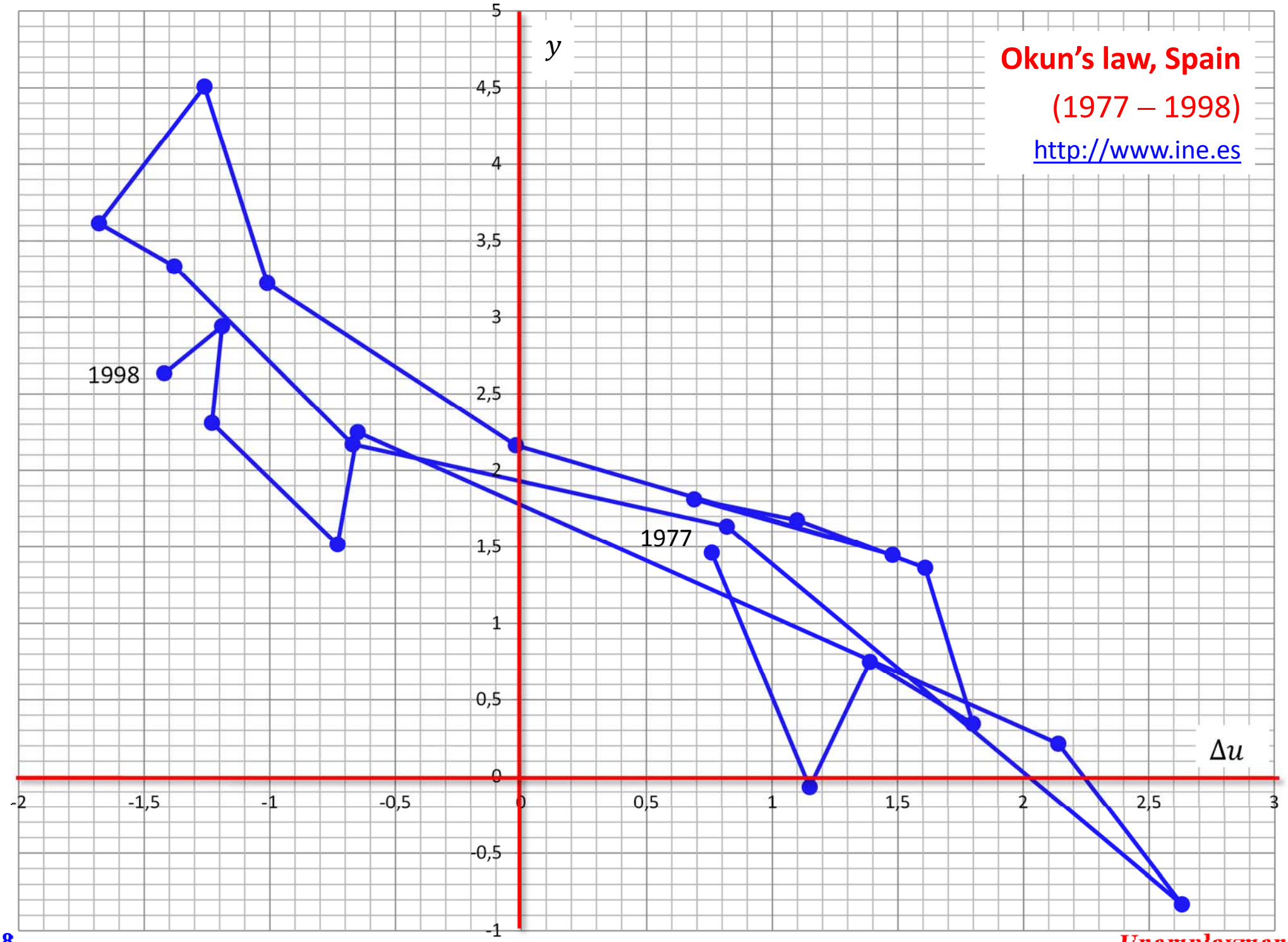
- If $y = 2\%$, then $u = u_{-1} + 1.5 - y/2 = u_{-1} + 1.5 - 2/2 = u_{-1} + 0.5$. If $y = 3\%$, then $u = u_{-1} + 1.5 - y/2 = u_{-1} + 1.5 - 3/2 = u_{-1}$.

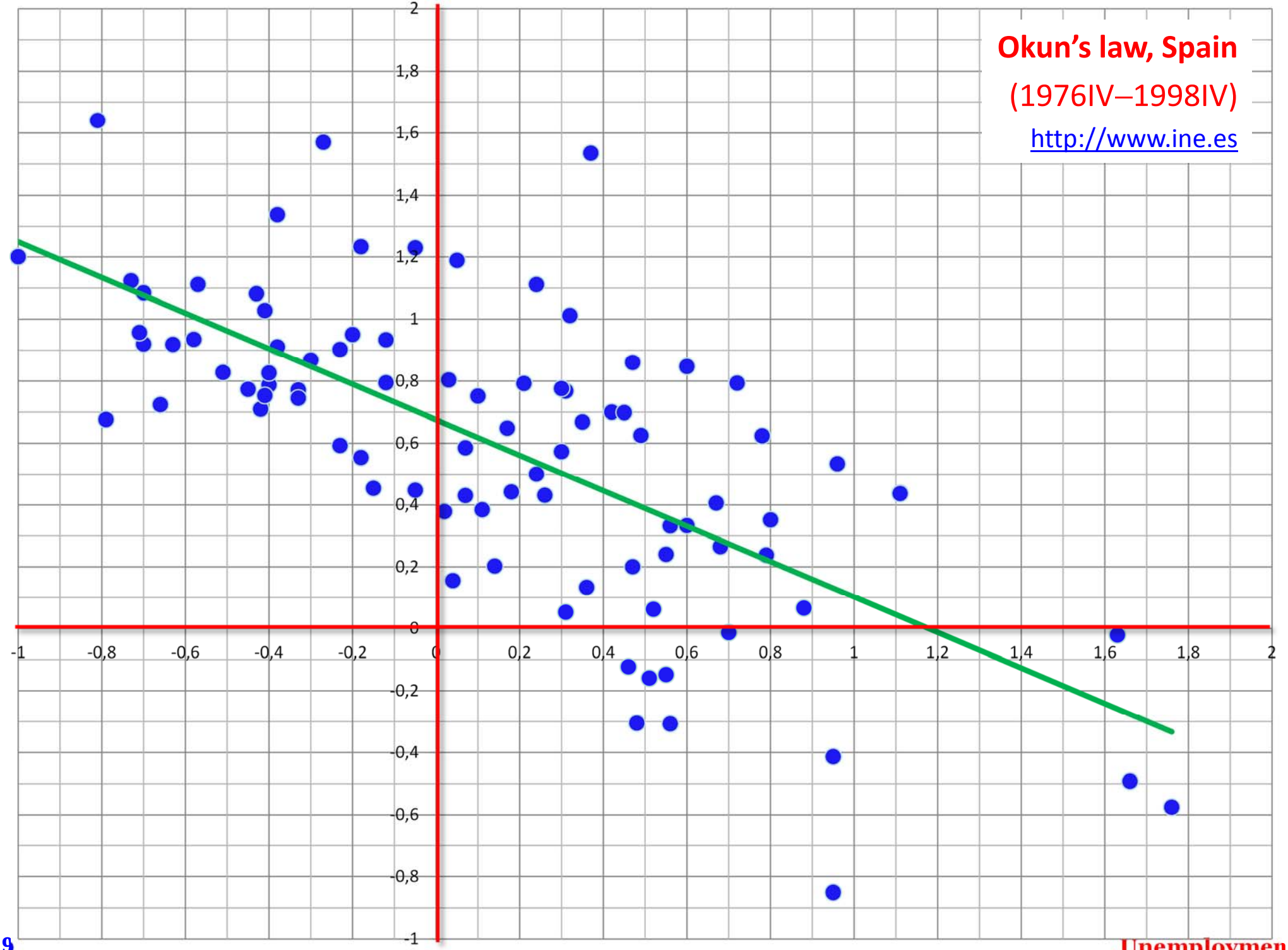
- Therefore, increasing y from 2% to 3% reduces u from $u_{-1} + 0.5$ to u_{-1}. There is a gain of 0.5 points: an additional 1% in y becomes 0.5 points less of u.

Okun's law, US, 1951-2008

https://www2.bc.edu/~murphyro/EC204/PPT/CHAP09.ppt




Okun's law, Spain
(1977 – 1998)
http://www.ine.es
y
Δu
1998
1977
5
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
-0,5
-1
-2
-1,5
-1
-0,5
0
0,5
1
1,5
2
2,5
3


Okun's law, Spain
(1976IV–1998IV)
http://www.ine.es
2
1,8
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
-0,2
-0,4
-0,6
-0,8
-1
-1
-0,8
-0,6
-0,4
-0,2
0
0,2
0,4
0,6
0,8
1
1,2
1,4
1,6
1,8
2

The Phillips curve

- It is an empirical relationship described in 1960 by Paul Samuelson and Robert Solow based on a 1958 paper by the New Zealand economist Alban William Housego Phillips (1914–1975).
- The Phillips curve expresses a negative relationship between the unemployment rate u and the inflation rate π: the lower u, the higher π.
- With α and β positive constants, a linear Phillips curve is represented by an equation of the sort

$$\pi = \alpha - \beta \cdot u \ .$$

Trade-off between u and π

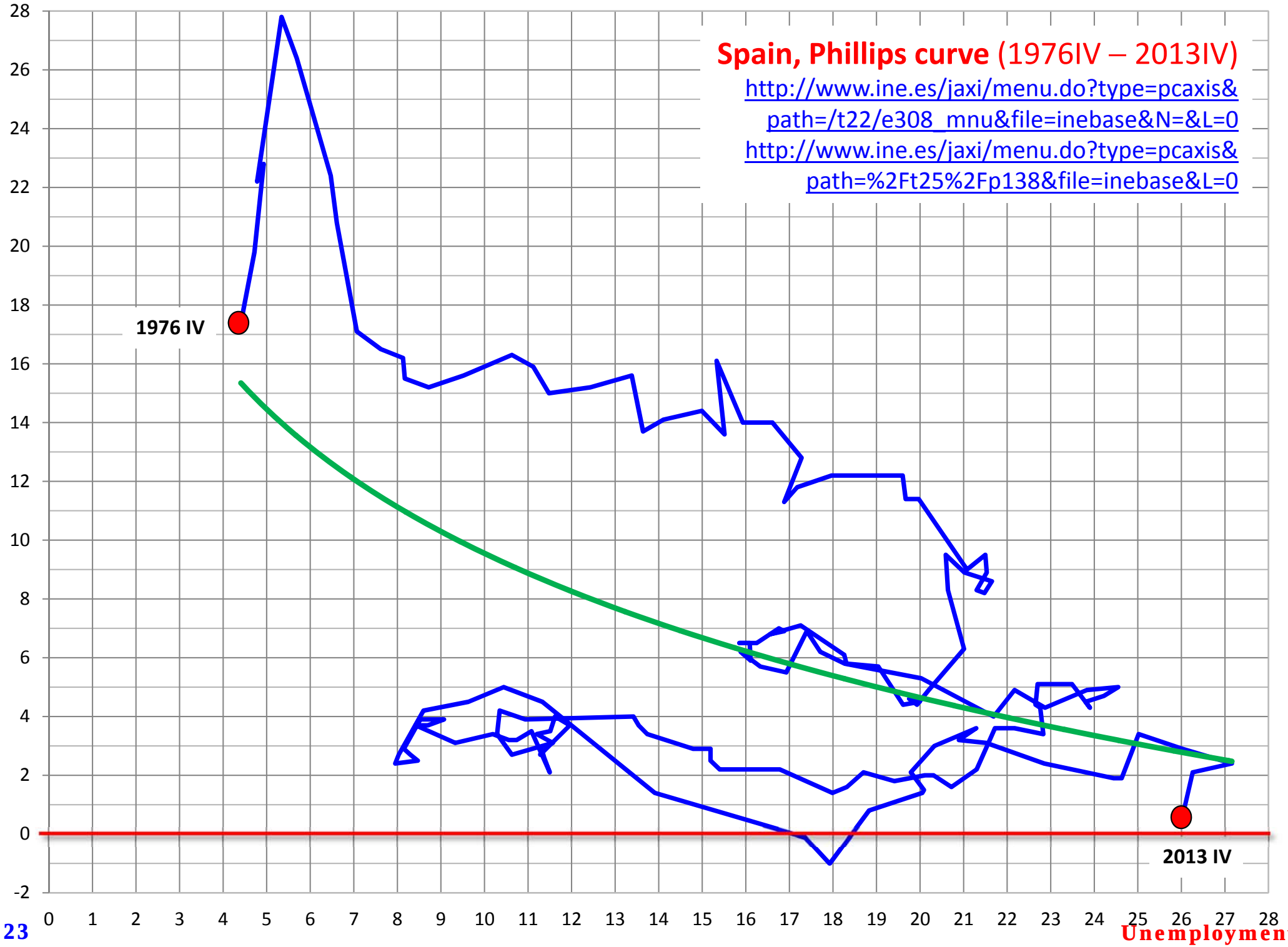
- Expressing π and u in percentage terms, that $\pi = \alpha - \beta \cdot u$ means that, to reduce one percentage point the unemployment rate u, it is necessary to accept an increase in the inflation rate π of β points.

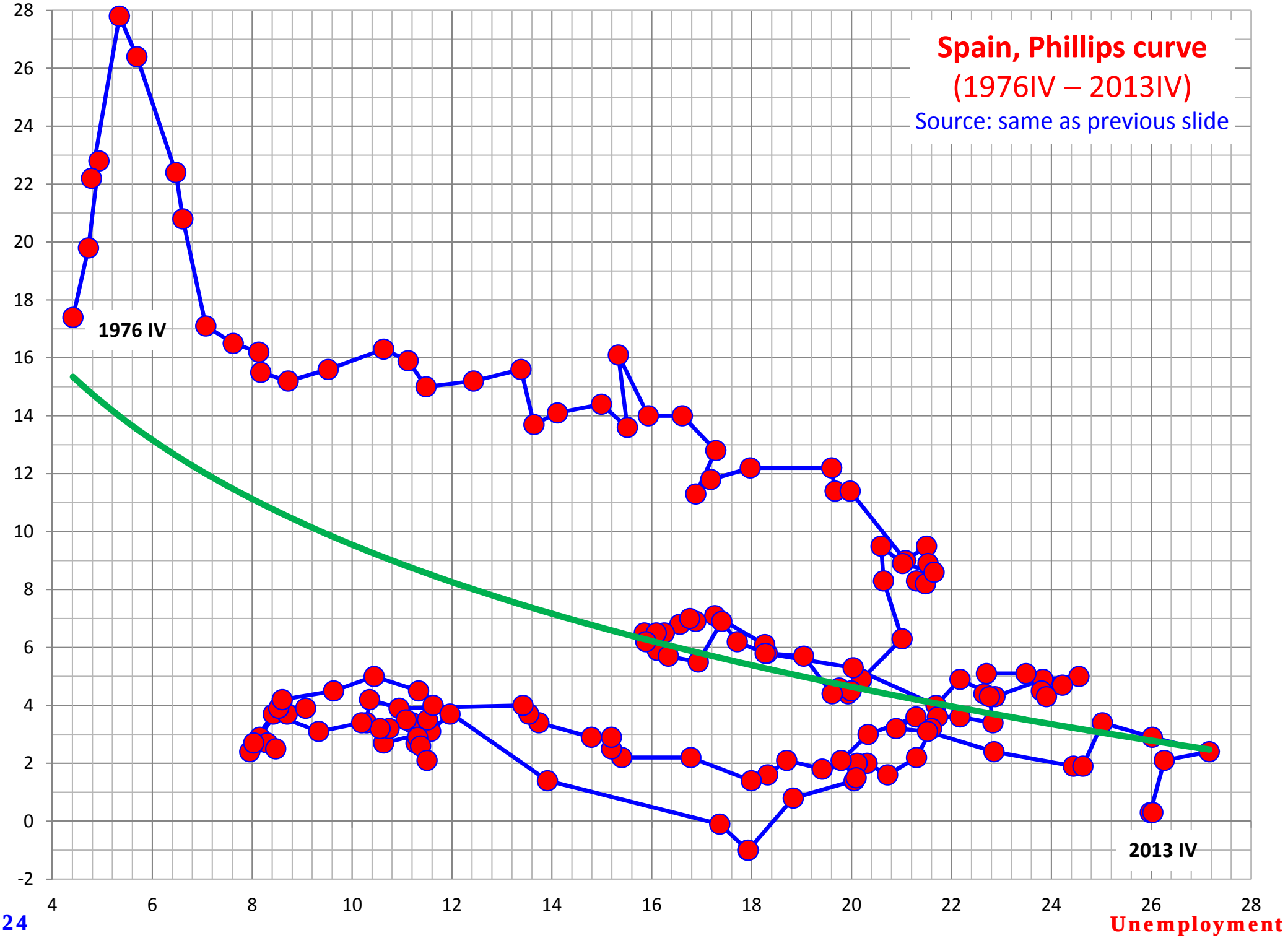
- Let $\alpha = 10$ and $\beta = 2$. If $u = 4\%$, then $\pi = 10 - 2 \cdot 4 = 2\%$. Then, for u to be reduced one point (from 4% to 3%), π must be increased in two percentage points (from $\pi = 2\%$ to $\pi = 10 - 2 \cdot 3 = 4\%$).

