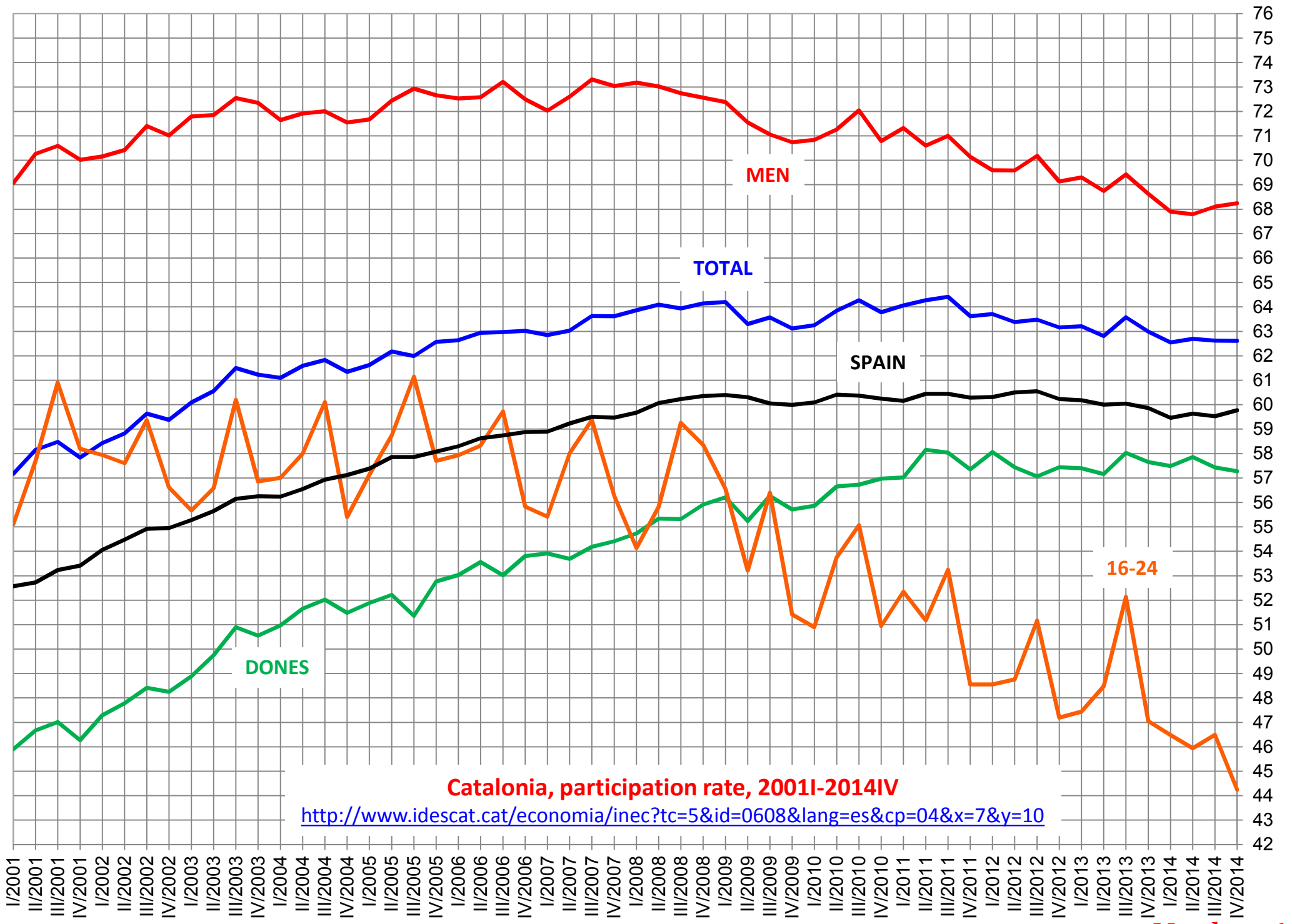


# Unemployment rate

- 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
- Unemployment rate =  $\frac{\text{Unemployment}}{\text{Labour force}}$
- Participation rate =  $\frac{\text{Labour force}}{\text{Economically active population}}$

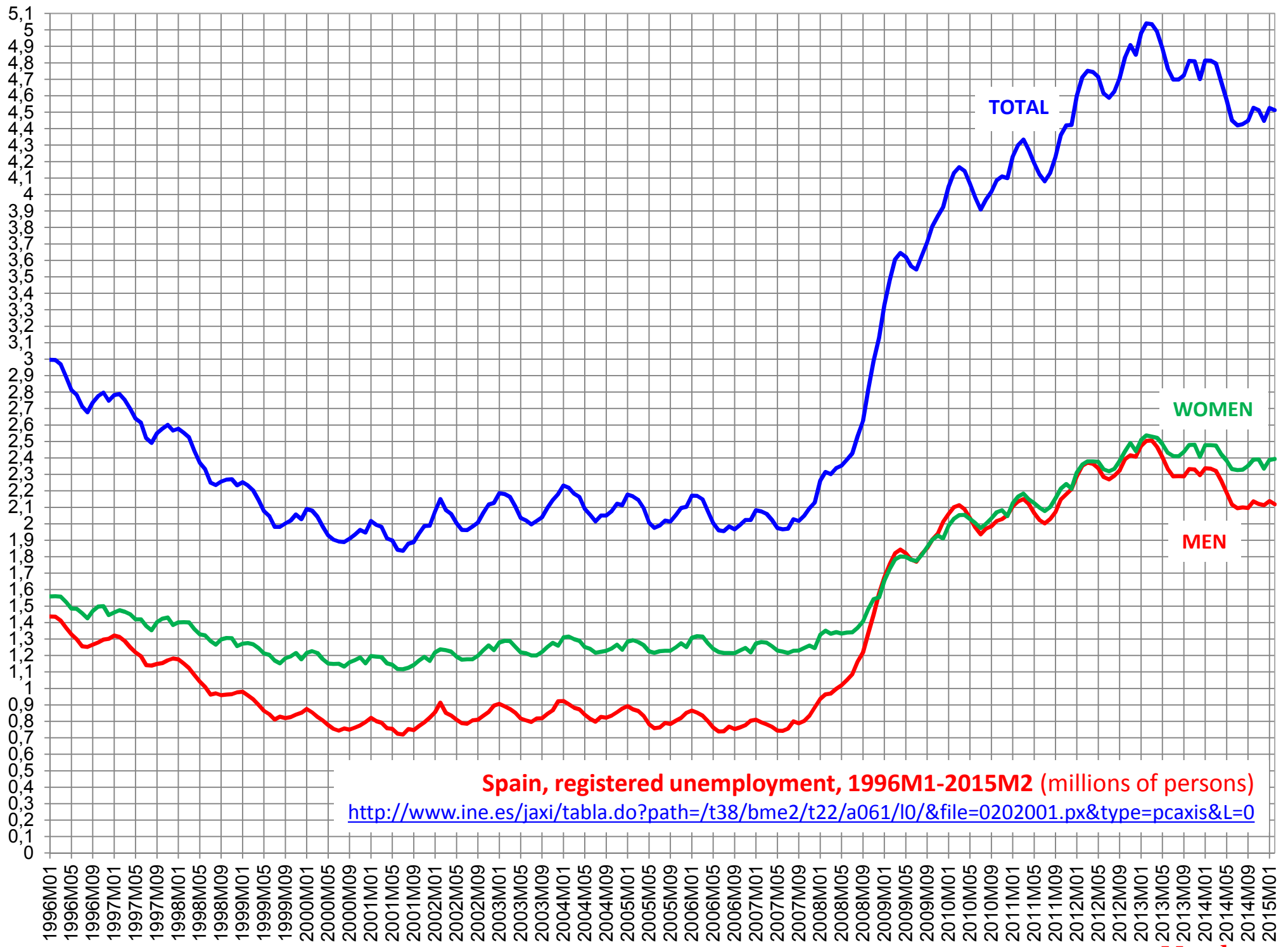


**Catalonia, participation rate, 2001I-2014IV**

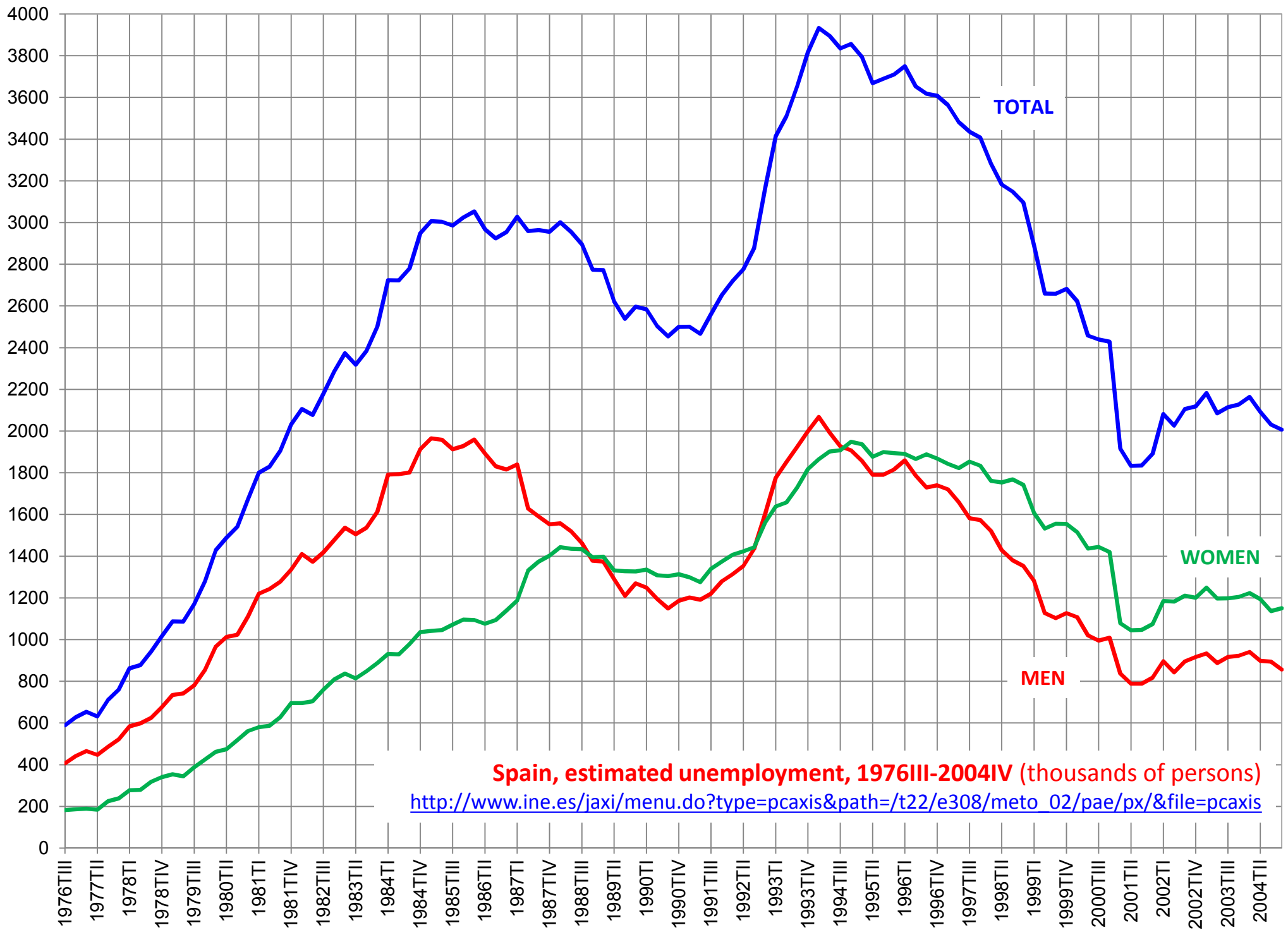
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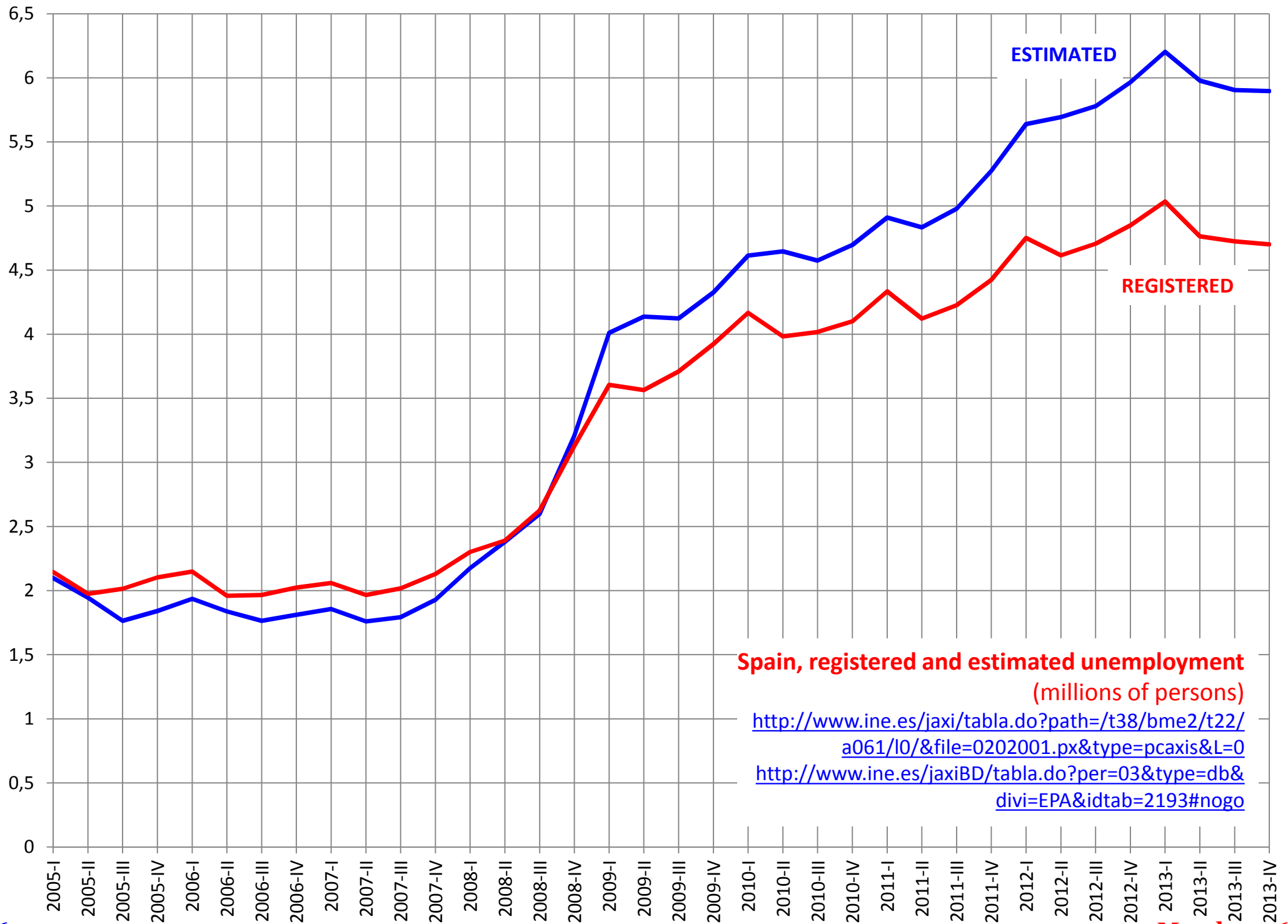
# Basic types of unemployment

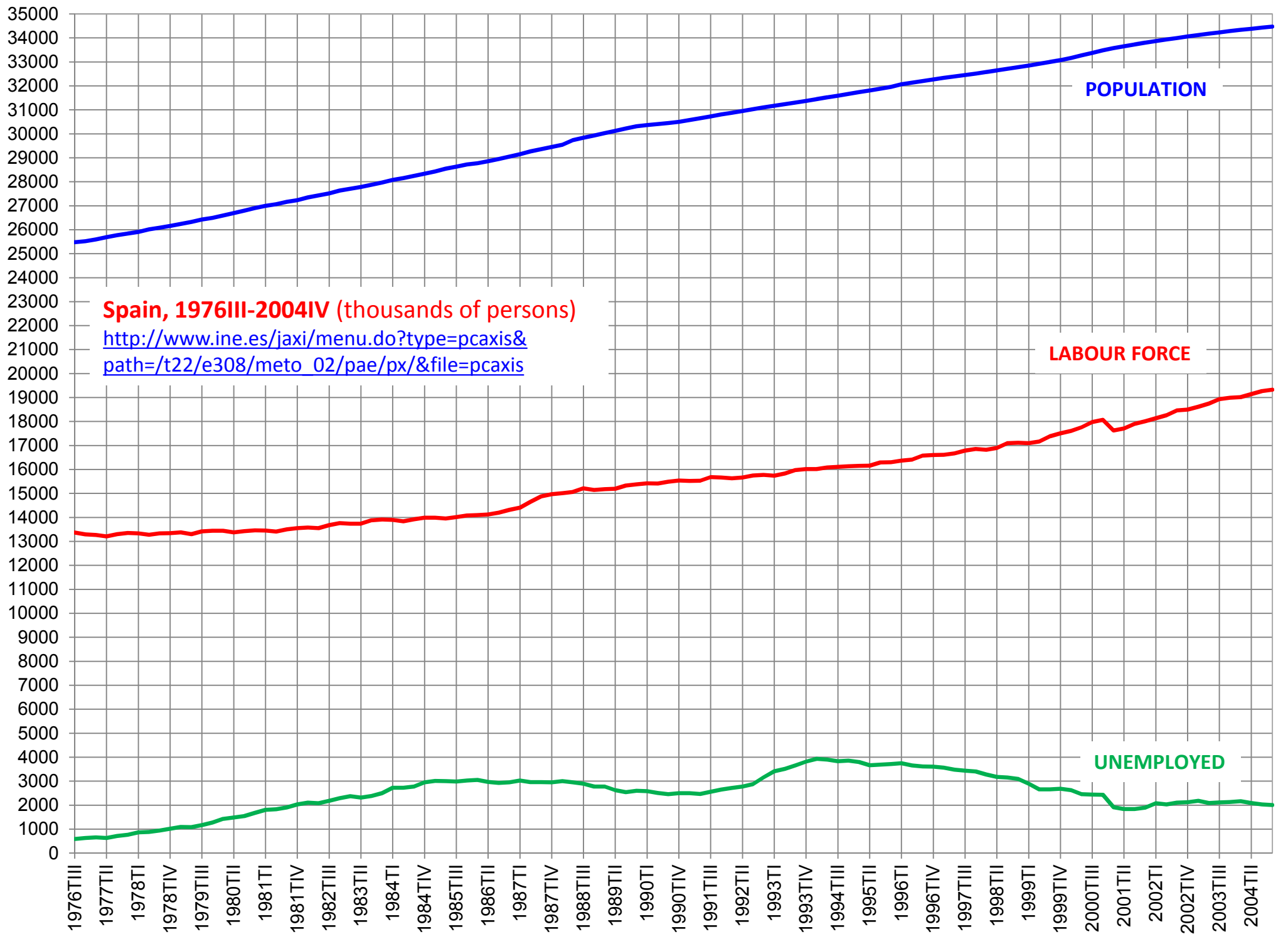
- Actual unemployment is divided into three categories (the first two define “natural unemployment”).
- Frictional. Occurs while workers are changing jobs.
- Structural. Due to structural changes in the economy that create and eliminate jobs and to the institutions that match workers and firms (firing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

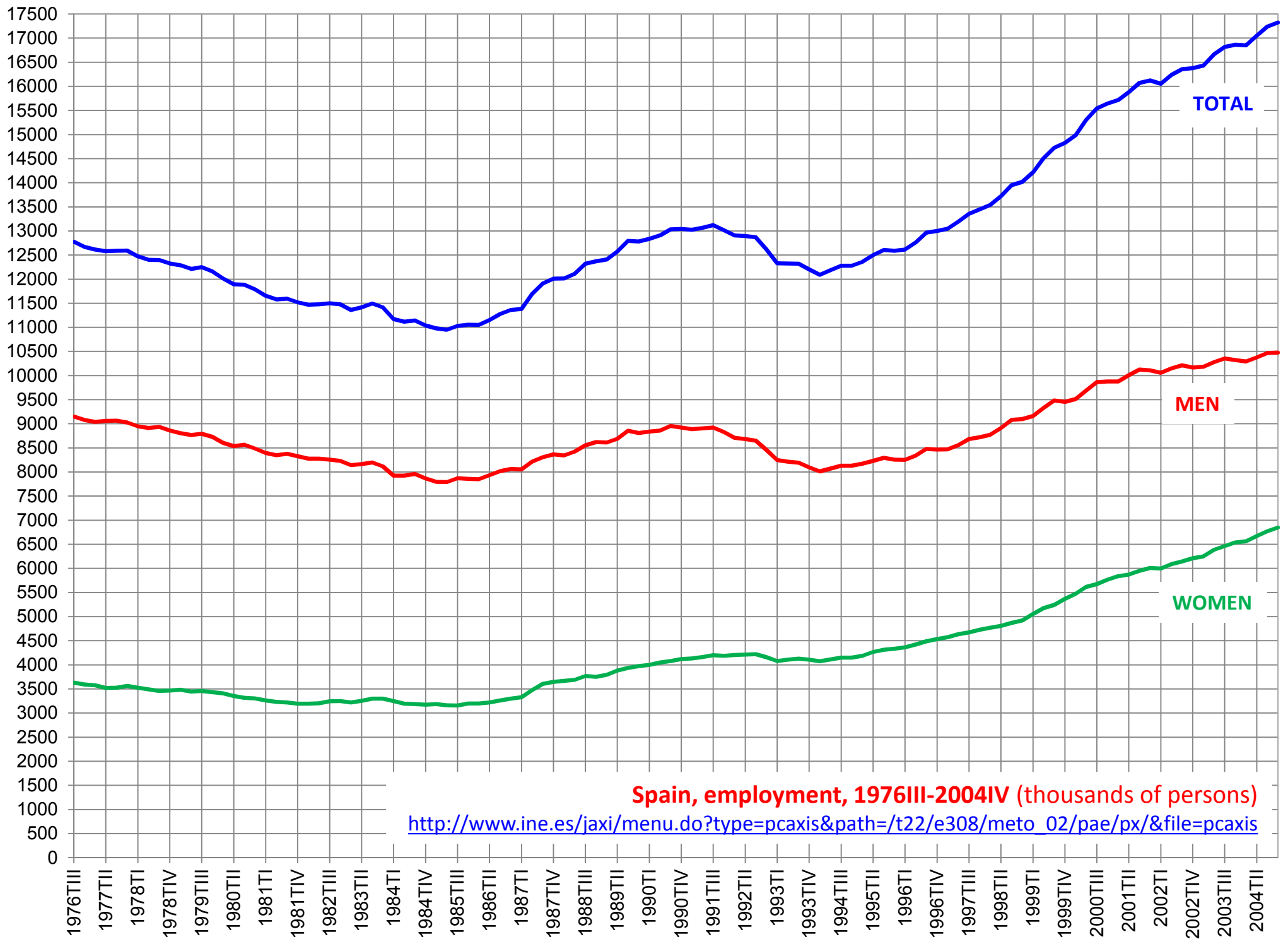


Spain, registered unemployment, 1996M1-2015M2 (millions of persons)  
<http://www.ine.es/jaxi/tabla.do?path=/t38/bme2/t22/a061/l0/&file=0202001.px&type=pcaxis&L=0>