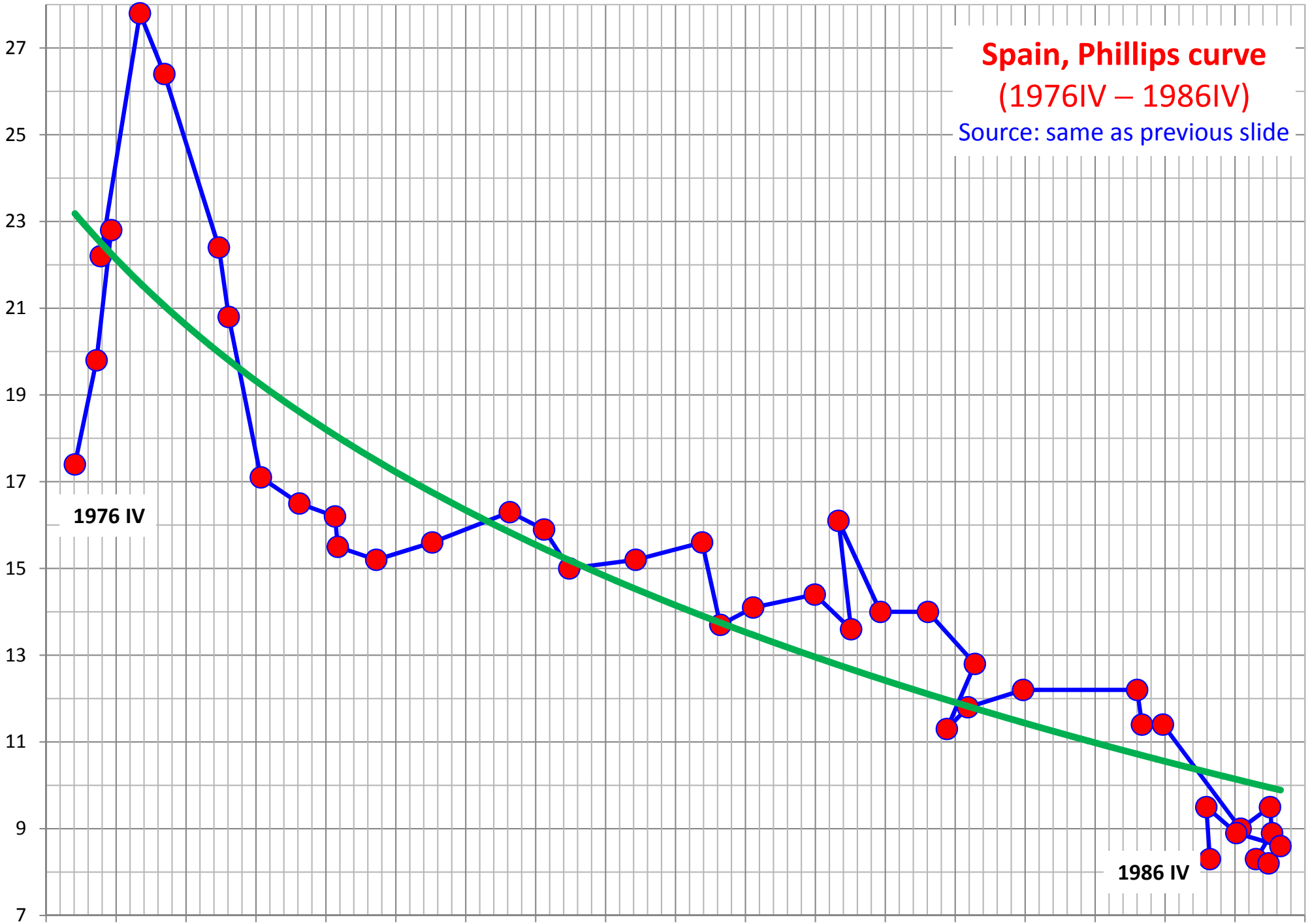
- α is the inflation rate that obtains with zero unemployment. It is a measure of underlying inflation.

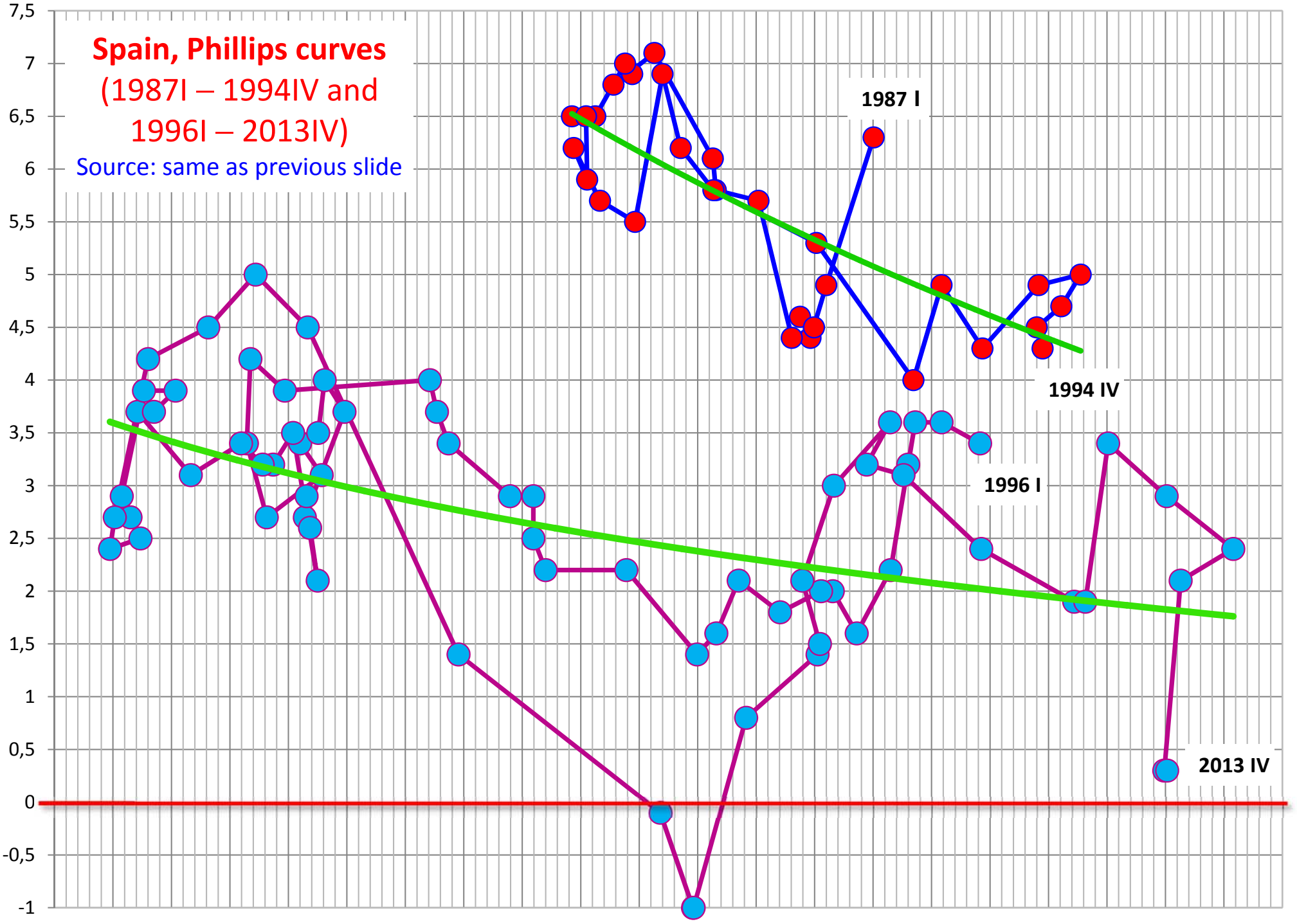
Unstability of the Phillips curve

- In contrast to Okun's law, the Phillips curve is in general unstable, since α is a volatile parameter.
- α depends on inflation expectations and the firms' cost structure: an increase in expected inflation or in the production costs rises α. When α rises, the curve shifts upward, so more inflation must be paid to reduce the unemployment rate.
- β indicates how sensitive π is to changes in u. It depends on institutional factors, like the bargaining power of trade unions (more power, higher β).


Spain, Phillips curve (1976IV – 2013IV)
http://www.ine.es/jaxi/menu.do?type=pcaxis&path=/t22/e308_mnu&file=inebase&N=&L=0
http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft25%2Fp138&file=inebase&L=0
1976 IV
2013 IV
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Unemployment


Spain, Phillips curve
(1976IV – 2013IV)
Source: same as previous slide
1976 IV
2013 IV
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
4
6
8
10
12
14
16
18
20
22
24
26
28
Unemployment


Spain, Phillips curve
(1976IV – 1986IV)
Source: same as previous slide
1976 IV
1986 IV
27
25
23
21
19
17
15
13
11
9
7
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
Unemployment


Spain, Phillips curves
(1987I – 1994IV and
1996I – 2013IV)
Source: same as previous slide
1987 I
1994 IV
1996 I
2013 IV
7,5
7
6,5
6
5,5
5
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
-0,5
-1
7
8
9
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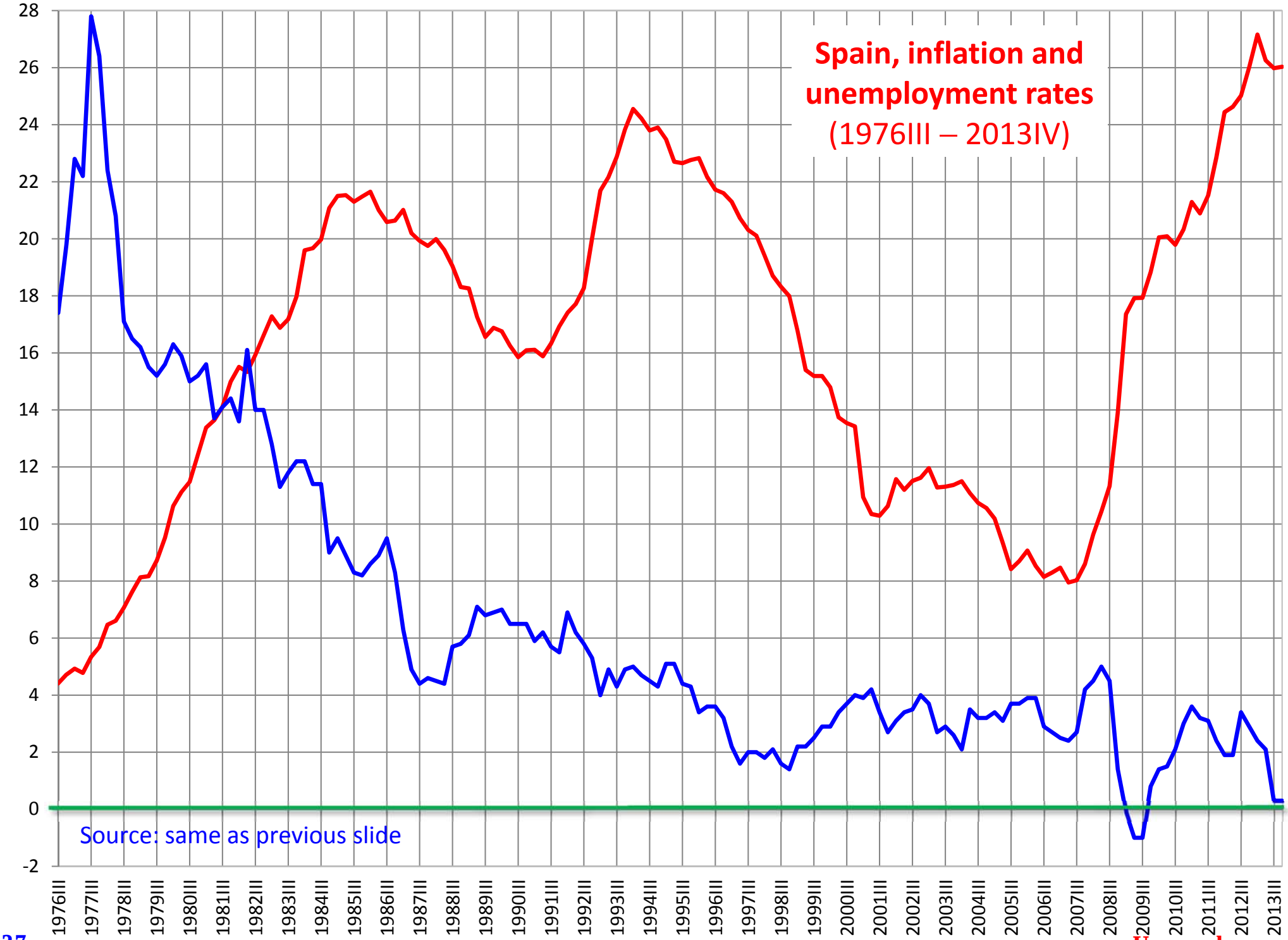
22
23
24
25
26
27
28
Unemployment


Spain, inflation and unemployment rates
(1976III – 2013IV)
Source: same as previous slide
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
1976III
1977III
1978III
1979III
1980III
1981III
1982III
1983III
1984III
1985III
1986III
1987III
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2007III
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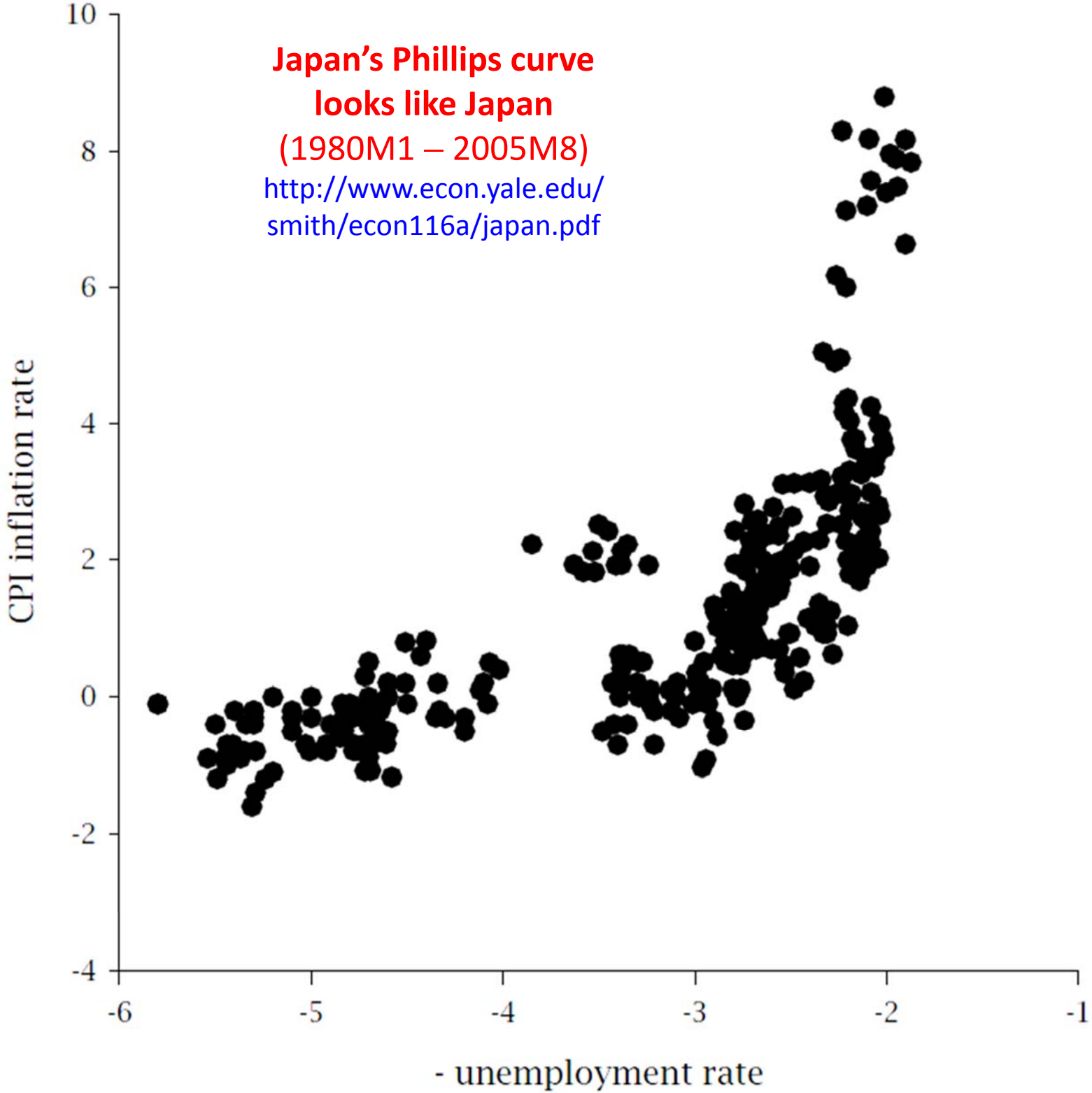
2009III
2010III
2011III
2012III
2013III