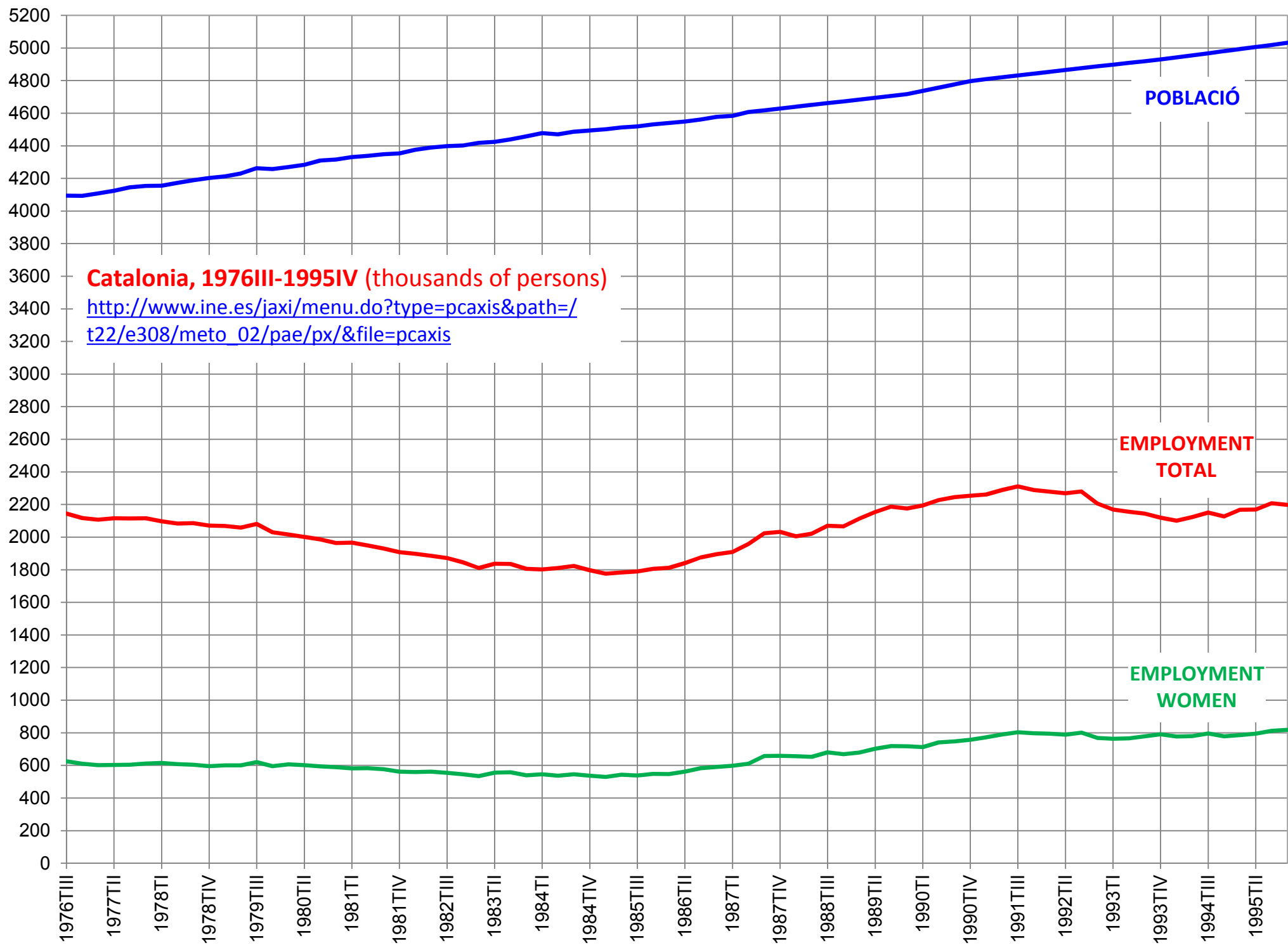


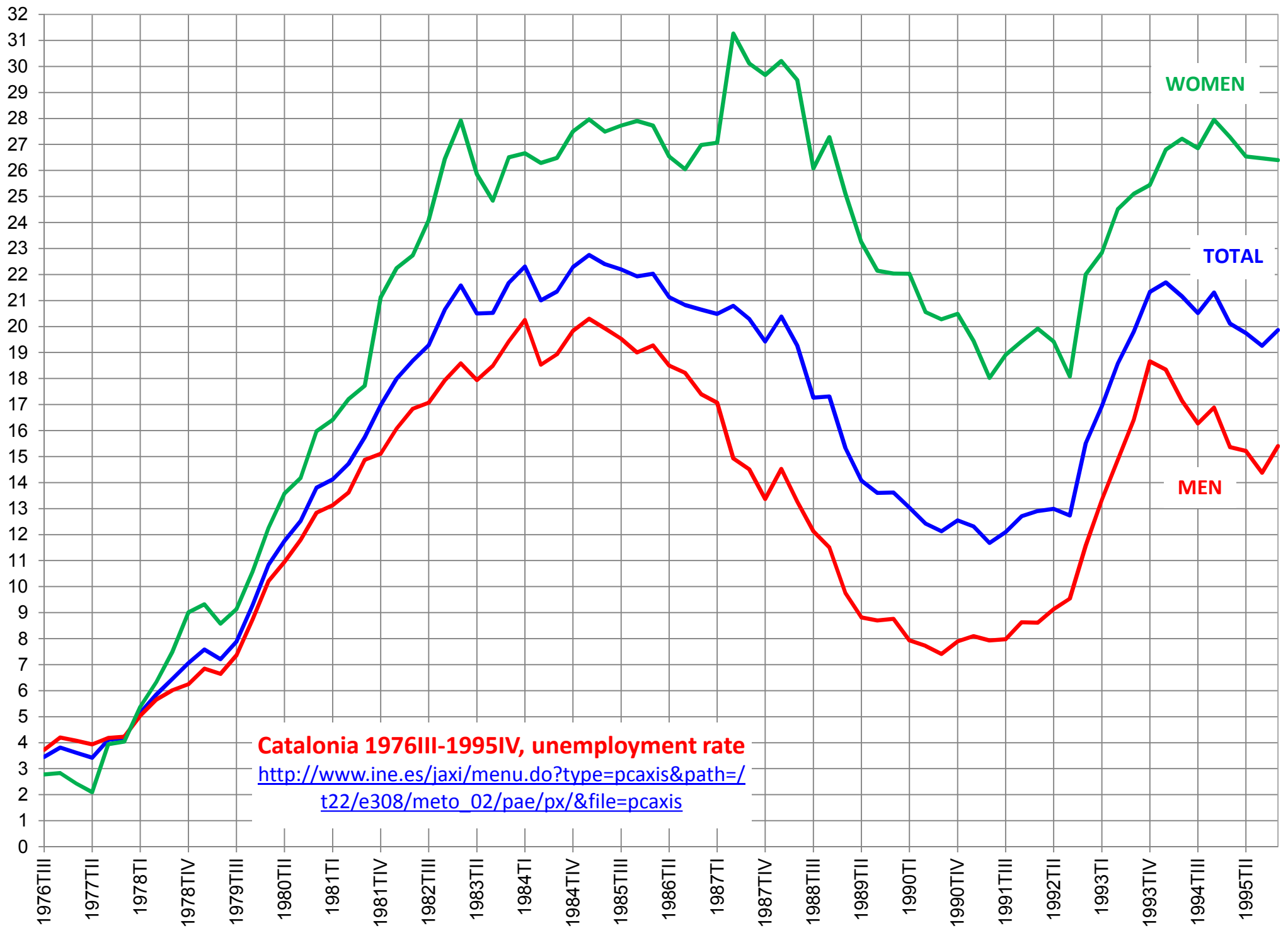


Spain, employment, 1976III-2004IV (thousands of persons)

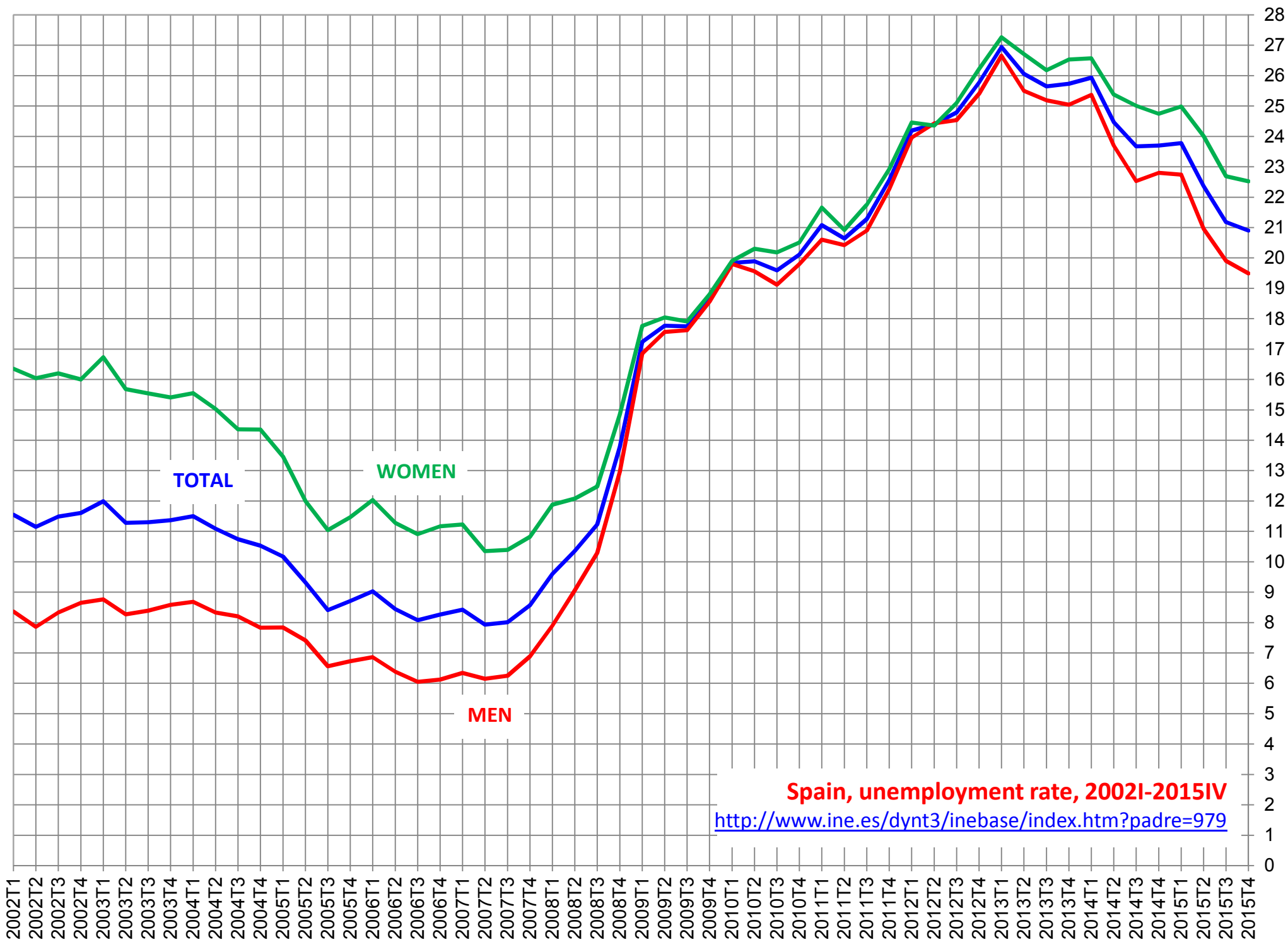
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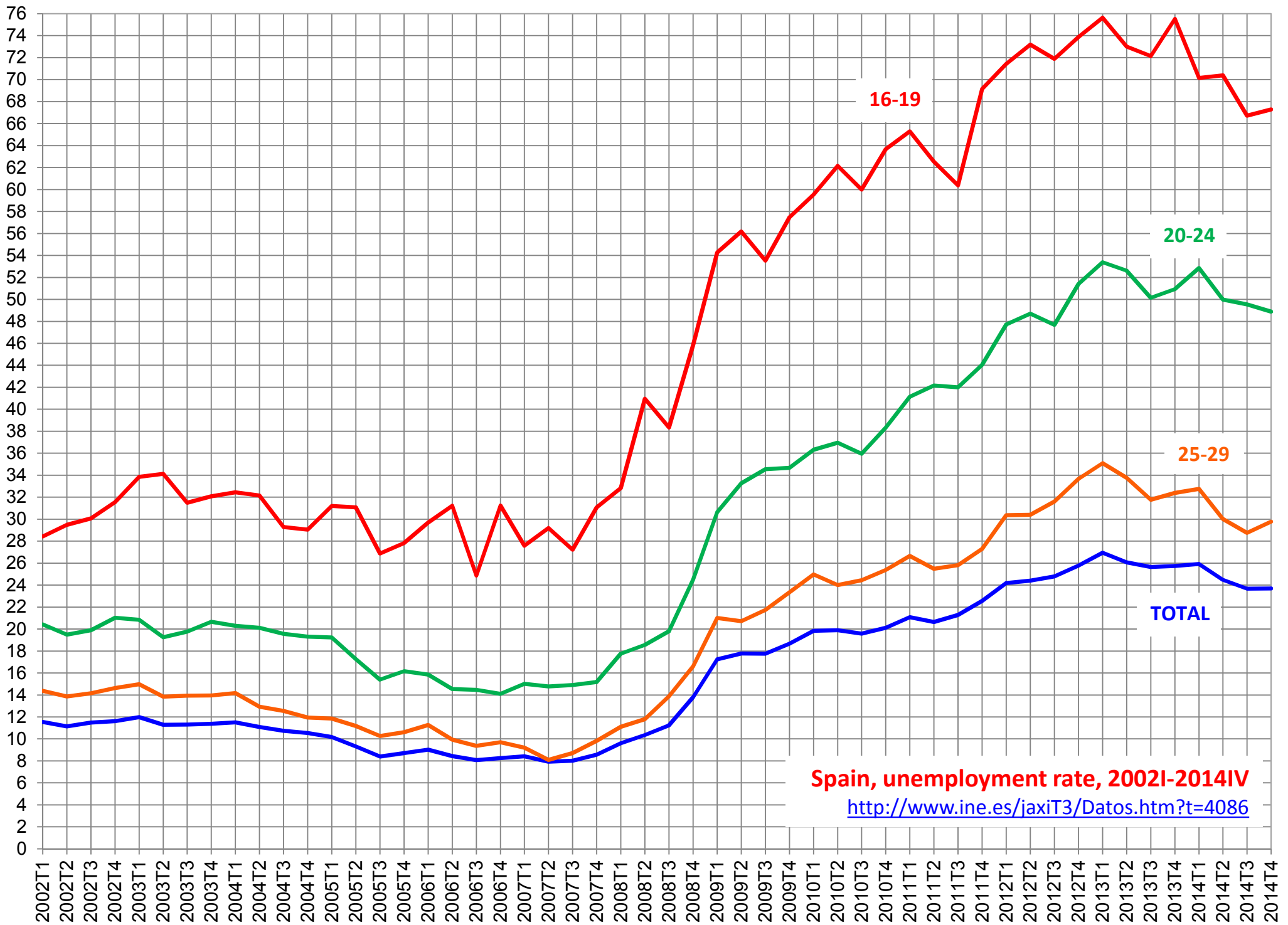


**Catalonia 1976III-1995IV, unemployment rate**  
[http://www.ine.es/jaxi/menu.do?type=pcaxis&path=/t22/e308/meto\\_02/pae/px/&file=pcaxis](http://www.ine.es/jaxi/menu.do?type=pcaxis&path=/t22/e308/meto_02/pae/px/&file=pcaxis)