Japan's Phillips curve looks like Japan

(1980M1 – 2005M8)

http://www.econ.yale.edu/smith/econ116a/japan.pdf



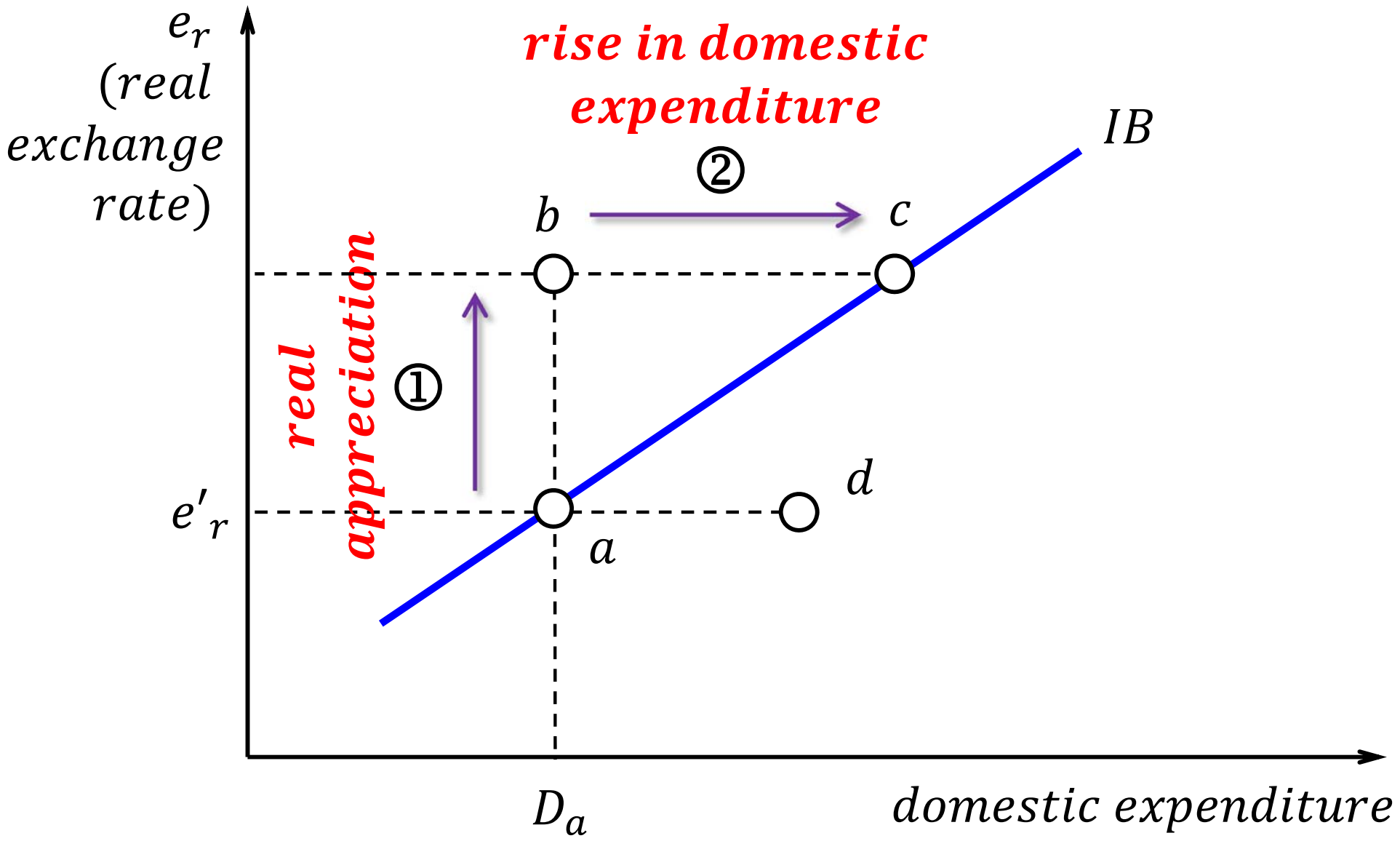
Internal and external balance

- Internal balance requires full employment of resources (sufficiently low unemployment rate) and price stability (low and stable inflation rate).
- External balance corresponds to a balanced current account (the supply and demand for the domestic currency are balanced). For simplicity, external balance is defined as zero trade balance.
- Internal balance and external balance both are assumed to depend on two variables: domestic expenditures and the real exchange rate.

The internal balance (IB) function /1

- The IB function drawn on the next slide is assumed increasing for the following reason.
- Suppose the economy is initially at point a. If a real appreciation occurs (the real exchange rage increases), then imports rise and exports fall. That is, there is a switch in demand from domestic to foreign goods. As a result, unemployment goes up and the economy moves from point a to b.
- To restore internal balance by reaching point c, unemployment must be eliminated. This requires an increase in domestic expenditure.

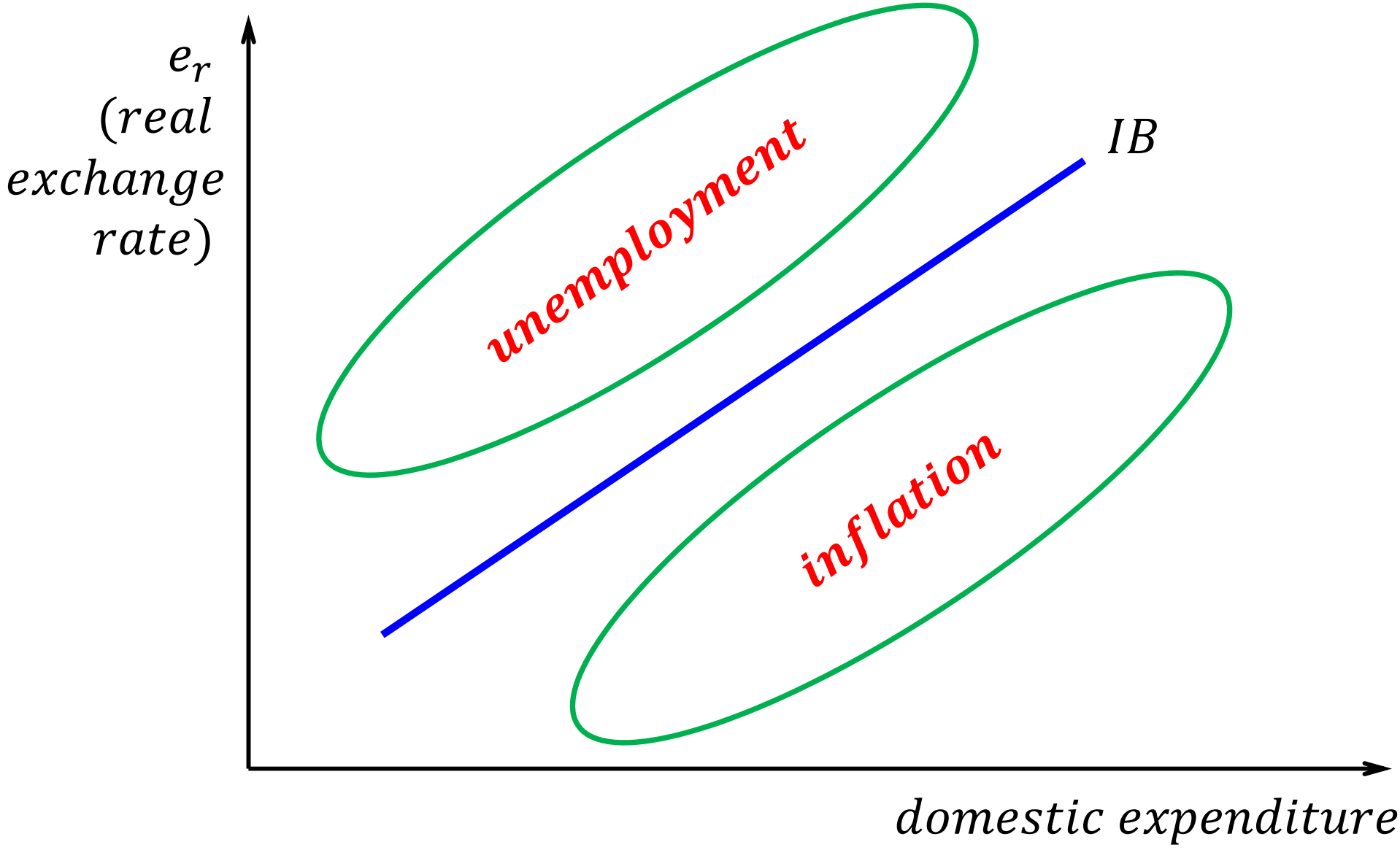
Interpreting the IB function /1



The internal balance (IB) function /2

- If follows from the previous analysis that points above the IB function (excessive expenditure abroad) imply the existence of unemployment.
- Below the IB function failure of internal balance is not due to unemployment but to inflation.
- For instance, at point d, given the corresponding real exchange rate e'_r, domestic expenditure is excessive with respect to the level D_a required to reach internal balance. This excess of domestic expenditure manifests itself in the form of inflation.

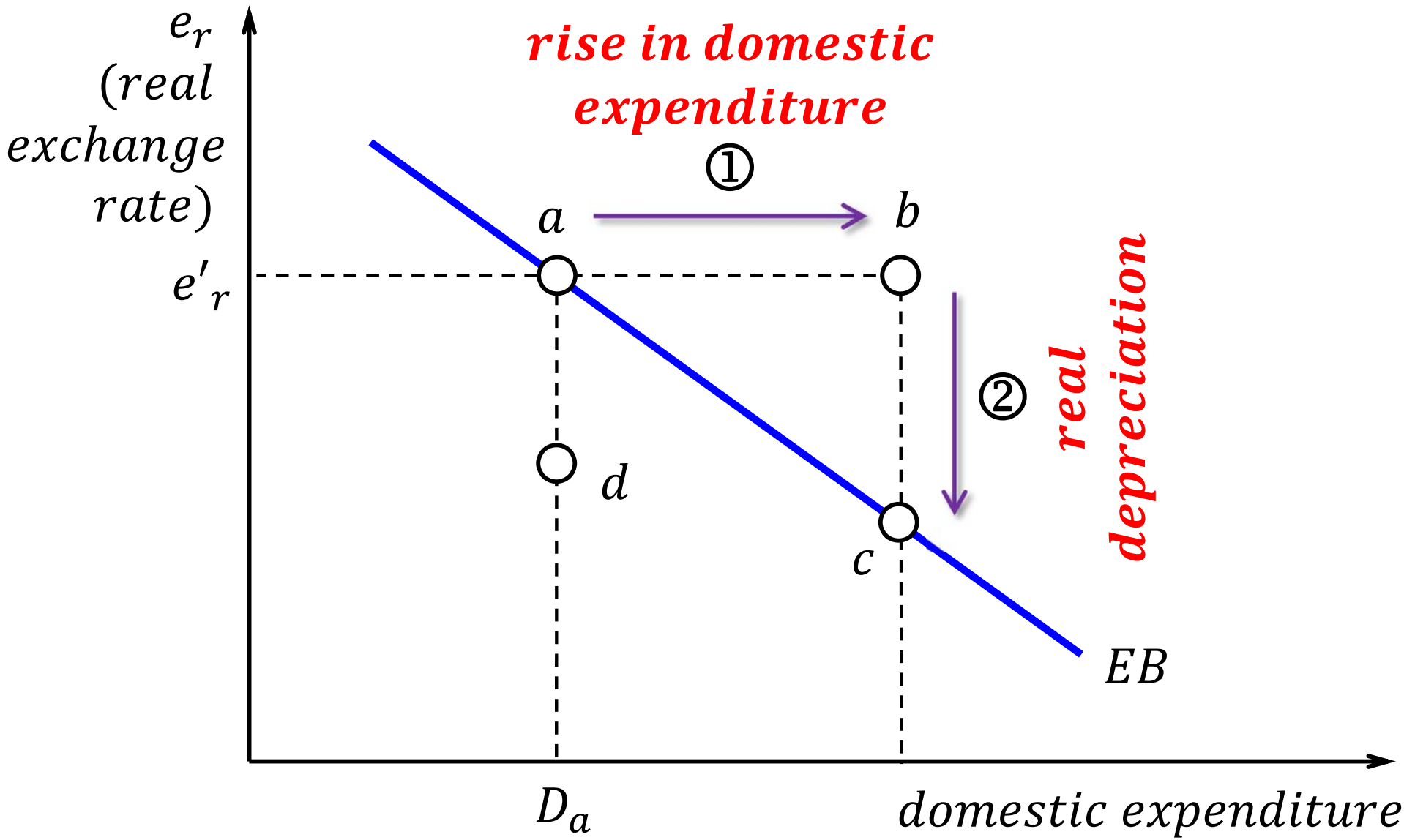
Interpreting the IB function /2



The external balance (EB) function /1

- The EB function drawn on the next slide is assumed decreasing for the following reason.
- Suppose the economy is initially at point *a*, where the trade balance is zero. If domestic expenditure increases, GDP and, consequently, income also increase. Part of this additional income is spent buying foreign goods. A trade deficit ensues.
- To restore external balance by reaching point *c*, the trade deficit must be neutralized. This requires a reduction of the real exchange rate: a real depreciation (an improvement of competitiveness).