Spain, unemployment rate, 2002I-2015IV

<http://www.ine.es/dynt3/inebase/index.htm?padre=979>

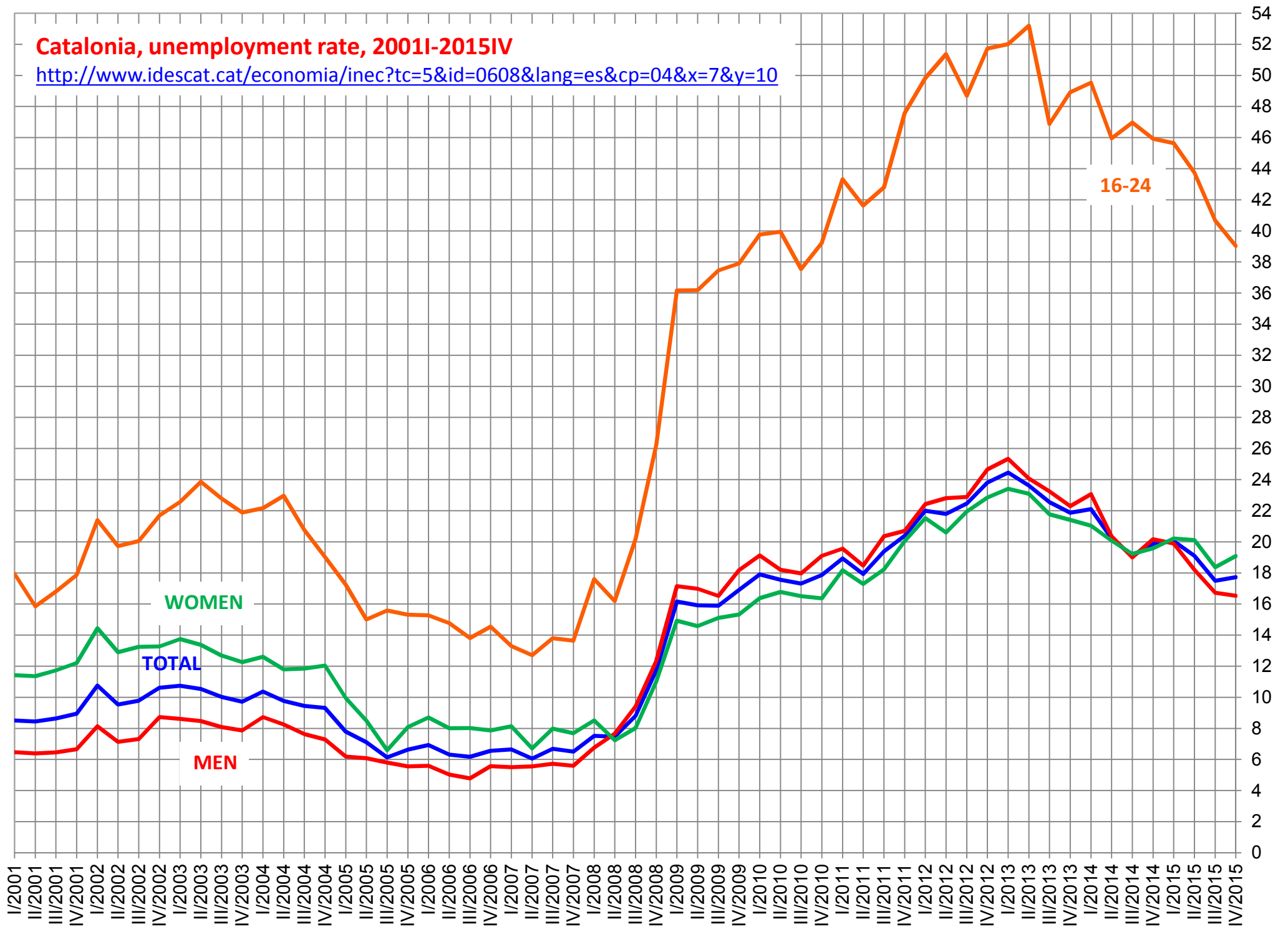


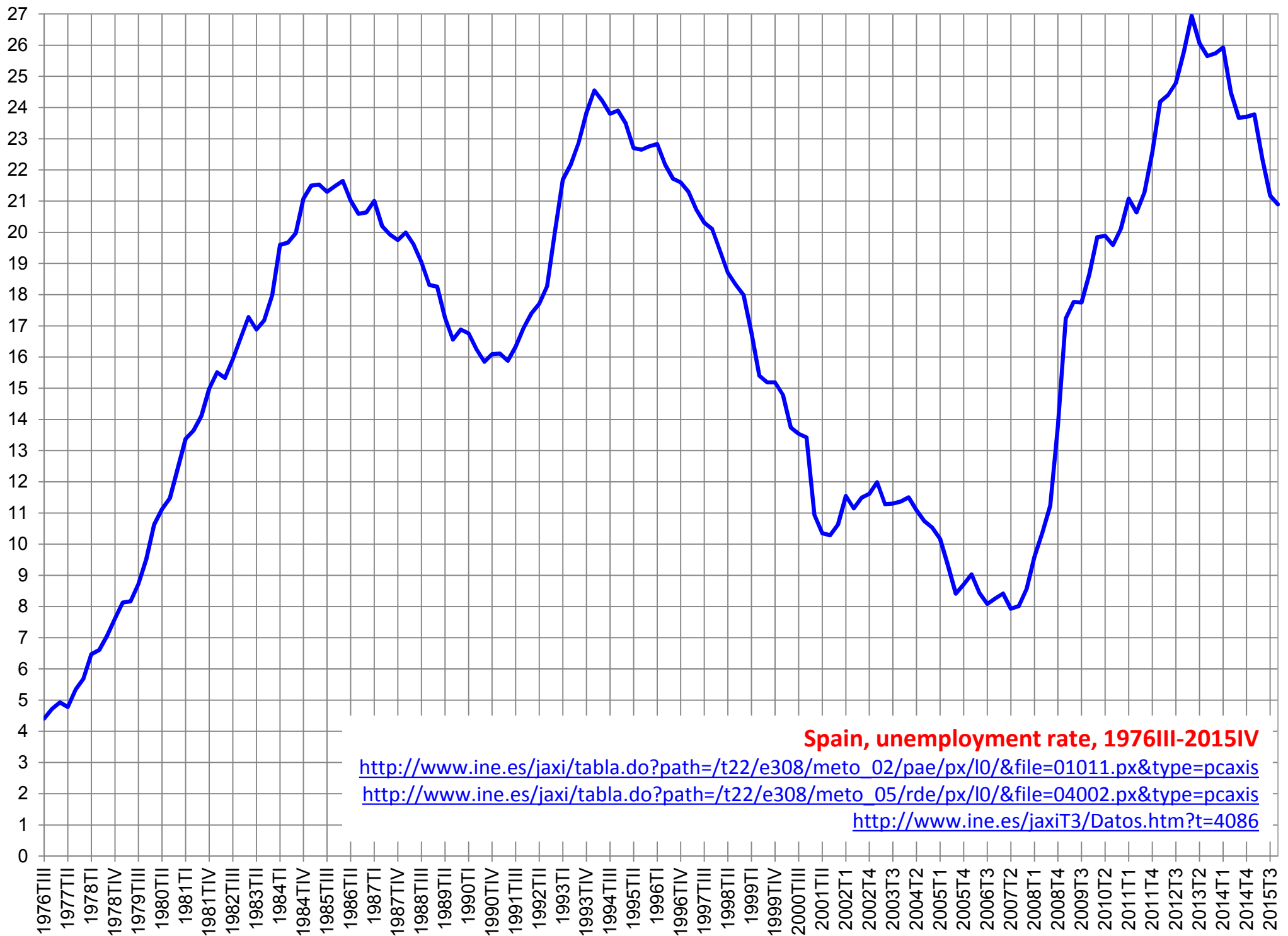
Spain, unemployment rate, 2002I-2014IV

<http://www.ine.es/jaxiT3/Datos.htm?t=4086>

# Catalonia, unemployment rate, 2001I-2015IV

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



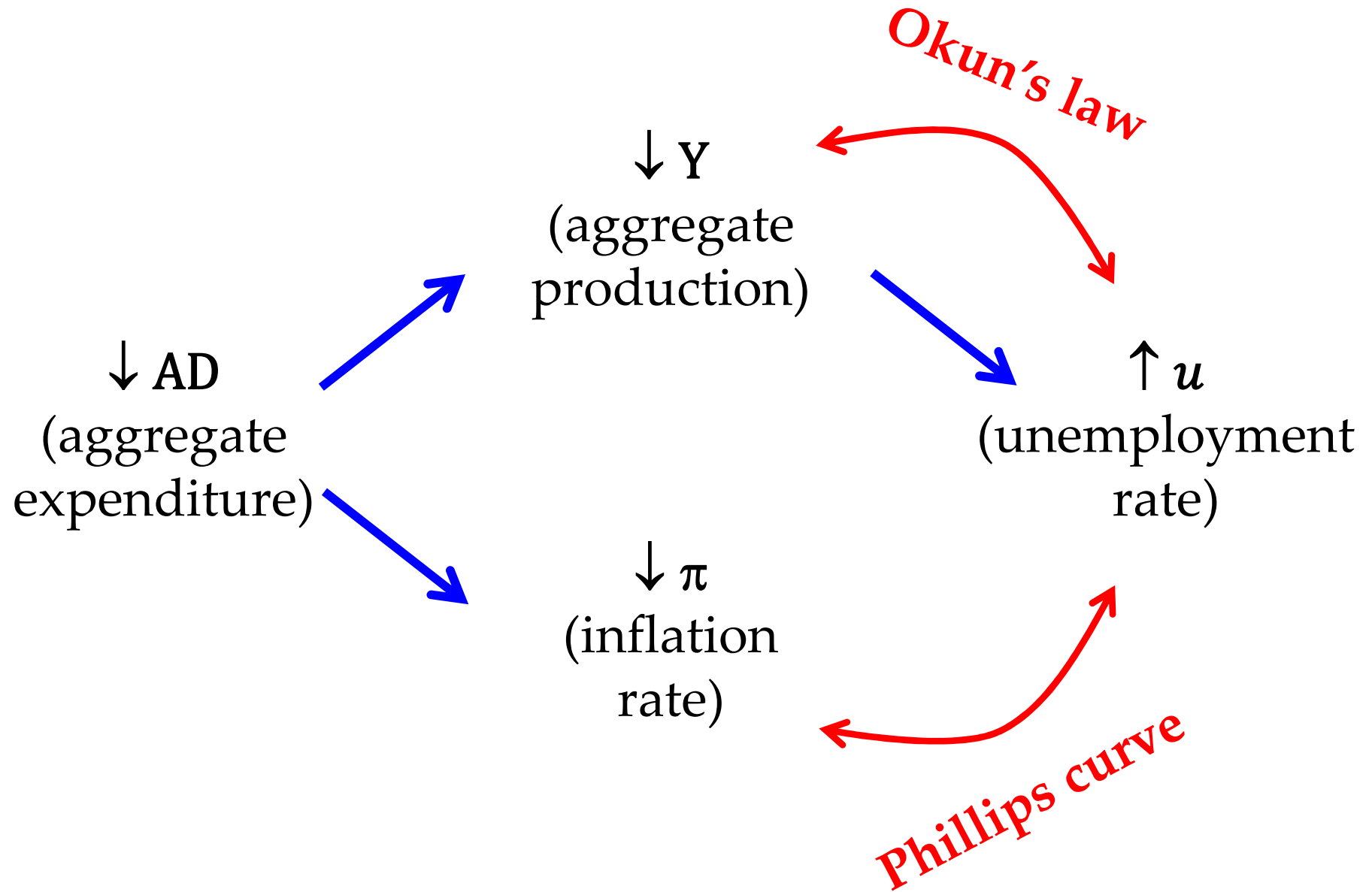


**Spain, unemployment rate, 1976III-2015IV**

[http://www.ine.es/jaxi/tabla.do?path=/t22/e308/meto\\_02/pae/px/l0/&file=01011.px&type=pcaxis](http://www.ine.es/jaxi/tabla.do?path=/t22/e308/meto_02/pae/px/l0/&file=01011.px&type=pcaxis)

[http://www.ine.es/jaxi/tabla.do?path=/t22/e308/meto\\_05/rde/px/l0/&file=04002.px&type=pcaxis](http://www.ine.es/jaxi/tabla.do?path=/t22/e308/meto_05/rde/px/l0/&file=04002.px&type=pcaxis)

<http://www.ine.es/jaxi3/Datos.htm?t=4086>



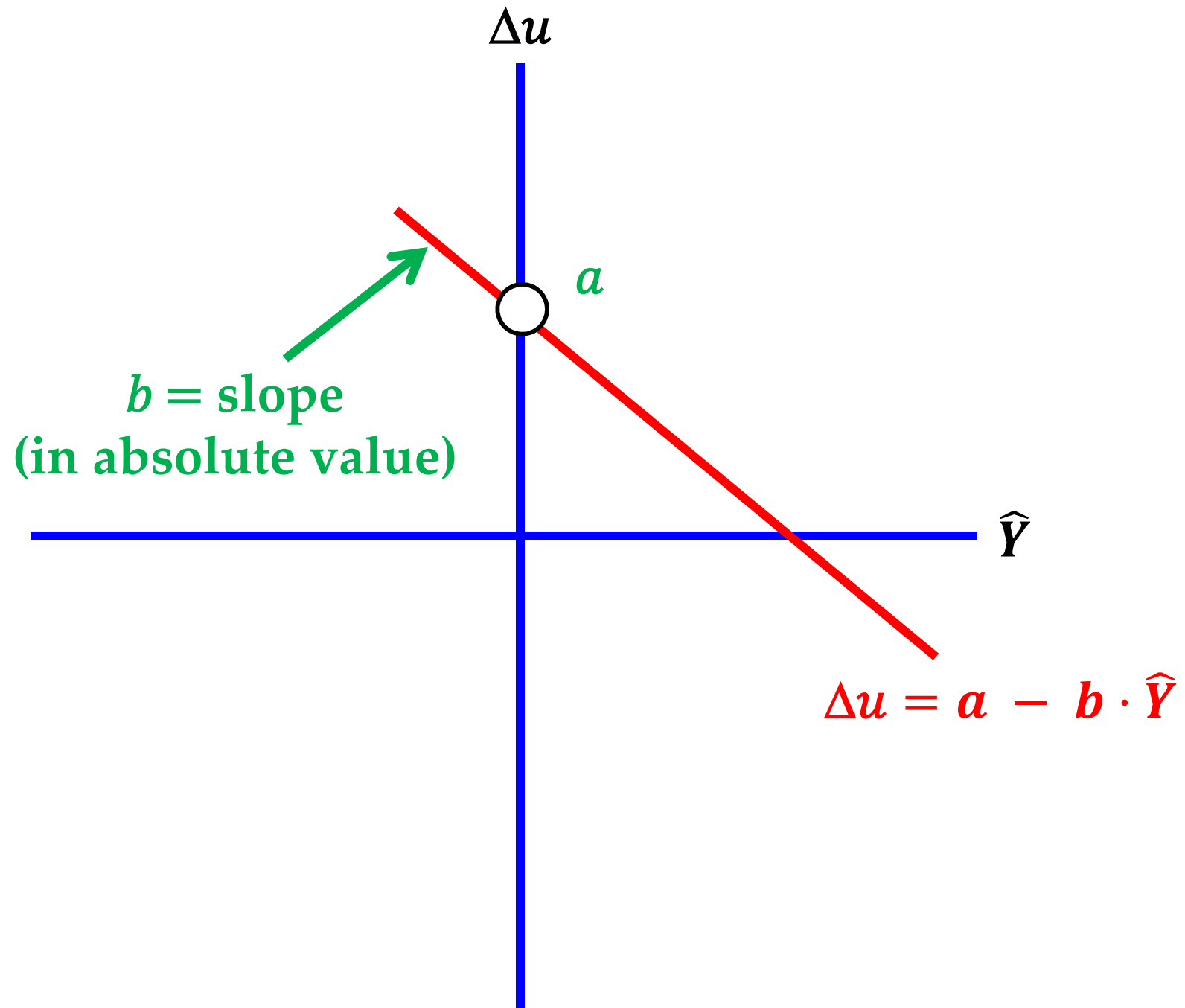
# Okun's law

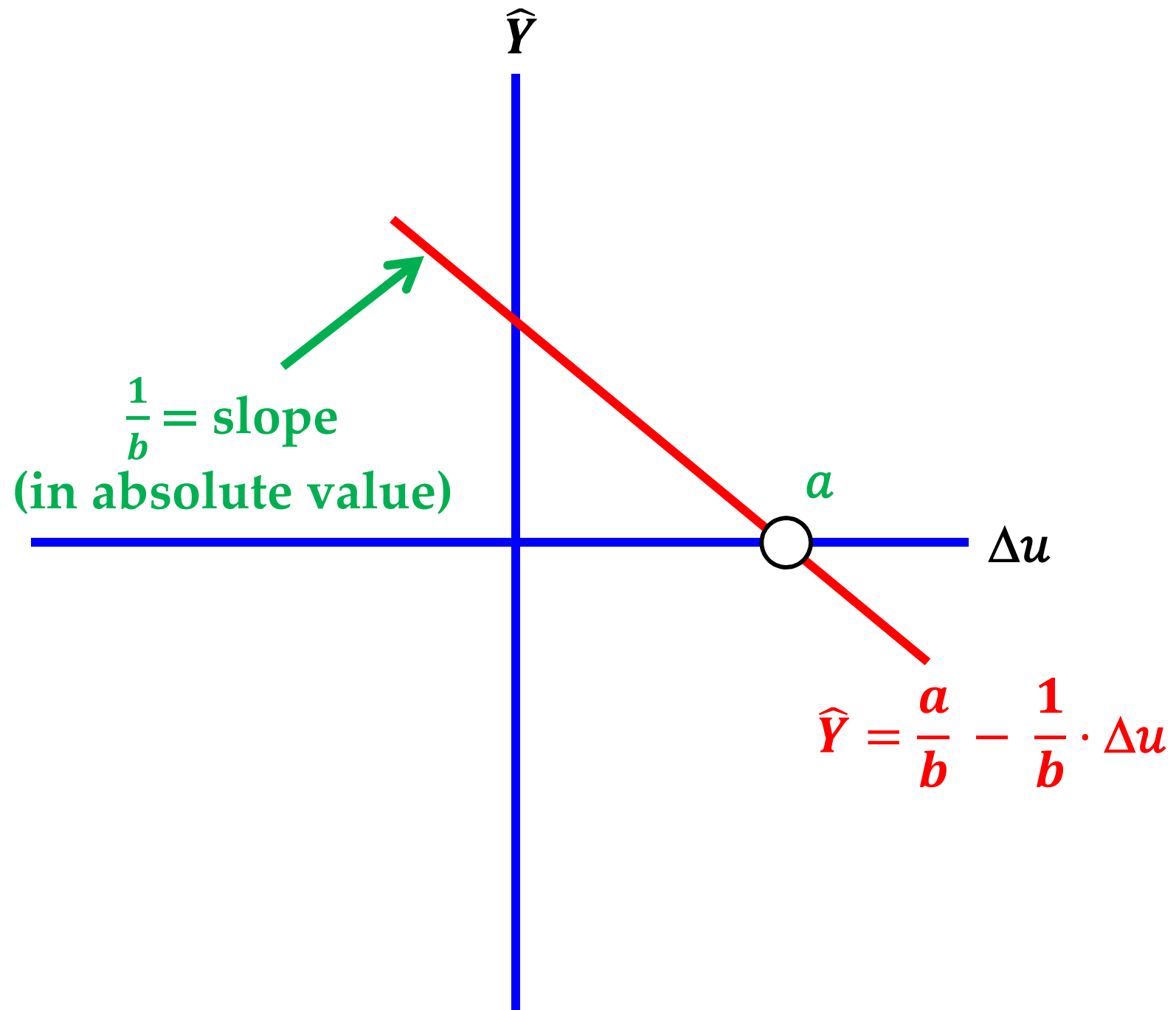
- Okun's law is an empirical relationship suggested in 1962 by the US economist Arthur Okun (1928-80).
- Okun's law: there is a negative relationship between the change  $\Delta u = u - u_{-1}$  in the unemployment rate and  $\hat{Y} = \frac{Y - Y_{-1}}{Y_{-1}}$ , the rate of growth of real GDP  $Y$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

$$\Delta u = a - b \cdot \hat{Y}$$

where  $a$  and  $b$  are positive constants that depend on the economy considered and the period with respect to which variables  $u$  and  $\hat{Y}$  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:

$$\Delta u = 1.5 - \hat{Y}/2 \quad \text{or} \quad u = u_{-1} + 1.5 - \hat{Y}/2.$$

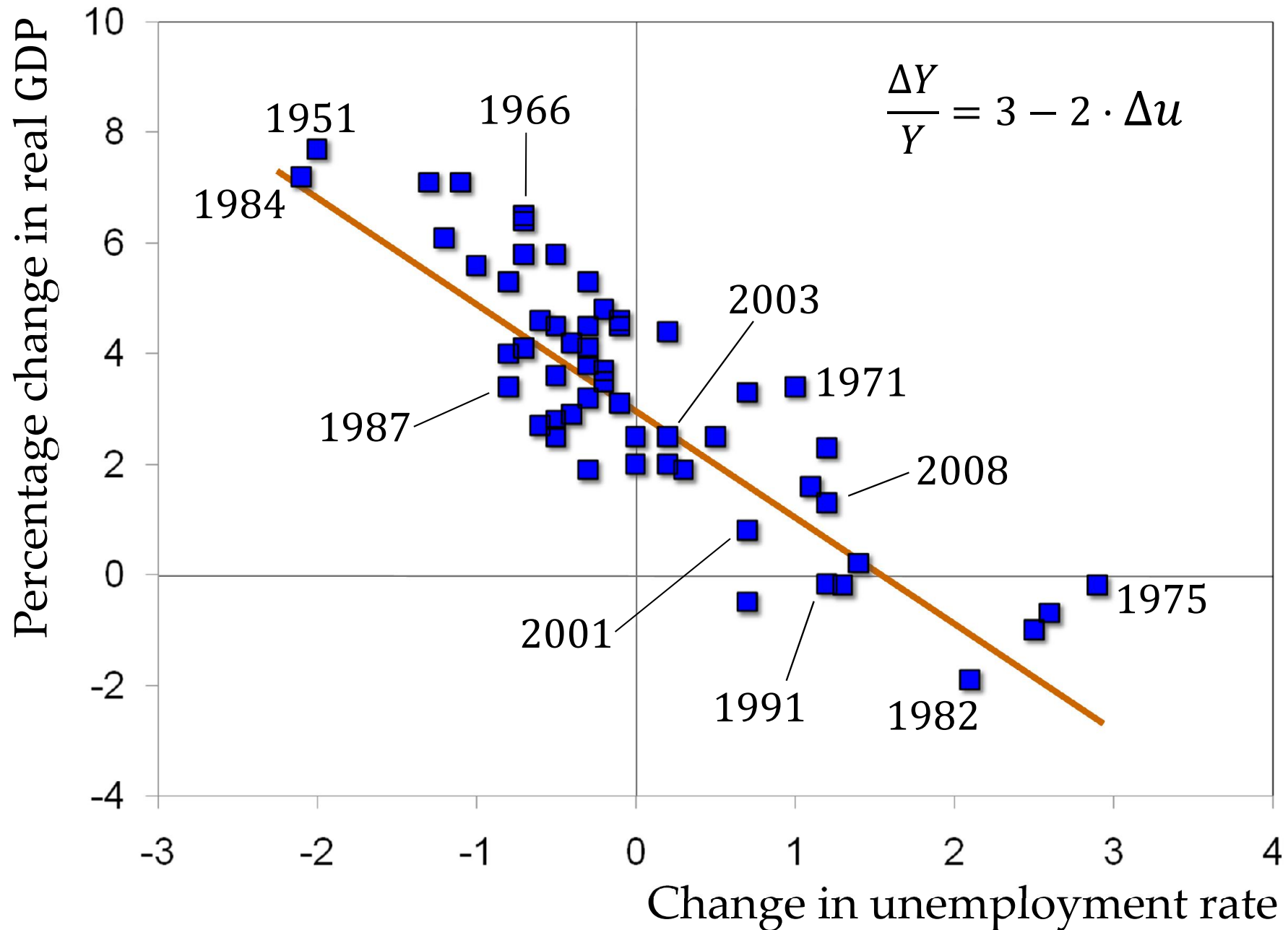
- $a$  represents the increase in  $u$  that occurs when the economy does not grow: if  $\hat{Y} = 0$ , then  $\Delta u = a$ .
- For instance, if  $u_{-1} = 2\%$  and  $\hat{Y} = 0$ , then  $u = u_{-1} + a - \hat{Y}/2 = 2 + 1.5 - 0/2 = 3.5$ . Hence, if the unemployment rate at the beginning of the year is 2% and the economy does not grow, then at the end of the year the rate is 3.5%.

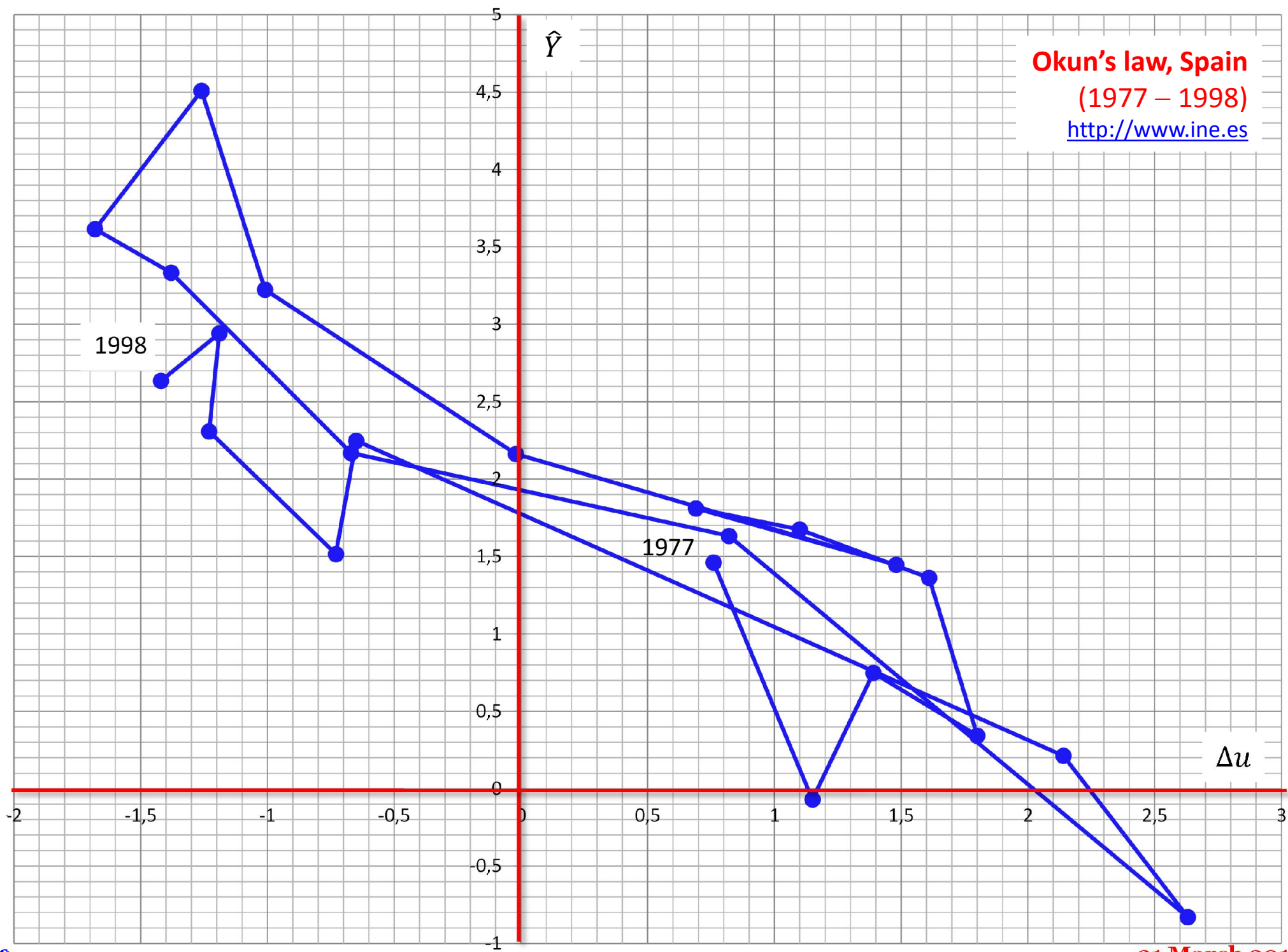
## Okun's law (US version) /2

- $b$  measures the ability of the economy to transform GDP growth into a smaller unemployment rate:  
 $b \approx 0.5$  means that increasing  $\hat{Y}$  by one point reduces  $u$  by 0.5 points.
- If  $\hat{Y} = 2\%$ , then  $u = u_{-1} + 1.5 - \hat{Y}/2 = u_{-1} + 1.5 - 2/2 = u_{-1} + 0.5$ . If  $\hat{Y} = 3\%$ , then  $u = u_{-1} + 1.5 - \hat{Y}/2 = u_{-1} + 1.5 - 3/2 = u_{-1}$ .
- Therefore, increasing  $\hat{Y}$  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  $\hat{Y}$  reduces  $u$  by 0.5 points.