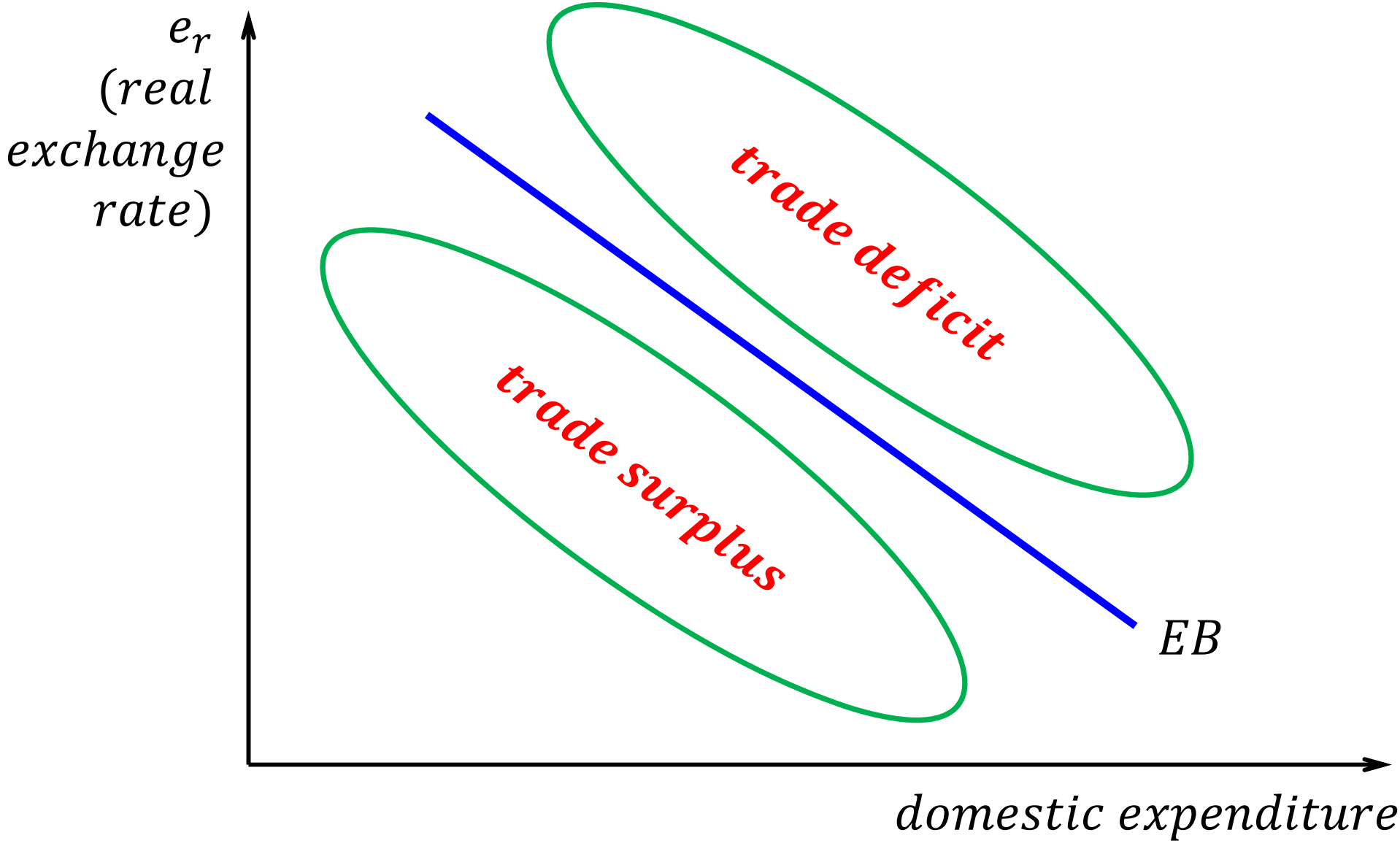
Interpreting the EB function /1



The external balance (EB) function /2

- If follows from the previous analysis that points above the EB function (excessive domestic expenditure) generate a trade deficit.
- Below the EB function failure of external balance is not due to a trade deficit but to trade surplus.
- For instance, at point d, given the corresponding level D_a of domestic expenditure, the real exchange rate is smaller than the value e'_r required to reach external balance with D_a. That is, the economy is too competitive and therefore runs a trade surplus.

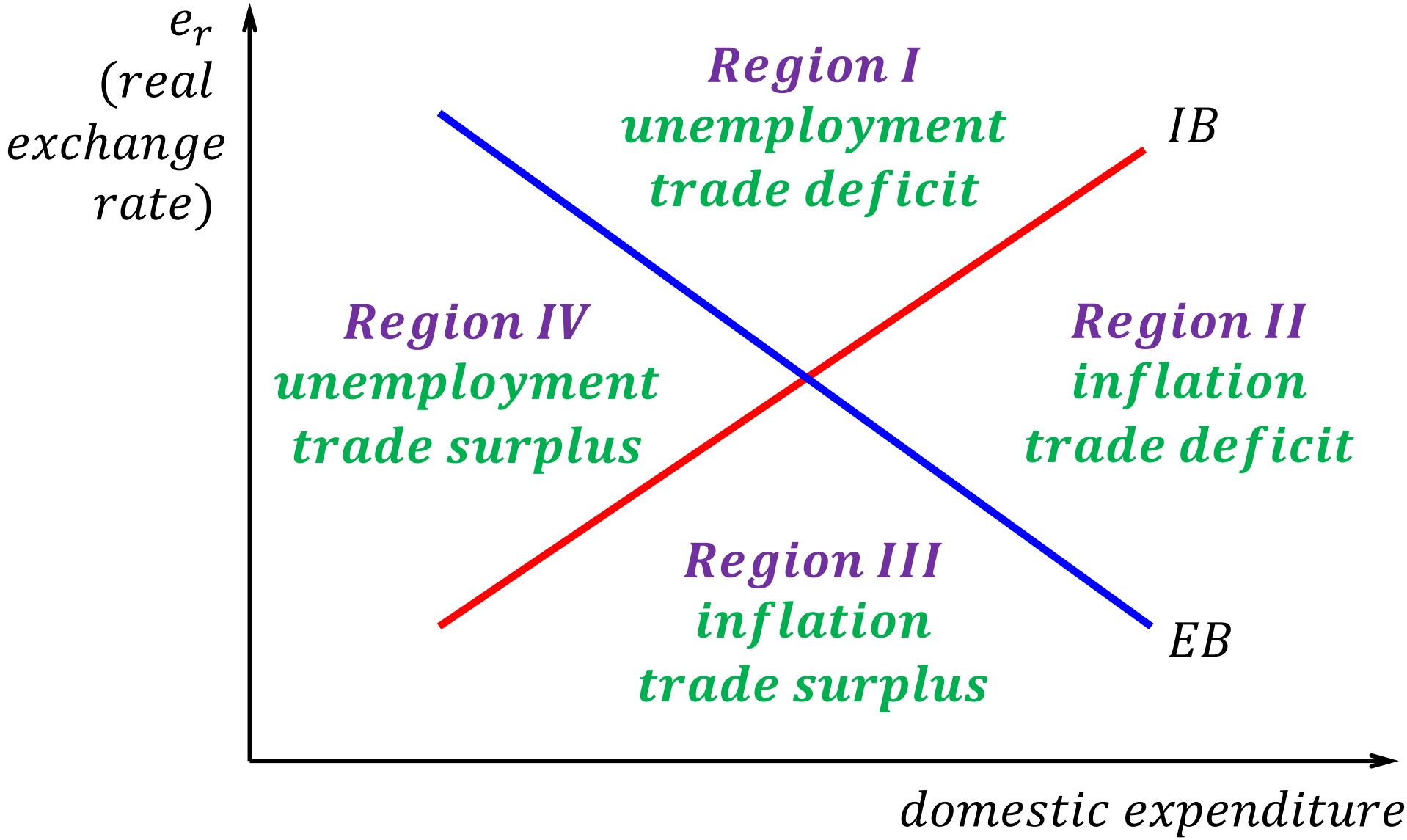
Interpreting the EB function /2



The Swan (or Meade-Swan) diagram

- The Swan diagram (due to Trevor W. Swan) combines the IB and EB functions.
- It separates the plane into four regions.
  - In region I, the economy experiences unemployment and trade deficit (Spain, Egypt, Poland).
  - In region II, inflation coexists with a trade deficit (Brazil, Turkey, Colombia, Morocco).
  - In region III, there is inflation and a trade surplus (China, Russia, Korea).
  - In region IV, the economy has unemployment and runs a trade surplus (Hungary, Slovakia).

The Swan diagram



The Swan diagram in action

- Suppose the economy is in Region I and, specifically, around the numeral "I" in "Region I".
- At that point, the economy has unemployment. It may appear that more expenditure is needed to reduce unemployment.
- The diagram suggests that the unemployment problem this economy faces is not solved by changing expenditure (increasing it) but by shifting expenditure. To reach the intersection of the IB and EB lines, domestic expenditure must be reduced and net exports increased (through depreciation).

Principle of effective market classification

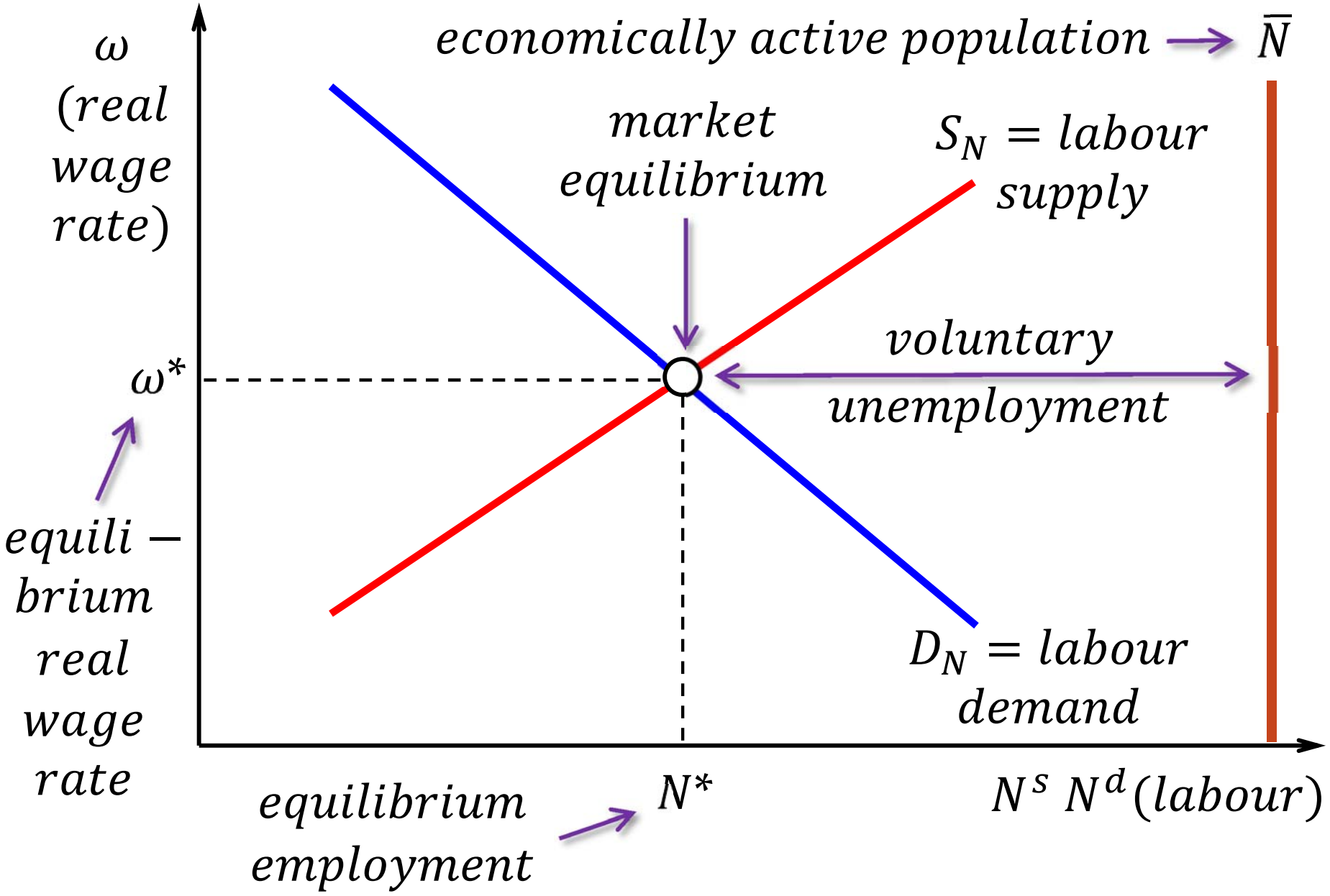
- Robert Mundell's principle of effective market classification: "Policies should be paired with the objectives on which they have the most influence".
- *"In countries where employment and balance-of-payments policies are restricted to monetary and fiscal instruments, monetary policy should be reserved for attaining the desired level of the balance of payments and fiscal policy for preserving internal stability. The opposite system would lead to a progressively worsening unemployment and balance-of-payments situation".*

http://robertmundell.net/major-works/the-appropriate-use-of-monetary-and-fiscal-policy-for-internal-and-external-stability

Explaining involuntary unemployment

- Involuntary unemployment occurs when, at the prevailing wage rate in the economy, there are people willing to work but are not given a job.
- The models developed next illustrate basic reasons for the existence of involuntary unemployment:
  - "too high" wage rates (classical explanation);
  - insufficient labour demand, due to insufficient aggregate demand (Keynesian explanation);
  - existence of market power (trade unions);
  - existence of labour discrimination; and
  - structural reasons (last model).

The classical labour market model /1



The classical labour market model /2

- It is a standard competitive model in which "price" is represented by the real wage ω (the nominal wage W divided by some price level P) and "quantity" is labour (labour supplied and demanded).
- The higher ω, the higher the labour supply N^s (up to the maximum labour that can be supplied: the economically active population $\bar{N}$). The labour supply function is therefore increasing.
- The labour demand function is decreasing: the higher ω, the lower the labour demand N^d.

Competitive labour demand /1

- A labour demand function can be constructed as follows. Take any firm using labour n to produce a certain commodity X by means of the production function $q(n)$ that establishes the total amount of X that can be produced using n units of labour.

- Define the firm's profit function as $\pi(n) = p \cdot q(n) - W \cdot n$, where n is the amount of labour the firms hires, p is the price at which the firm sells X (in a competitive market for X), and W is the nominal wage (the cost of hiring each unit of labour).

Competitive labour demand /2

- Suppose the aim of the firm is to choose n to maximize the profit function. Assuming the function $q(n)$ differentiable, the first order condition for a maximun is $\frac{d\pi(n)}{dn} = 0$. Since the firm is a price taker in the commodity market,

$$\frac{d\pi(n)}{dn} = p \cdot \frac{dq(n)}{dn} - W = 0 \ .$$

- The derivative $\frac{dq(n)}{dn}$ is the marginal product of labour (MPL). Therefore, $MPL(n) = W/p$ implicitly defines the firm's labour demand function.

Competitive labour demand /3

- $MPL(n)$ is typically supposed to be decreasing: the more labour is hired, the smaller the contribution that the last unit makes to production (each additional unit of labour is less productive).
- As a result, when represented graphically in the space $(\frac{W}{p}, n)$, the function $\frac{W}{p} = MPL(n)$ is decreasing. This says that the firm hires labour until its marginal product coincides with the real cost of hiring labour (the real wage $\frac{W}{p}$). Equivalently, labour is paid according to the value of its marginal productivity: $W = p \cdot MPL(n)$.

Example

- If $q(n) = 2 \cdot n^{1/2}$, $MPL(n) = \frac{dq(n)}{dn} = 2 \cdot \frac{1}{2} \cdot (n)^{\frac{1}{2}-1} = n^{-1/2} = \frac{1}{n^{1/2}}$. The firm's labour demand function is

$$MPL(n) = \frac{W}{p}$$

Labour demand stimulated by a rising price of the product or a falling wage rate

- Therefore, $\frac{1}{n^{1/2}} = \frac{W}{p}$. Solving for n,

$$n = \frac{1}{(W/p)^2} \quad or \quad \boxed{n = \frac{p^2}{W^2}.}$$

- Since $\frac{dn}{d(W/p)} = -\frac{2}{(W/p)^3} < 0$, the demand for labour is a decreasing function of the real wage W/p.