## Okun's law, US, 1951-2008

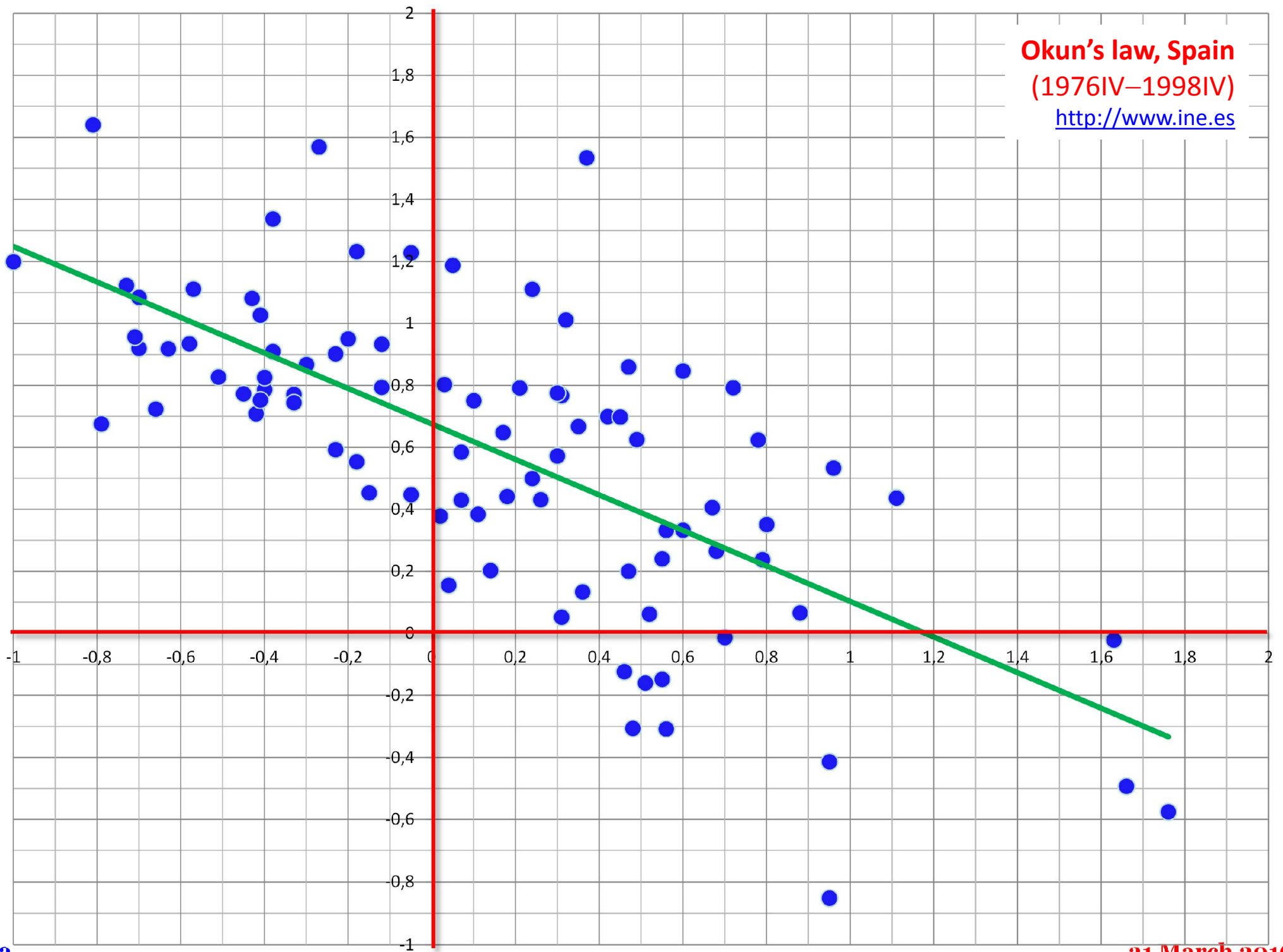
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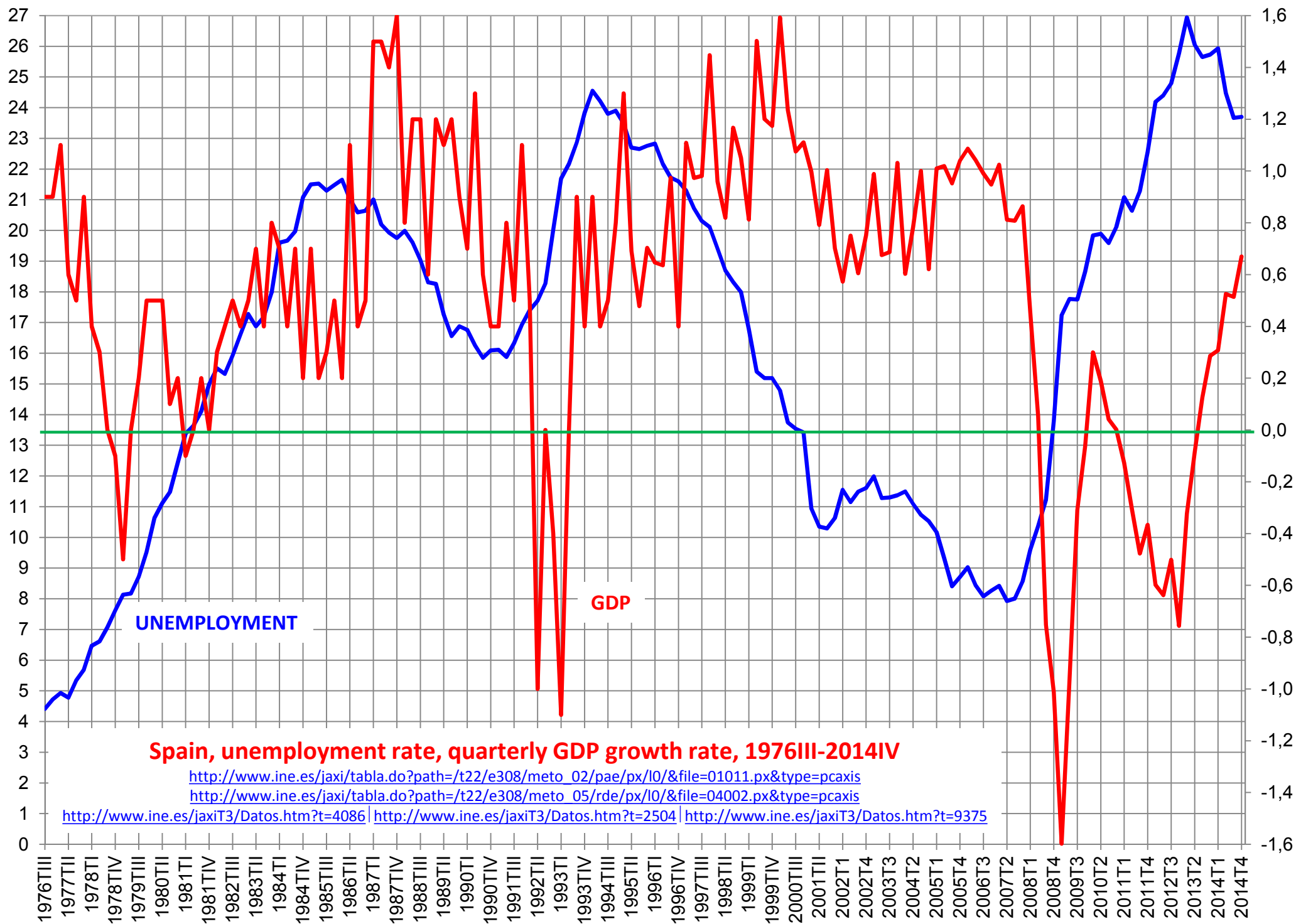