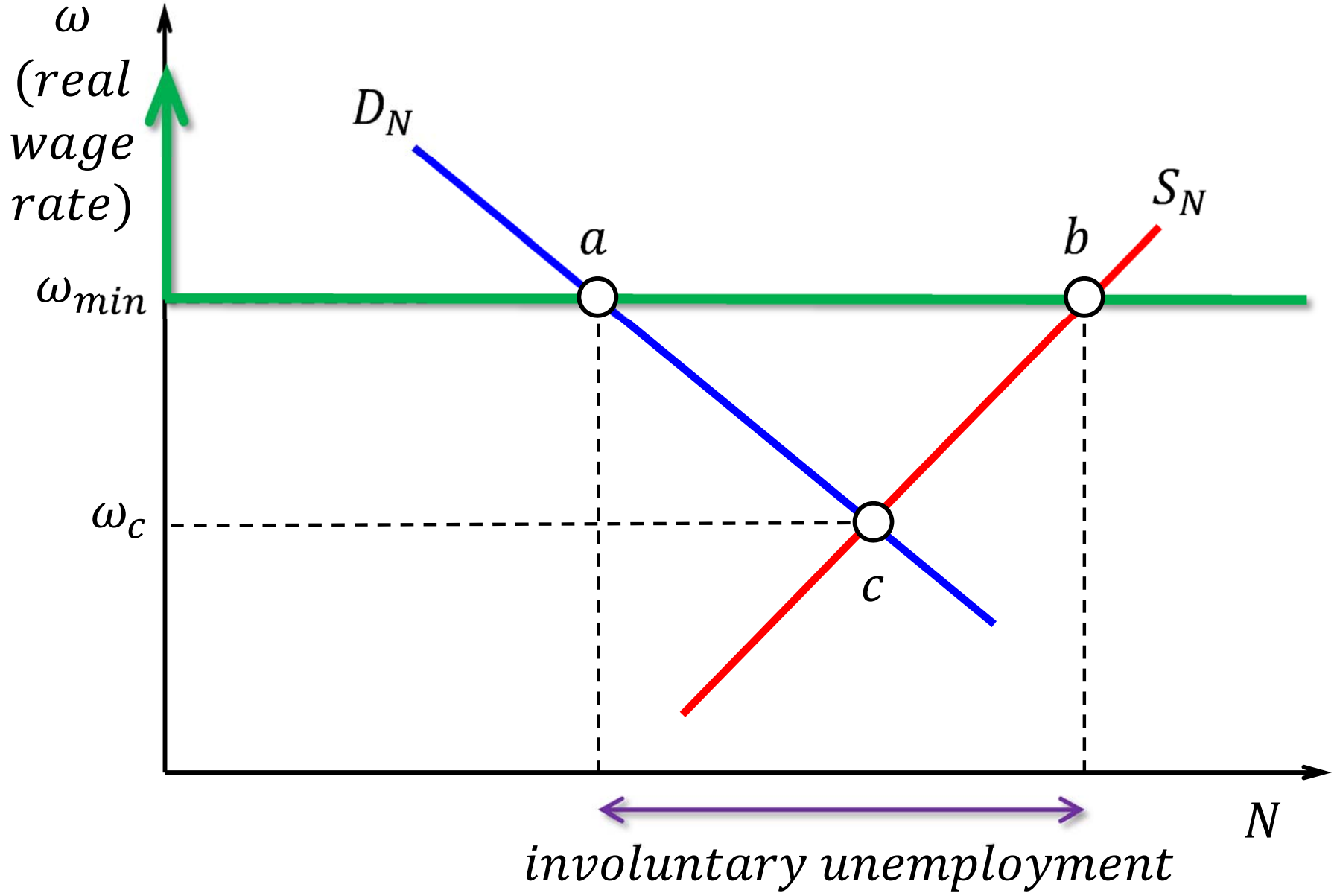
Equilibrium in the labour market

- Since the labour demand of each firm is inversely correlated with a certain wage rate, one may jump to the conclusion that the aggregate demand for labour in an economy is inversely correlated with the economy's real wage.
- The equilibrium real wage rate ω^* is such that labour supplied at ω^* equals labour demanded at ω^*. Given ω^*, there is no involuntary unemployment: everyone willing to get hired at ω^* is hired. The difference $\bar{N} - N^*$ can be viewed as voluntary unemployment ($\frac{N^*}{\bar{N}}$ would be the participation rate).

Unemployment in the classical model /1

- Establishing a mininum real wage ω_{min} above the equilibrium wage rate ω^* generates involuntary unemployment in a competitive labour market.
- The next slide illustrates this possibility. Market equilibrium occurs at point c. If the minimum wage rate ω_{min} is set, the market state is no longer represented by c but by a: although workers are willing to be at b, firms cannot be forced to hire more workers than the amount given by a.
- At the prevailing wage rate ω_{min} there is an excess supply, interpreted as involuntary unemployment.

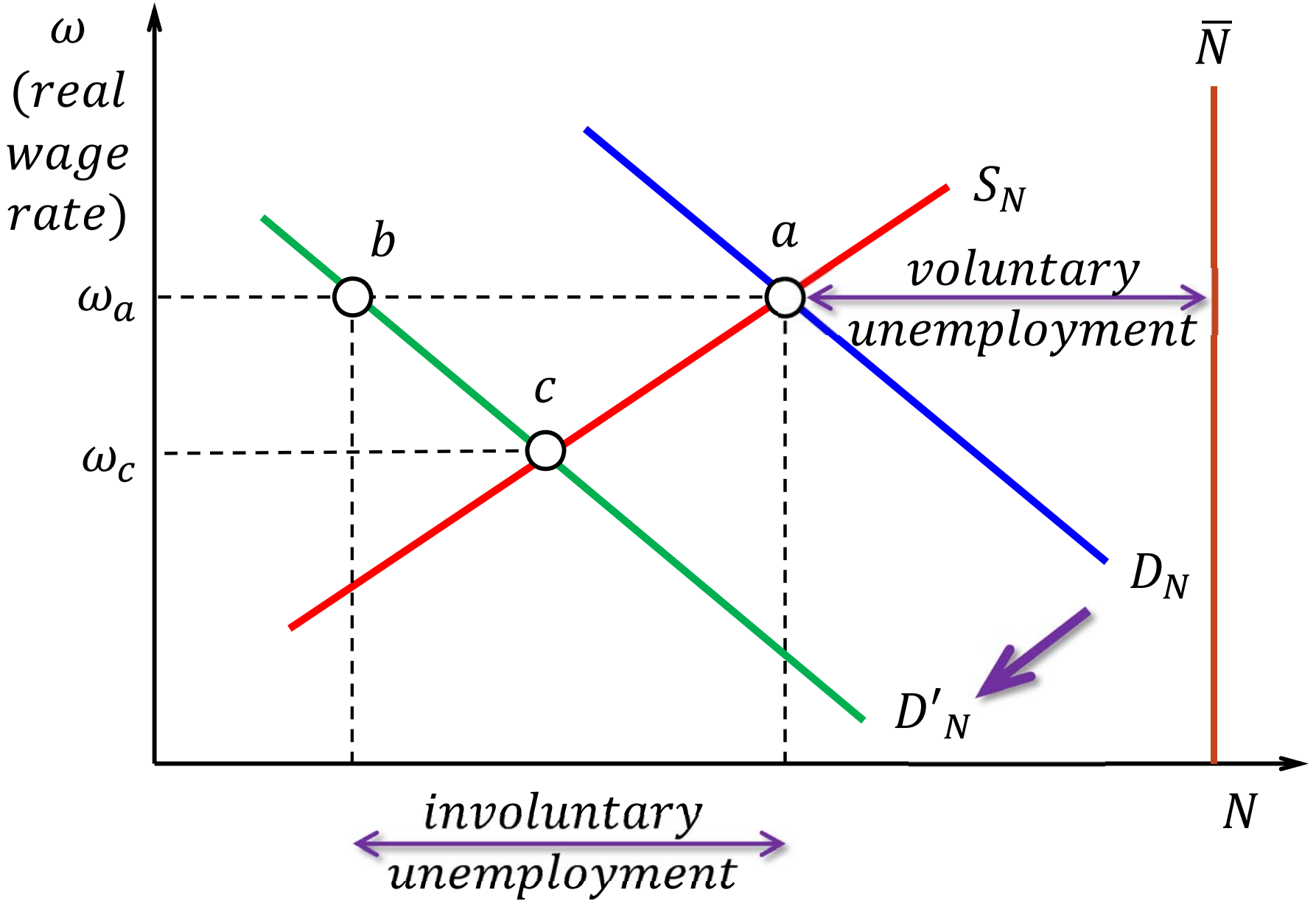
Unemployment in the classical model /2



Unemployment in the classical model /3

- Involuntary unemployment in a competitive labour market may also temporarily arise if the real wage rate adjusts sluggishly.
- The next slide illustrates this situation. Market equilibrium occurs initially at a, with wage rate ω_a. The demand for labour function shifts to the left. The new equilibrium would be represented by c.
- But if the real wage rate takes time to adjust (decrease), the wage rate in the market may temporarily remain at the initial level ω_a. The market is then at b, where involuntary unemployment exists.

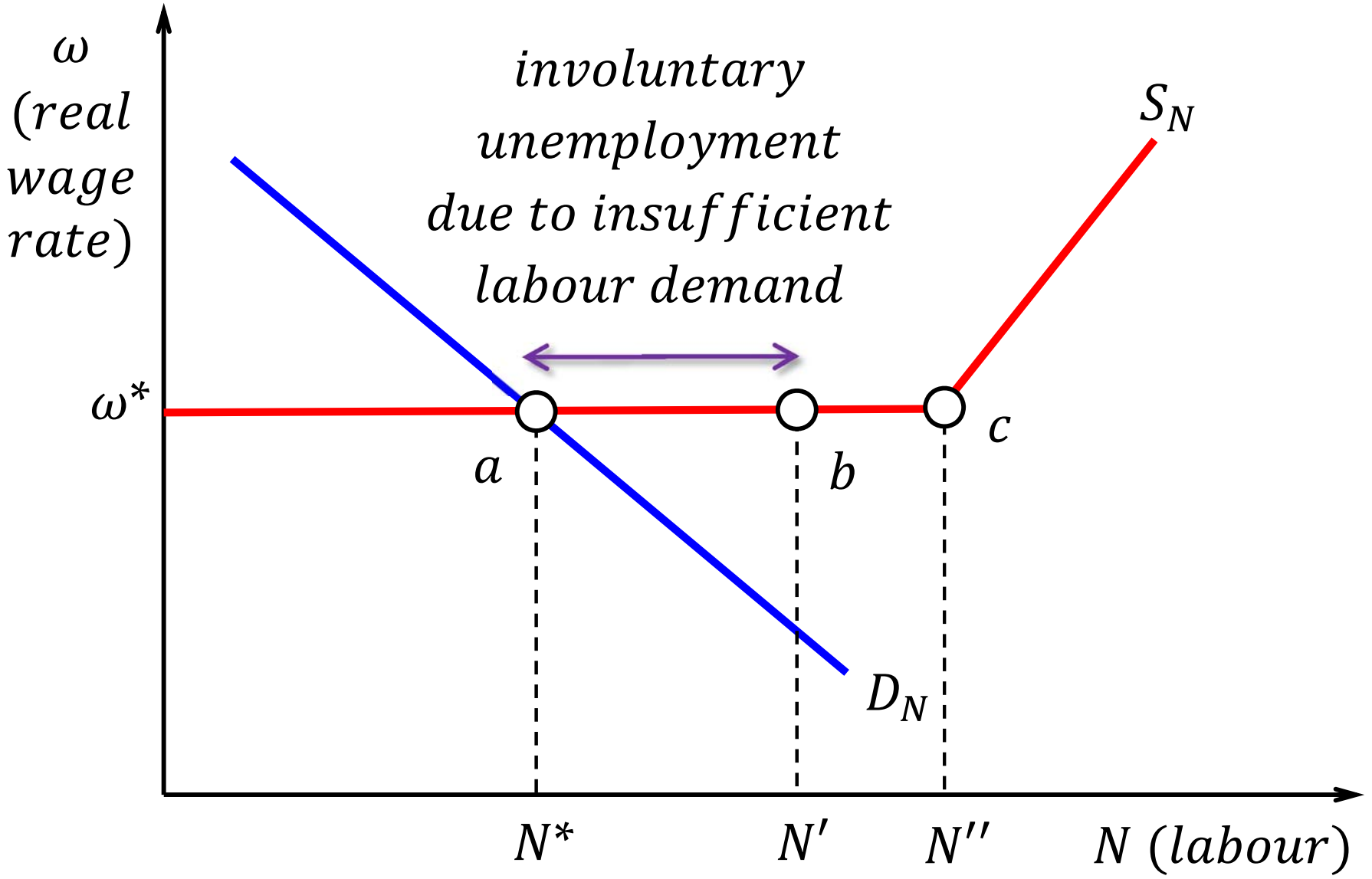
Unemployment in the classical model /4



An atypical example /1

- Suppose the S^N function combines a flat with an upward sloping section, as shown in the next slide.
- The flact section at real wage ω^* could be interpreted in the sense that, when the real wage is ω^*, (i) workers are, in principle, indifferent between supplying labour or not, and (ii) some random variable determines the amount actually supplied.
- Market equilibrium occurs at a, where employment is N^*. If workers finally choose to supply N' (effective labour supply represented by b), there is involuntary unemployment given by $N' - N^*$.

An atypical example /2



(Derived) demand for labour

- Firms do not hire workers because they aim at accumulating workerts. The labour forces is a tool to produce commodities and obtain a profit by selling the commodities produced.
- For that reason, it is said that the demand for labour by firms is a derived demand: it arises as an intermediate step in the process of reaching the firms' final goal, which is making profits.
- Hence, the demand for labour crucially depends on sales expectations: no matter how "cheap" labour is, workers will not be hired if firms do not expect to sell what these workers would produce.

Monopsony /1

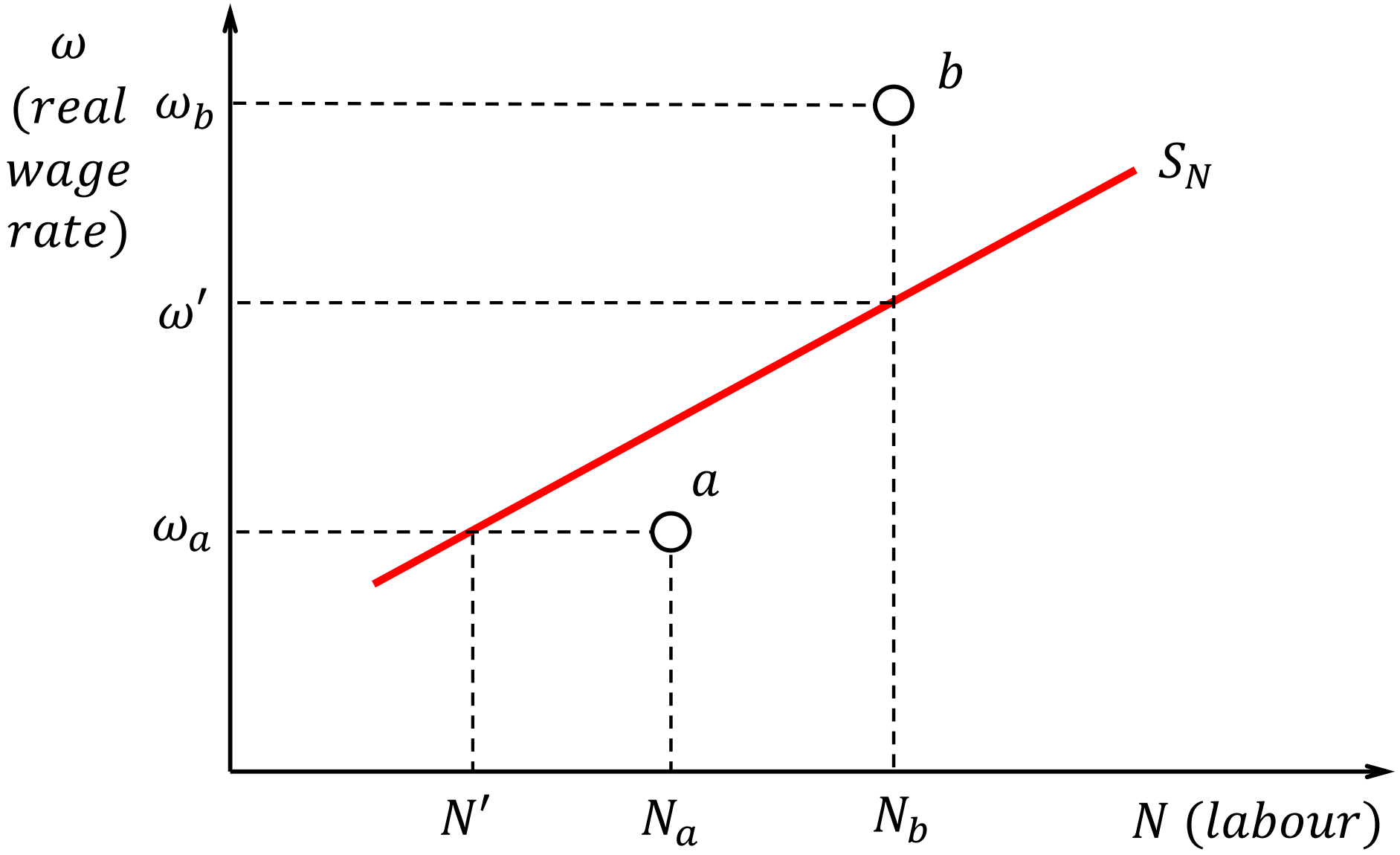
- Since there are fewer firms than workers and firms typically hire several workers, it seems reasonable to presume that firms enjoy some market power.
- To consider a simple benchmark case, suppose there is a unique firm: a monopsonist. In a monopsony, the buyer (the firm) dictates the terms to the sellers (workers). So suppose the firm chooses the wage rate to maximize profits.
- Assume also that the firm is competitive in the product market (price p of the commodity given) and workers are price-takers (take W and p as given).

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

Monopsony /2

- In a monopoly, the monopolist's problem is to choose a point along the market demand function.
- Similarly, a monopsonist will choose a point along the market labour supply function.
- To see this, consider the supply function S_N depicted on the next slide. A monopsonist cannot choose a point a below S_N: at the corresponding wage rate ω_a labour supply N' is smaller than demand N_a.
- A monopsonist will neither choose a point b above S_N: the firm could get the amount N_b of labour demanded at b at a rate ω' smaller than ω_b.

The monopsonist is limited by S_N



Monopsony /3

- The firm's profit function is $\pi(N) = p \cdot q(N) - W(N) \cdot N$, where $W(N)$ is the labour supply function (in nominal terms): $W(N)$ is the smallest nominal wage W inducing workers to supply the amount N of labour. Using the chain rule,

$$\frac{d\pi(N)}{dN} = p \cdot \frac{dq(N)}{dN} - \left(\frac{dW(N)}{dN} \cdot N + W(N) \right).$$

- To reach a maximum, it is necessary that $\frac{d\pi(N)}{dN} = 0$. Accordingly, since $\frac{dq(N)}{dN} = MPL(N)$,

$$p \cdot MPL(N) = W(N) + \frac{dW(N)}{dN} \cdot N \ .$$

Monopsony /4

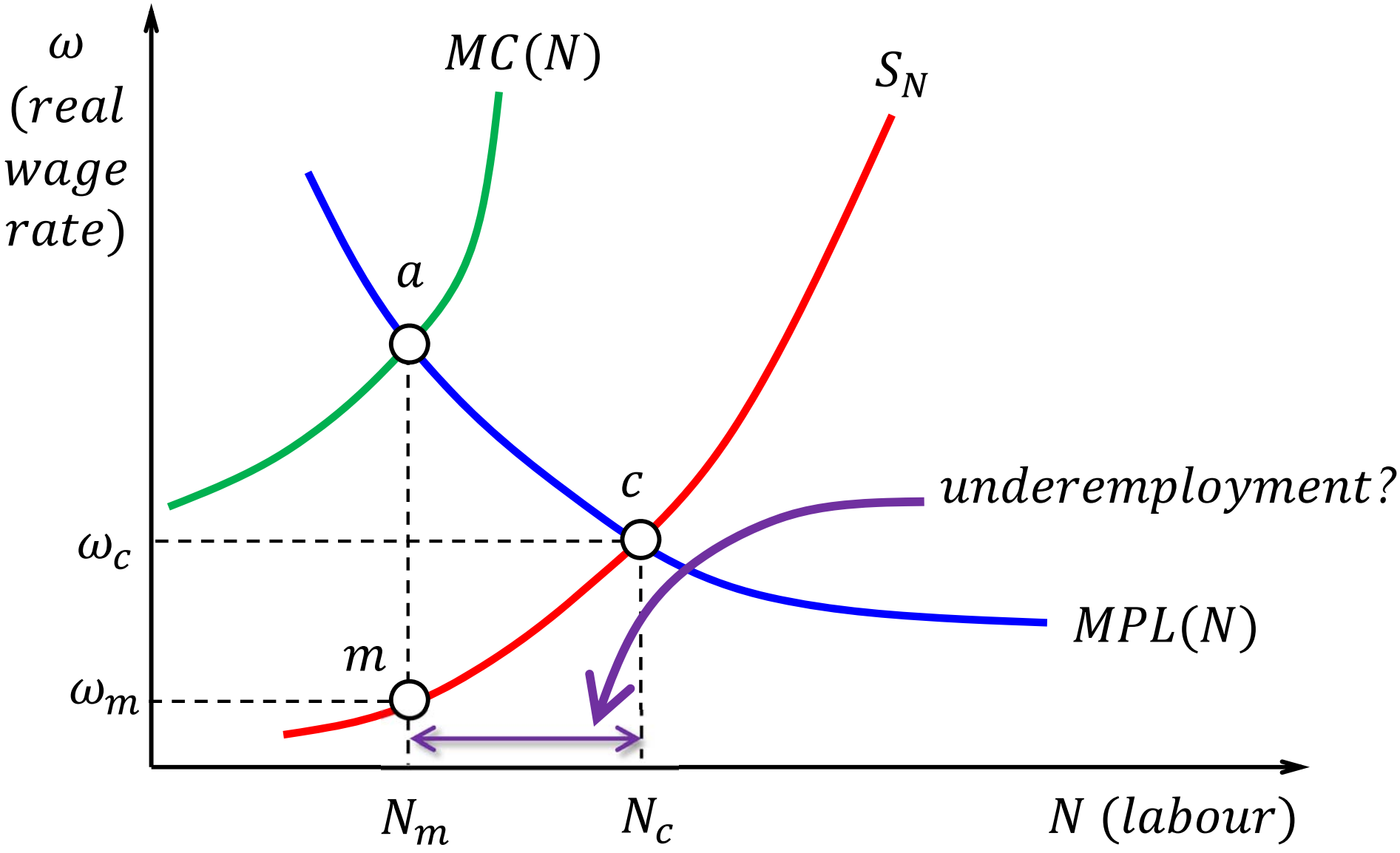
- The left-hand side $p \cdot MPL(N)$ is the marginal revenue of labour or value of the marginal product of labour: the money revenue the firm obtains by selling what an additional unit of labour produces.
- The right-hand side $W(N) + \frac{dW(N)}{dN} \cdot N$ represents the marginal cost of labour: the monetary cost of hiring an additional unit of labour. This cost is higher than the nominal wage rate $W(N)$. In real terms,

$$\underbrace{MPL(N)}_{\text{real marginal revenue}} = \underbrace{\frac{W(N)}{p} + \frac{dW(N)}{dN} \cdot \frac{N}{p}}_{\text{real marginal cost}} .$$

Monopsony /5

- The left-hand side $MPL(N)$ is what the firm obtains in real terms from one more unit of labour. The right-hand side $\frac{W(N)}{p} + \frac{dW(N)}{dN} \cdot \frac{N}{p}$ is what one more unit of labour costs to the firm in real terms.
- When the firm is competitive (wage taker), the condition is $MPL(N) = \frac{W}{p}$, so the real wage $\frac{W}{p}$ defines the real marginal cost for the firm. But, for a monopsonist, this cost is higher than the real wage $\frac{W(N)}{p}$, for which reason the real marginal cost function $MC(N)$ lies above the supply function S_N.

Perfect competition vs monopsony



Example

- Let $q(N) = 15 \cdot N - \frac{1}{2}N^2$, with $q(N) = 0$ if $N > 24$, be the monopsonist's production function. The labour supply function is $N = \frac{1}{2}\frac{W}{p}$; that is, $W = 2 \cdot N \cdot p$. Since $\pi = p \cdot \left(15 \cdot N - \frac{1}{2}N^2\right) - (2 \cdot N \cdot p) \cdot N$, $\frac{d\pi}{dN} = p \cdot (15 - N) - 4 \cdot N \cdot p$. Therefore, $\frac{d\pi}{dN} = 0$ implies $15 - N = 4 \cdot N$. The monopsonist demands $N = 3$ $(W/p = 6)$. If the firm is competitive, labour demand is obtained from $PML = \frac{W}{p}$, where W comes from the labour supply function. In sum, $15 - N = \frac{2 \cdot N \cdot p}{p}$ and $N = 5$ $(W/p = 10)$.

On the monopsony solution

- The monopsony solution, in analogy with the monopoly solution, is determined in two stages. First, marginal cost of labour is equated to marginal revenue of labour (point a) to ascertain the labour demanded N_m. Second, the wage rate ω_m chosen by the monopsonist is the one that the supply of labour associates with N_m.
- The result is not involuntary unemployment (given ω_m, workers would like to supply precisely N_m) but what could be considered underemployment: the compensation workers receive may be too low compared with their ability (their MPL) .

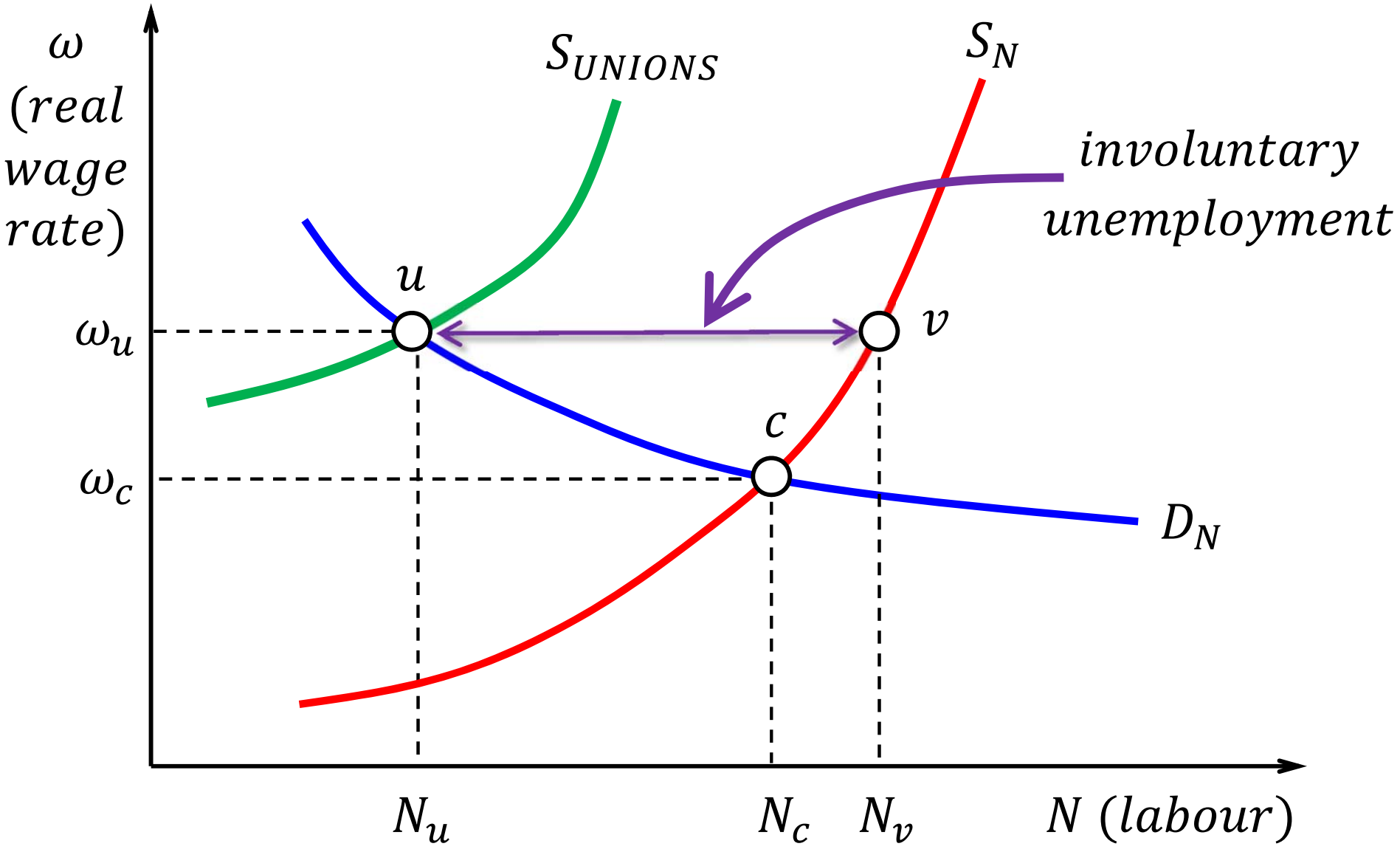
Supply-side market power: unions /1

- The monopsony analysis shows that demand-side market power generates less employment and lower wages than perfect competition.
- Supply-side market power is typically associated with the existence of trade unions. For any given amount of labour N, the wage rate unions demand to supply N will be higher than the wage rate dictated by the supply of labour function.
- This follows from the fact that unions (since they can organize strikes) have more bargaining power over wages than individual workers.

Supply-side market power: unions /2

- As a result, the function S_{UNIONS} associating with each amount of labour N the wage rate that unions will ask to be willing to supply N must lie above the supply of labour function.
- The next slide combines the function S_{UNIONS} with a competitive labour demand function D_N. Without trade unions, market equilibrium is at c. With unions market equilibrium is at u. The distance between u and v represents involuntary unemployment: given wage ω_u, workers would individually like to supply N_v but the presence of the union only allows N_u to be hired.

Supply-side market power: unions /3



Fighting involuntary unemployment

- When the wage is "too high", the obvious solution to get rid of unemployment is to lower the wage (or let time pass by for the wage to adjust by itself).
- When unemployment is due to lack of labour demand, the natural solution is an aggregate demand expansion that induces firms to hire more workers to satisfy the additional demand.
- When the cause of unemployment is market power (unions), the solution seems harder to implement: how to reduce the unions' bargaining power without raising protests by part of the workers?

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

Price setting & wage setting model /1

- In modern economies, the nominal wage rate of a substantial number of workers is determined through collective bargaining involving unions.
- If workers are represented by unions, at any level of employment, the real wage will be above the wage rate dictated by the labour supply function.
- It is assumed that unions establish the real wage using a wage setting function WS sloping upward and lying above the labour supply function S_N. The higher the unions' bargaining power, the larger the vertical distance between between WS and S_N.

Price setting & wage setting model /2

- Whereas workers (through unions) are assumed to set the nominal wage, firms are supposed to fix the prices of the commodities they produce.
- A simple price setting rule consists of adding a mark-up $\hat{\mu} > 0$ to labour costs: $P = (1 + \hat{\mu}) \cdot \frac{W}{MPL}$.
- W is measured in money (EUR) and MPL in units of product per worker. Thus, $\frac{W}{MPL}$ is the money paid to workers divided by what they produce. In other words, $\frac{W}{MPL}$ is the (labour) cost of producing a unit of the commodity.

Price setting & wage setting model /3

- It is convenient to define $\mu = \frac{\hat{\mu}}{1+\hat{\mu}}$, so $P = (1+\hat{\mu}) \cdot \frac{W}{PML}$ can be equivalently expressed as $P = \frac{1}{1-\mu} \cdot \frac{W}{MPL}$.