**Okun's law, Spain**  
 (1977 – 1998)  
<http://www.ine.es>

**Okun's law, Spain**  
(1976IV–1998IV)  
<http://www.ine.es>





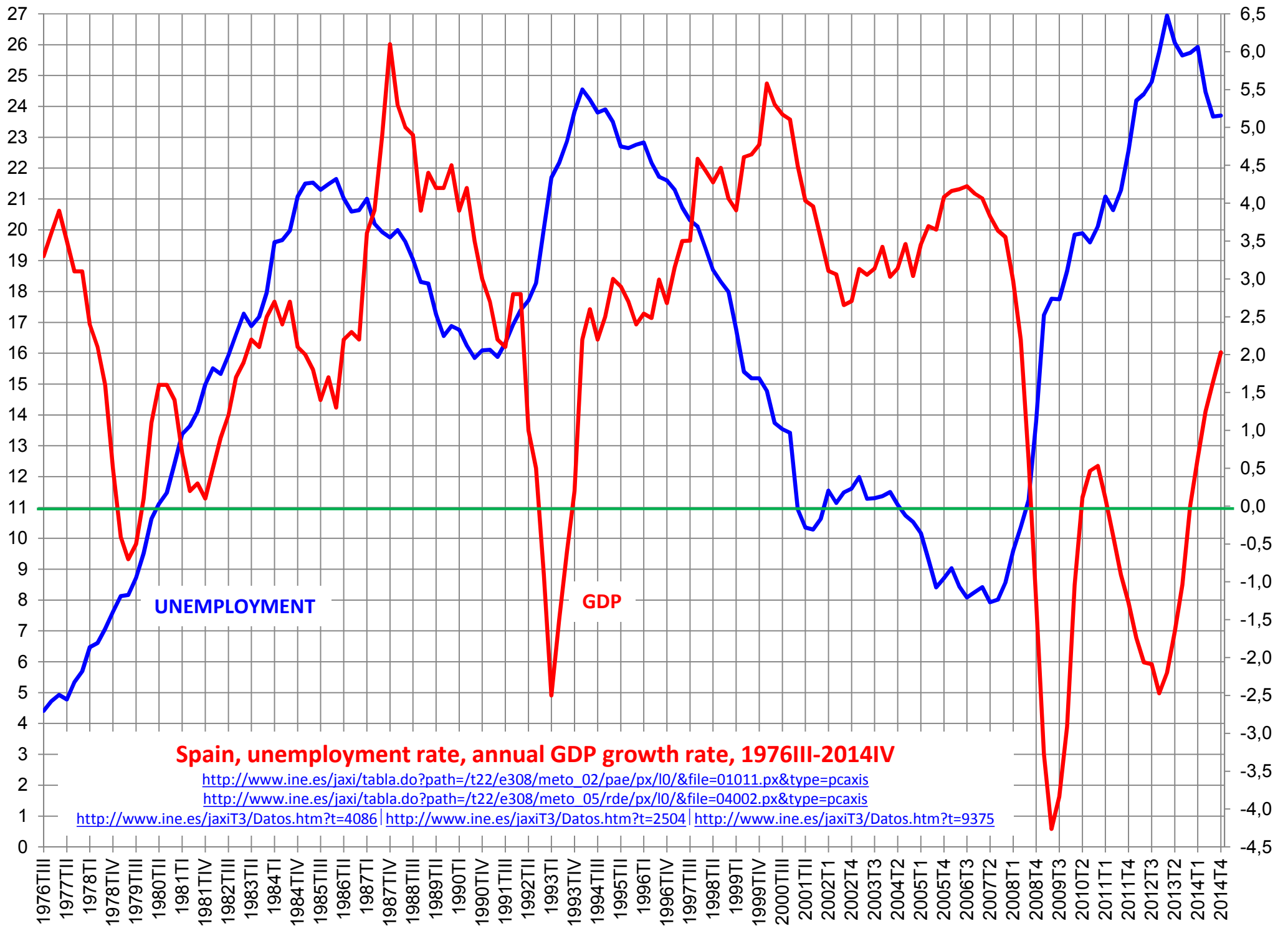
**Spain, unemployment rate, quarterly GDP growth rate, 1976III-2014IV**

[http://www.ine.es/jaxi/tabla.do?path=/t22/e308/meto\\_02/pae/px/l0/&file=01011.px&type=pcaxis](http://www.ine.es/jaxi/tabla.do?path=/t22/e308/meto_02/pae/px/l0/&file=01011.px&type=pcaxis)

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**Spain, unemployment rate, annual GDP growth rate, 1976III-2014IV**

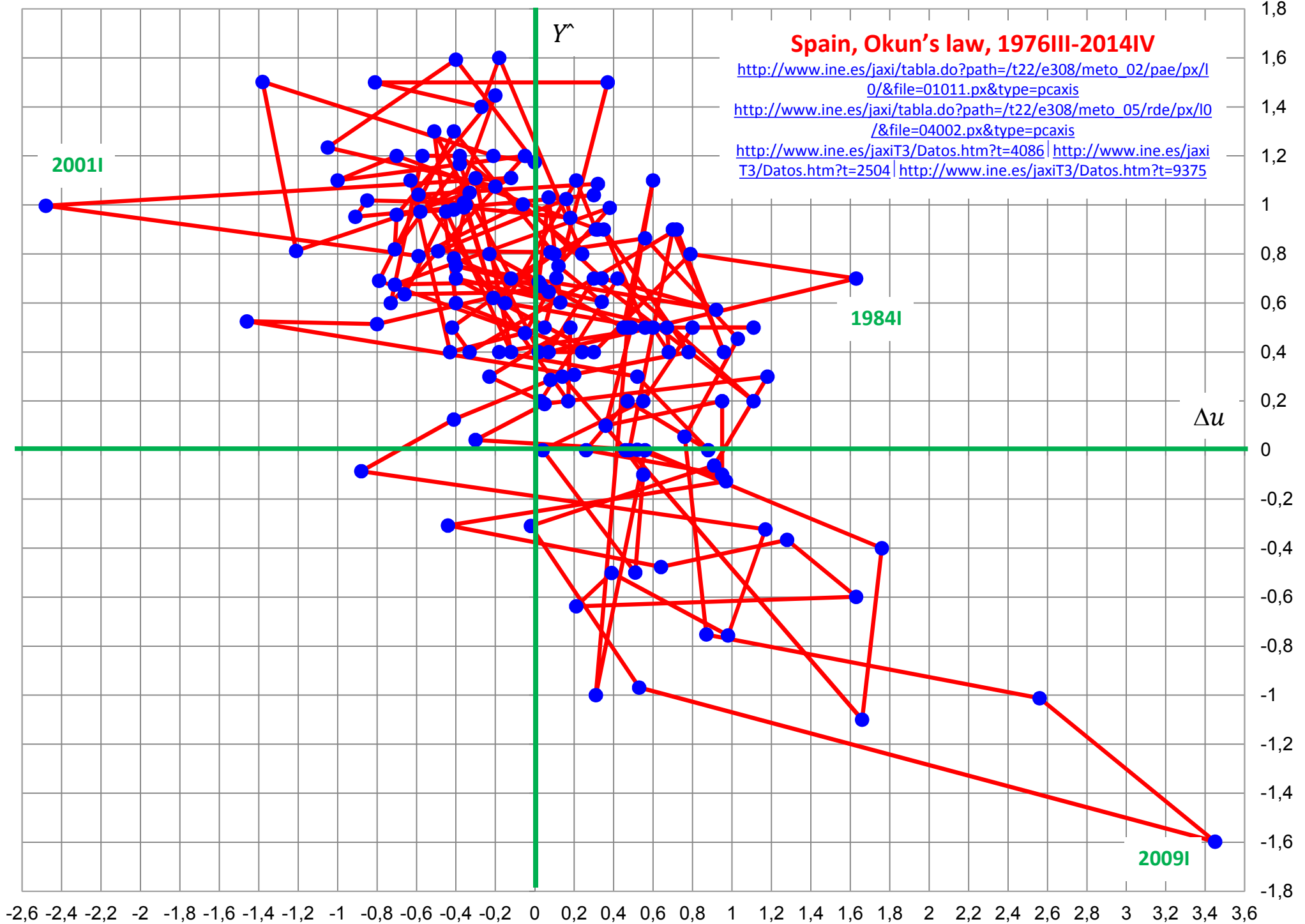
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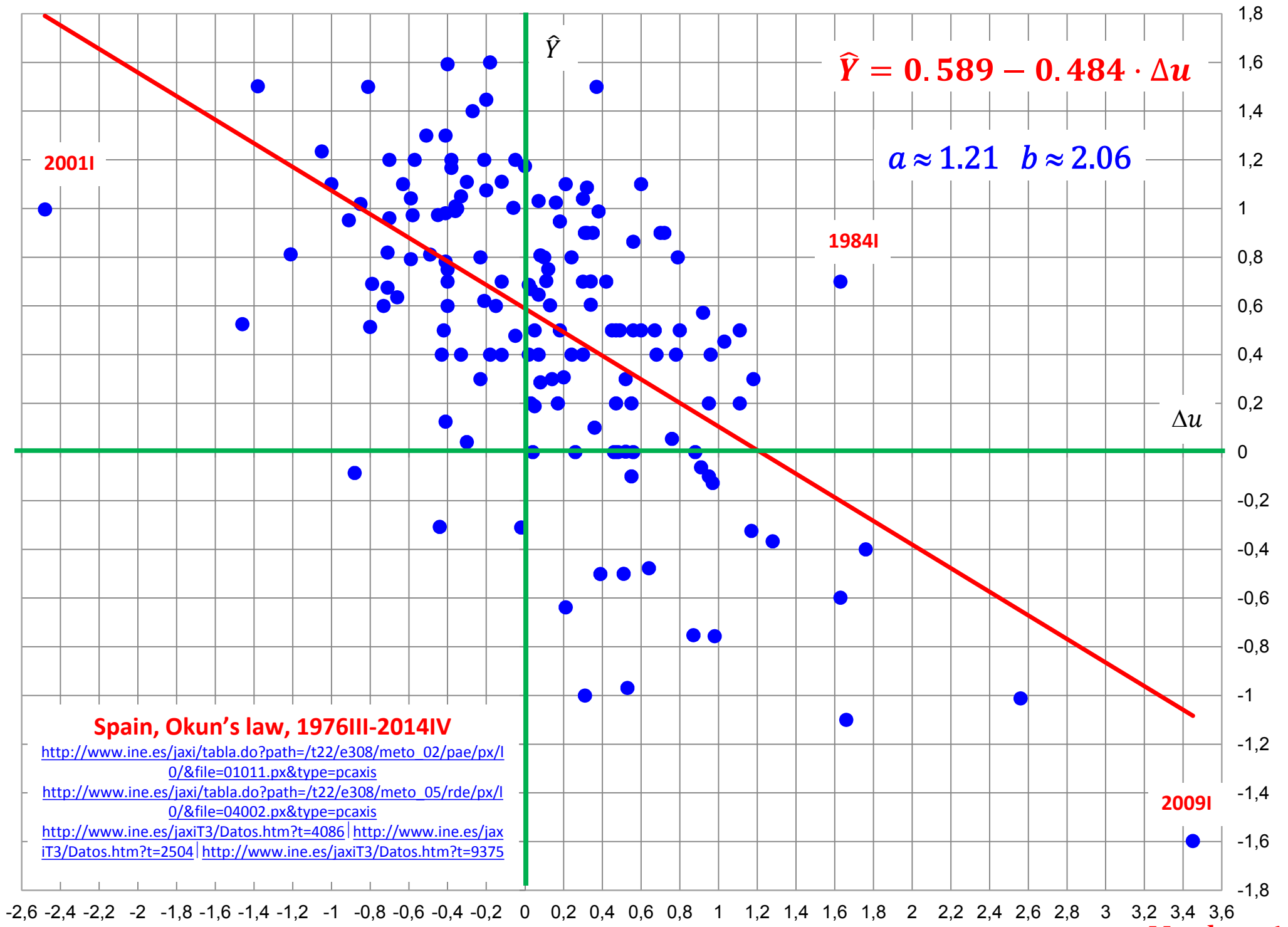
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### Spain, Okun's law, 1976III-2014IV

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[http://www.ine.es/jaxi/tabla.do?path=/t22/e308/meto\\_05/rde/px/10/&file=04002.px&type=pcaxis](http://www.ine.es/jaxi/tabla.do?path=/t22/e308/meto_05/rde/px/10/&file=04002.px&type=pcaxis)  
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# 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  $\pi$ : the lower  $u$ , the higher  $\pi$ .
- With  $\alpha$  and  $\beta$  positive constants, a linear Phillips curve is represented by an equation of the sort

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

# Trade-off between $u$ and $\pi$

- Expressing  $\pi$  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  $\pi$  of  $\beta$  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%),  $\pi$  must be increased in two percentage points (from  $\pi = 2\%$  to  $\pi = 10 - 2 \cdot 3 = 4\%$ ).
- $\alpha$  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  $\alpha$  is a volatile parameter.
- $\alpha$  depends on inflation expectations and the firms' cost structure: an increase in expected inflation or in the production costs rises  $\alpha$ . When  $\alpha$  rises, the curve shifts upward, so more inflation must be paid to reduce the unemployment rate.
- $\beta$  indicates how sensitive  $\pi$  is to changes in  $u$ . It depends on institutional factors, like the bargaining power of trade unions (more power, higher  $\beta$ ).