- Clearly, $(1-\mu) \cdot MPL = \frac{W}{p}$. In sum,

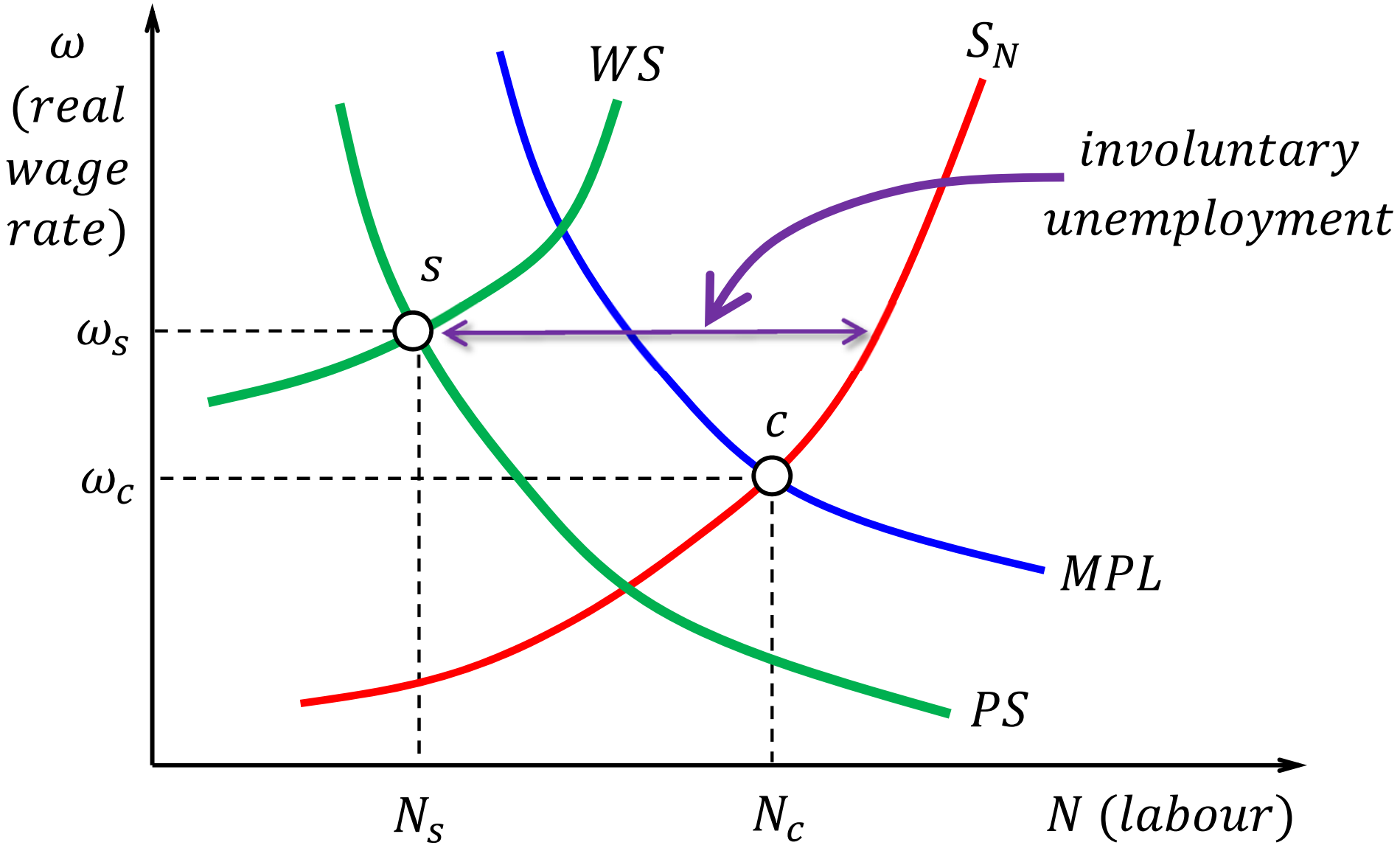
$$\underbrace{MPL}_{\text{production per worker}} = \underbrace{\frac{W}{p}}_{\text{real wage per worker}} + \underbrace{\mu \cdot MPL}_{\text{real profit per worker}}.$$

- μ is then a mark-up over output: the fraction of the workers' productivity that the firm appropriates.

Price setting & wage setting model /4

- Under perfect competition in the labour and product markets, $\frac{W}{p} = MPL$.
- When prices are set by firms as the marking up of labour costs per worker, $\frac{W}{p} = (1 - \mu) \cdot MPL$. This is called the price setting function PS. As $0 < \mu < 1$, $\frac{W}{p} = (1 - \mu) \cdot MPL$ means that $\frac{W}{p} < MPL$.
- As the MPL function is downward sloping, the PS function is downward sloping as well. PS lies below MPL because PS is a fraction of MPL (the constant $1 - \mu$ is smaller than 1).

The WS and PS model



Example

- Supply of labour function: $\omega = \frac{5}{3} \cdot N$ (ω is the real wage rate).
- MPL function: $MPL = 20 - 5 \cdot N$.
- Demand for labour function: $\omega = MPL$.
- WS function: $\omega = 3 \cdot N$.
- PS function: $\omega = (1 - \mu) \cdot MPL$, with $\mu = 0.4$.
- Competitive solution: $\frac{5}{3} \cdot N = 20 - 5 \cdot N \Rightarrow N = 3$ and $\omega = 5$.
- WS - PS solution: $3 \cdot N = 0.6 \cdot MPL \Rightarrow 3 \cdot N = 0.6 \cdot (20 - 5 \cdot N) \Rightarrow N = 2$ and $\omega = 6$.

Segmented labour market model

- Suppose workers may have or not some economically irrelevant feature that firms may like or not (for instance, being a man or not).
- Firms classify workers in two types (I and II) depending on whether they possess the feature or not. Some firms (type I firms) prefer type I workers; the rest (type II) prefer type II workers.
- Each type of firms defines a different (competitive) labour market. Workers are unaware of the fact that there are two types of firms. From their perspective, the labour market is not segmented.

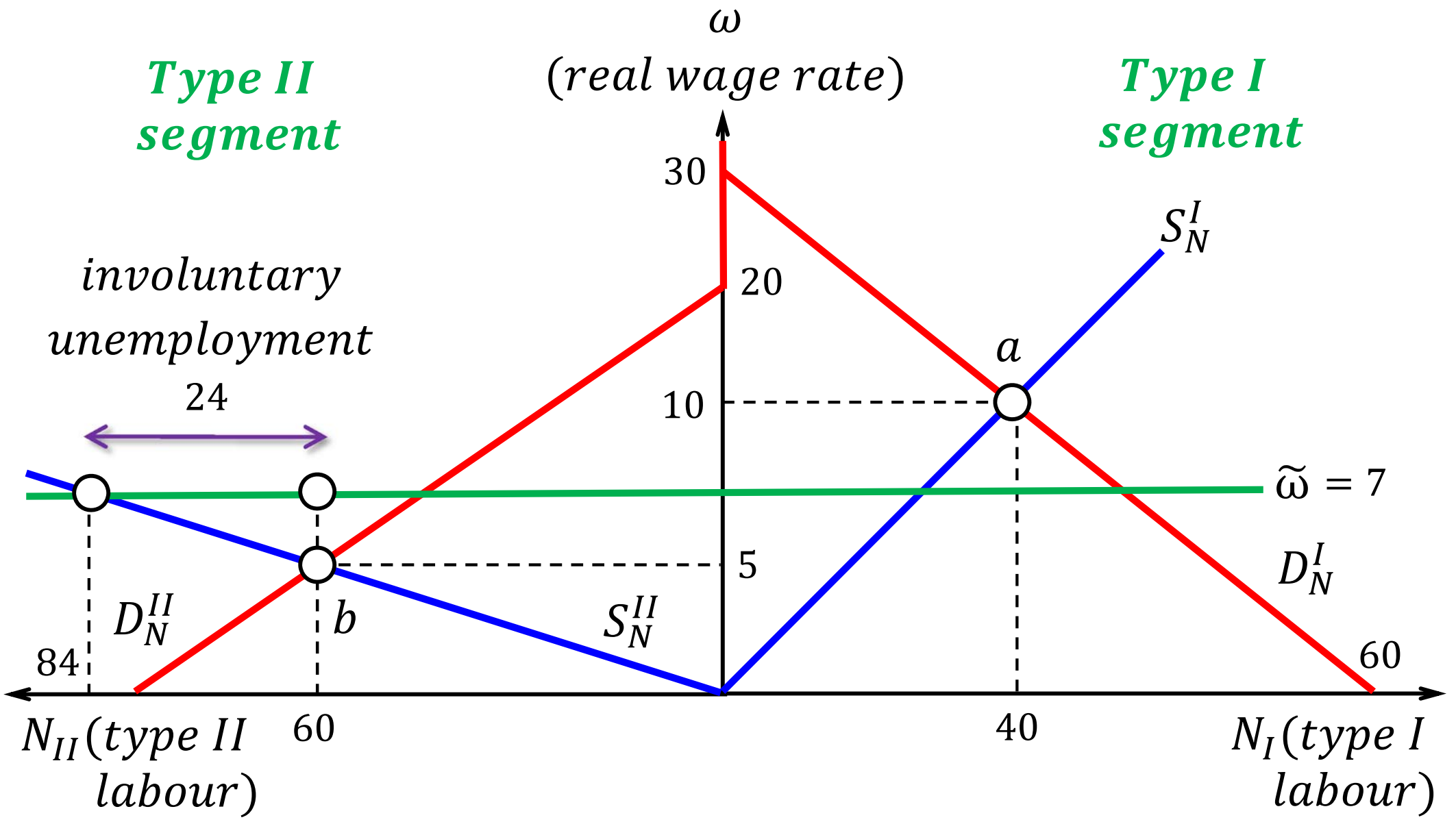
Example /1

- Supply of labour function of type I workers: $S_N^I = 4 \cdot \omega$ (ω is the real wage rate).
- Demand for labour function of type I firms: $D_N^I = 60 - 2 \cdot \omega$ ($N_I^d = 0$ if $\omega > 30$).
- Market equilibrium (type I): $(N_I, \omega_I) = (40, 10)$.
- Supply of labour function of type II workers: $S_N^{II} = 12 \cdot \omega$.
- Demand for labour function of type II firms: $D_N^{II} = 80 - 4 \cdot \omega$ ($N_{II}^d = 0$ if $\omega > 20$).
- Market equilibrium (type II): $(N_{II}, \omega_{II}) = (60, 5)$.

Example /2

- $\frac{40}{40+60} = \frac{2}{5} = 40\%$ of employment corresponds to type I workers and $\frac{60}{40+60} = \frac{3}{5} = 60\%$ to type II. Using these weights, the average real wage rate would be $\tilde{\omega} = \frac{2}{5} \cdot \omega_I + \frac{3}{5} \cdot \omega_{II} = \frac{2}{5} \cdot 10 + \frac{3}{5} \cdot 5 = 7$.
- At $\tilde{\omega} = 7$, no more type I workers than are actually employed would like to be hired. But, at $\tilde{\omega} = 7$, type II workers would like to supply $S_N^{II} = 12 \cdot \tilde{\omega} = 84$. Since employment of type II workers equals $N_{II} = 60$, involuntary unemployment appears to be $S_N^{II}(\tilde{\omega} = 7) - \quad N_{II} = 84 - 60 = 24$ (unemployment rate $= 24/(24 + N_I + N_{II}) = 19.3\%$); see next slide.

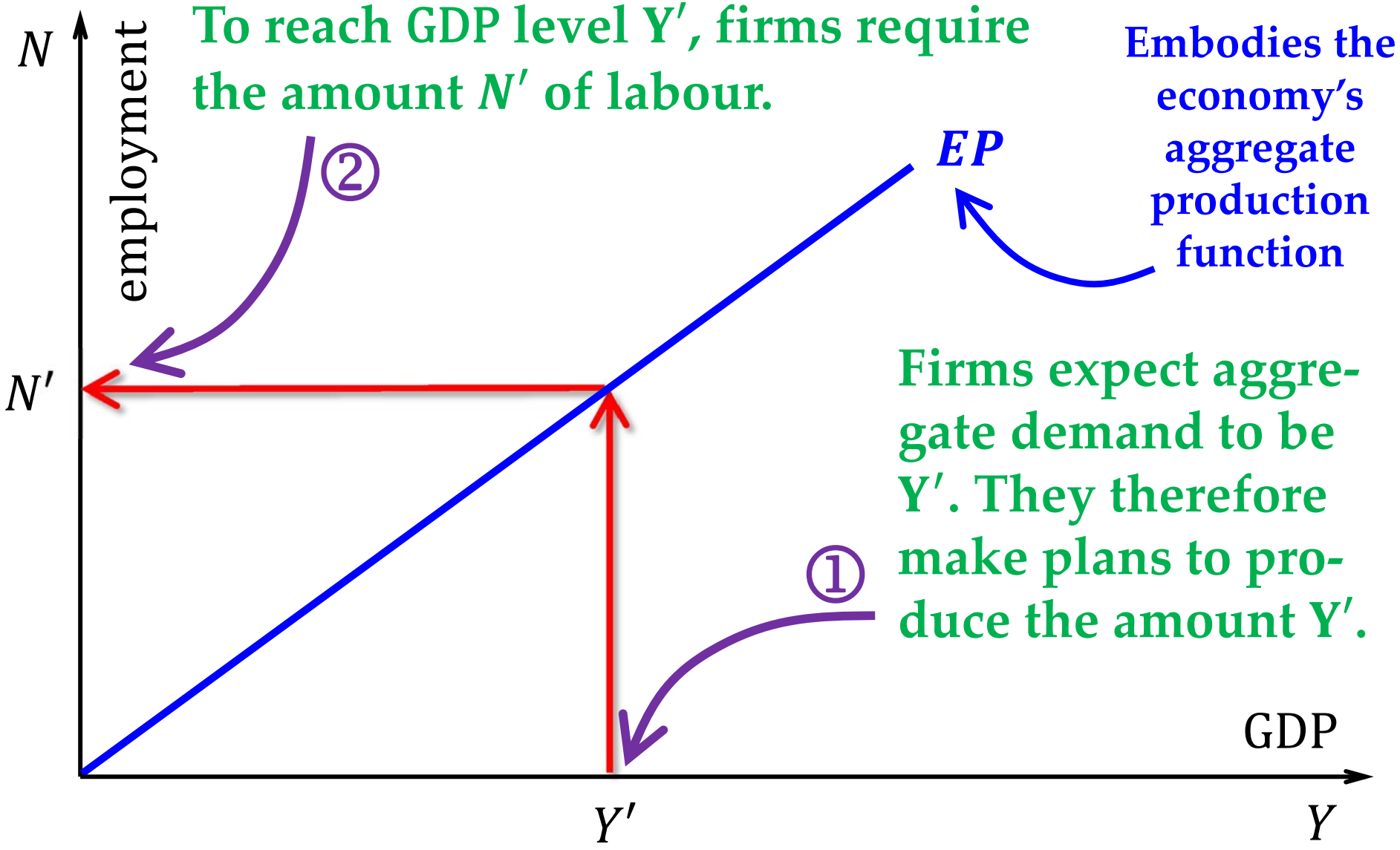
Though each segment is in equilibrium, there is a sense in which involuntary unemployment exists.



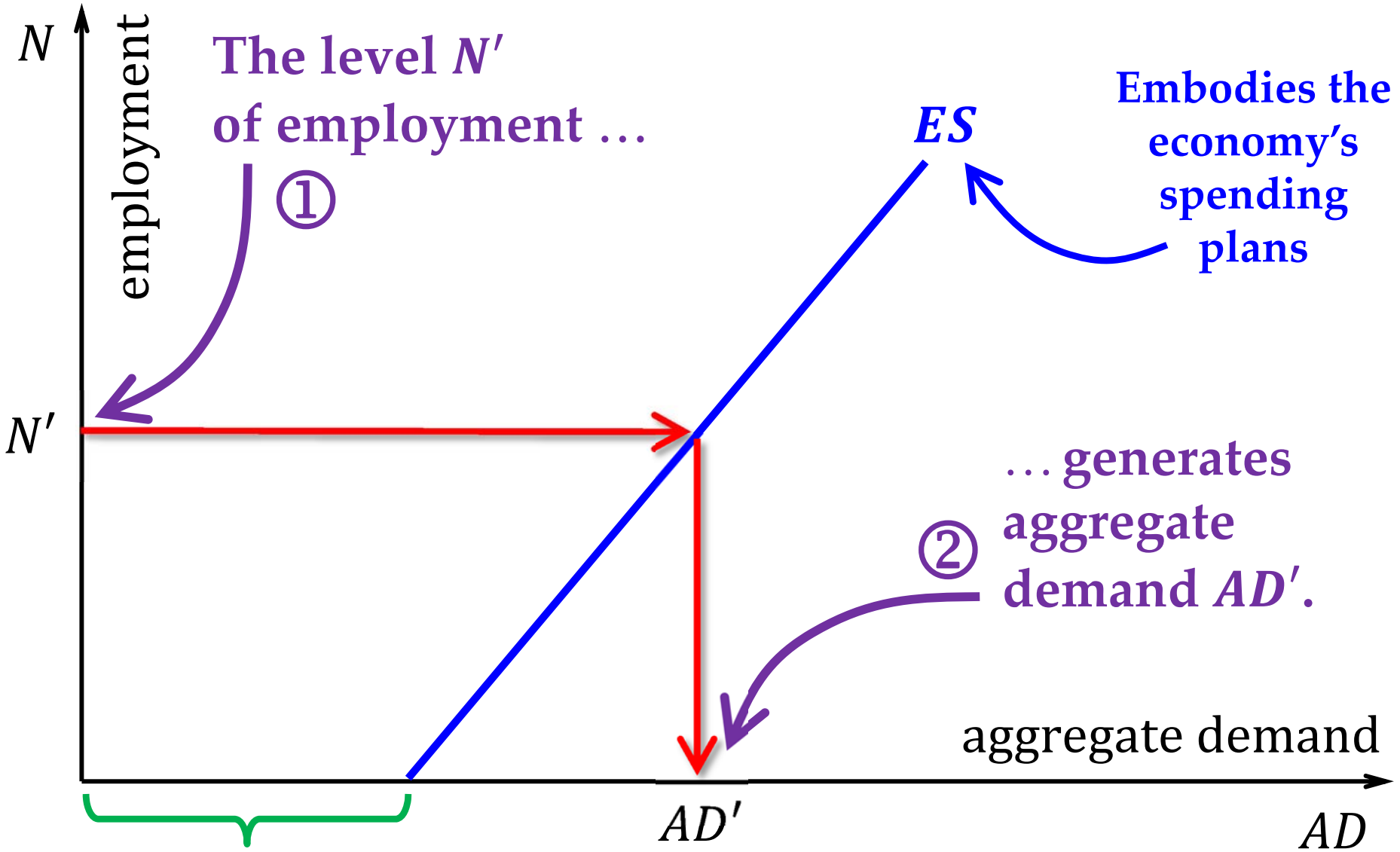
The E-PIS model

- It postulates three linear relations linking employment with production, income, and spending.
  - *EP* relation (production → employment): establishes the amount of employment required to reach a certain GDP level.
  - *EI* relation (income → employment): identifies the amount of labour supplied for every value of aggregate income.
  - *ES* relation (employment → expenditure): indicates the aggregate level of spending associated with any given amount of employment.

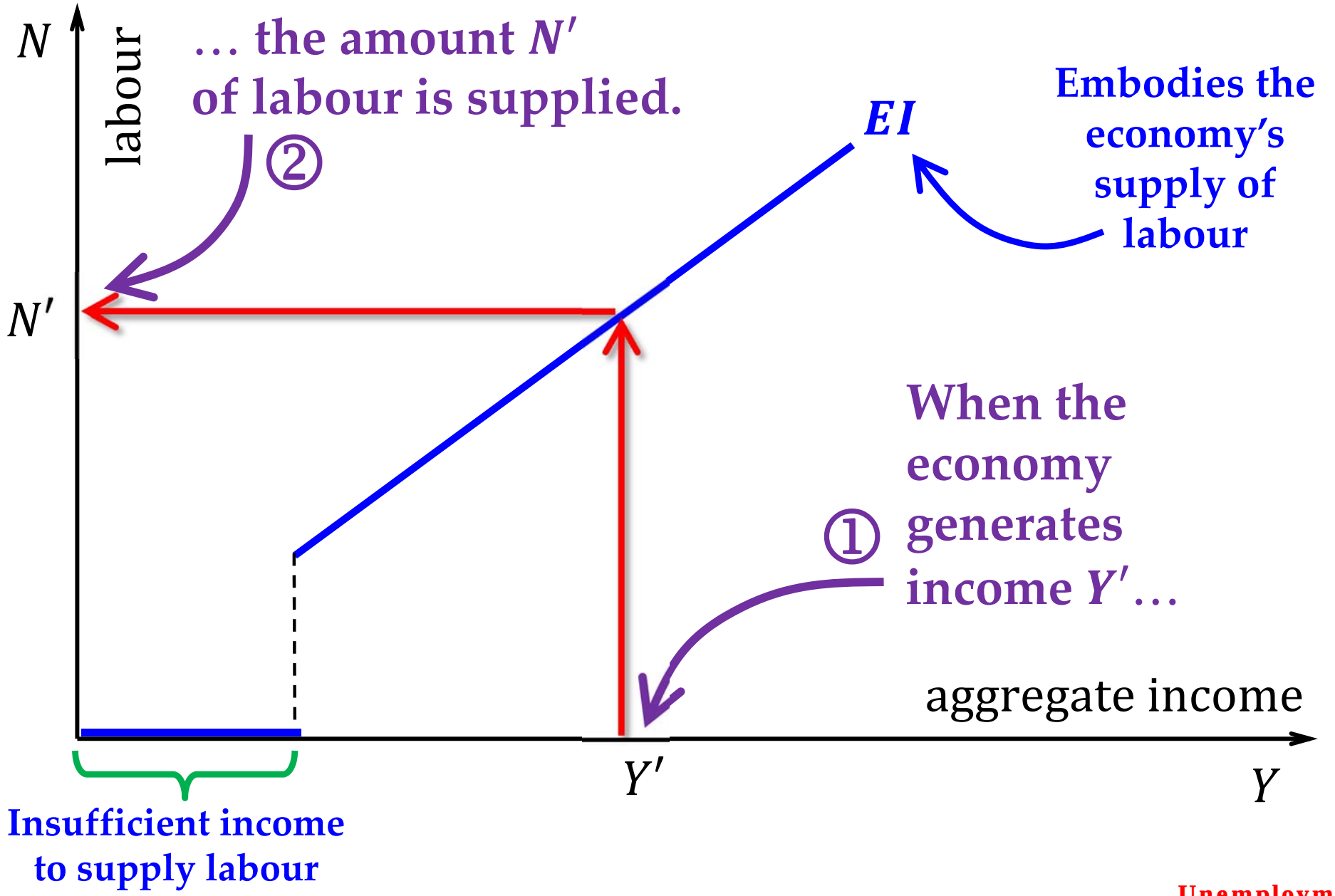
EP (employment-production) relation



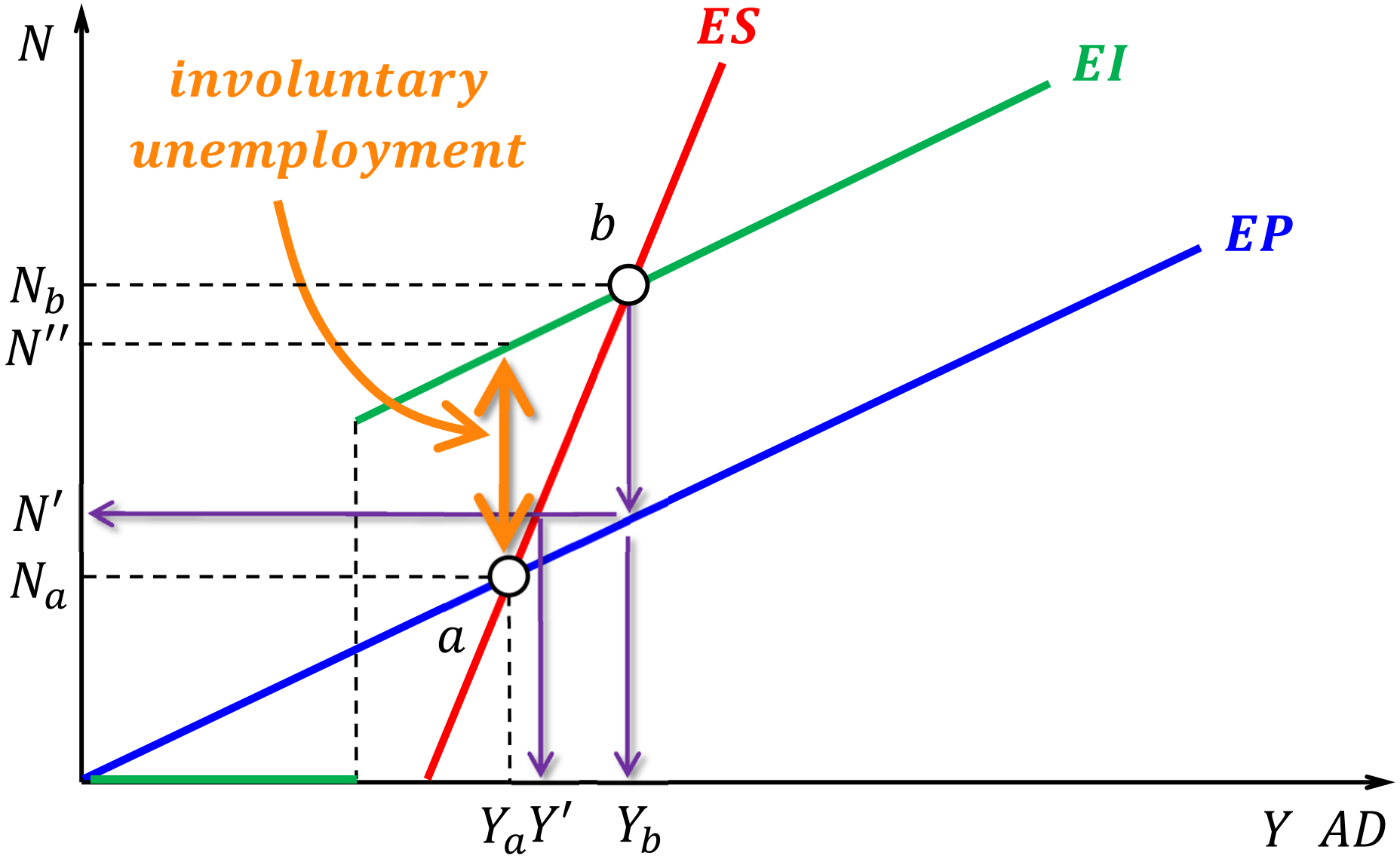
ES (employment-spending) relation



EI (employment-income) relation



Solving the E-PIS model /1



Solving the E-PIS model /2

- When drawn simultaneously, there is no point at which the three relations intersect.
- Without delving into details, let us assume that the solution is found at a point when two lines intersect. Leaving the origin aside, there are two candidates: point a and point b.
- Point b is not stable (self-sustained). At b, employment is N_b and aggregate demand is Y_b. But, according to EP, to produce Y_b, the economy only needs the amount $N' < N_b$ of labour. Hence, b does not represent a consistent state of the economy.

Solving the E-PIS model /3

- At a, employment is N_a and aggregate demand is Y_a. To generate a GDP equal to Y_a firms demand exactly the amount N_a of labour. In addition, the level N_a of employment generates precisely the level Y_a of aggregate demand. This state of the economy appears self-consistent and stable.
- The problem is that there is involuntary unemployment at point a. Given income Y_a, workers would like to supply the amount N'' of labour. Since employment at a is only N_a, $N'' - N_a$ defines the level of involuntary unemployment. Question: what shifts in the lines would reduce it?

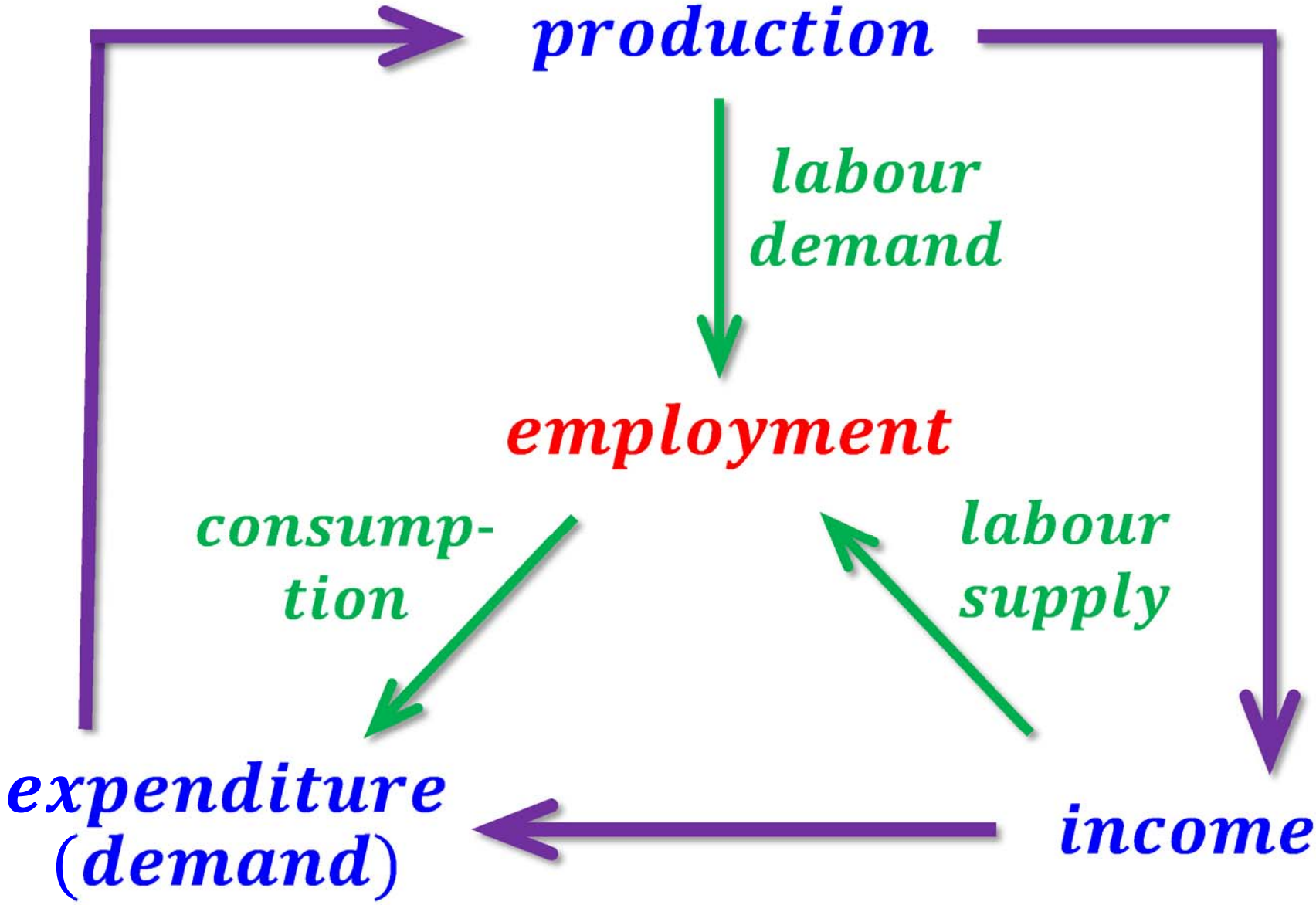
Interpreting the E-PIS model /1

- The arguably simplest description of an economy is given by the loop

production → income → expenditure → production → …

- The E-PIS model inserts labour in this loop. First, production creates a derived demand: the demand for labour. Second, the income the economy generates is a key variable helping workers to decide the amount of labour supplied.

- Lastly, the level of employment, once determined, significantly contributes to establish aggregate demand, which in turn affects production.


production
labour demand
employment
consump-tion
labour supply
expenditure (demand)
income

Interpreting the E-PIS model /2

- The classical view of this process attributes to the labour market the leading role. Employment is first established, this next determines production, and production is finally used.
- The Keynesian view inverts the order. First, expenditure decisions are made. These decisions indicate the necessary production level. Finally, the labour required to carry out the production plan is hired.
- The E-PIS model aligns itself with the latter view. The state of the economy is foremost determined by the firms' expected level of aggregate demand.

Interpreting the E-PIS model /3

- To meet the expected demand level Y, firms hire the amount of labour N necessary to produce Y. As long as the income level corresponding to production level Y induces workers to supply at least N, the employment-income relation is irrelevant.
- Since there is no obvious reason why the EI relation cannot be established independently of the other relations, it is highly unlikely that workers will exactly supply N. Thus, the excess of labour supplied constitutes involuntary unemployment. As it emerges from the very working of the economy, it will be hard to eliminate it completely.