

On Wage Formation, Wage Development and Unemployment

by

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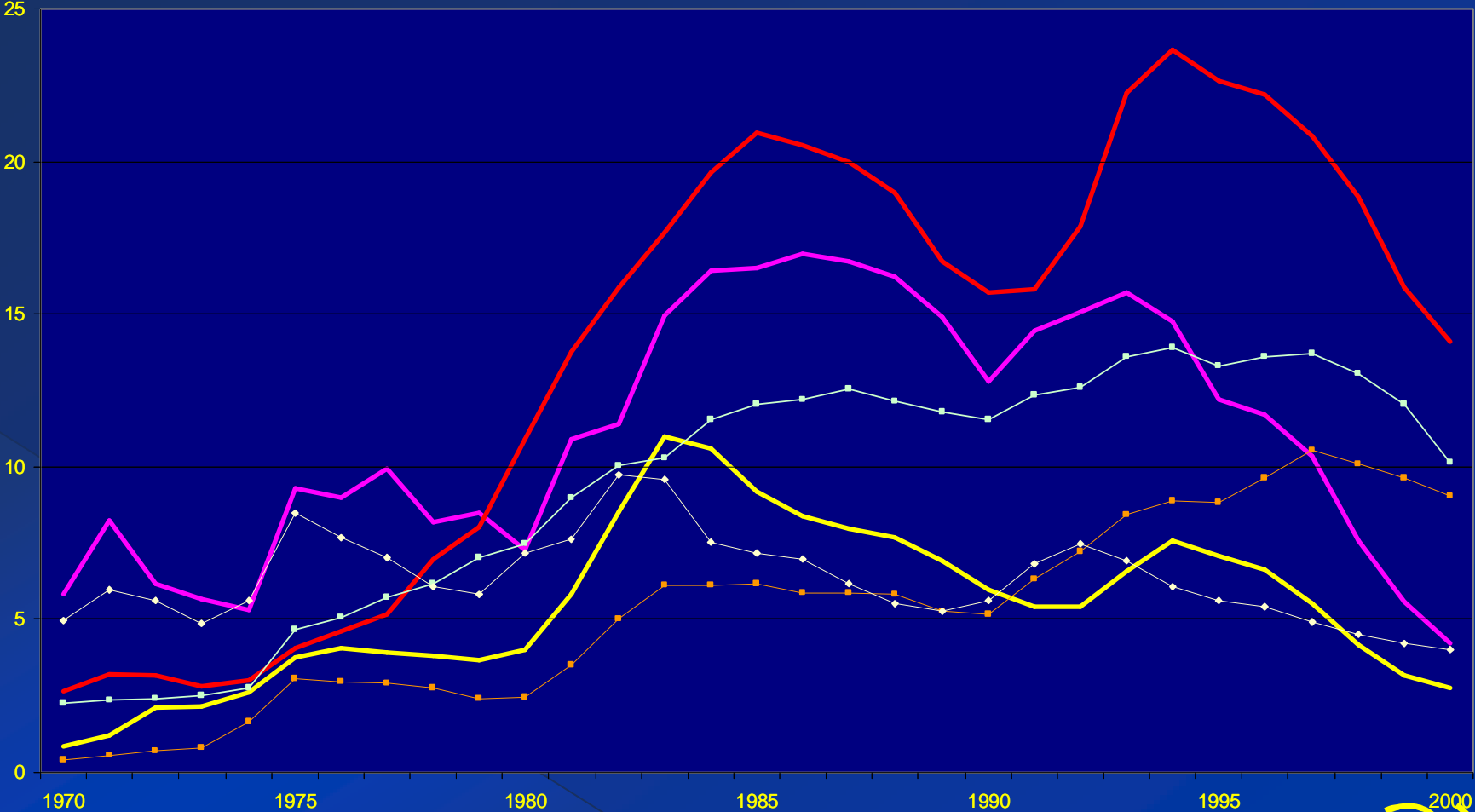
EC Occasional Seminar
DG Employment, Social Affairs and Equal Opportunities

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The Netherlands, Ireland and Spain

Germany, France and the US



— Ireland
 — Spain
 — The Netherlands

— France
 — Germany
 — US



The Netherlands, Ireland and Spain

- Strong decline in unemployment just before 2001
- ... within EMU also in Finland ... also in US ...
- Still high unemployment in Spain

Germany, France

- Also decline in France and Germany
- ... but slower and less steep
- ... and unemployment still relatively high



Unemployment elasticities

Wage increase (%) due to a 1%-point decrease in unemployment

	Short-term	Long-term
Ireland	0.80	1.82
The Netherlands	0.66	2.28
Spain	0.17	1.21
France	2.22	4.35
Germany	0.55	1.01
US	0.32	0.94

Source: Layard, Nickell and Jackman (1991)



Outline presentation

- Wage bargaining model -> non-linear wage equation
- Estimation results for The Netherlands
- Contributions of the determinants
- Estimation results for the other countries
- New avenues

Wage bargaining model

(à la Graafland and Huizinga, 1999)

$$\text{Max arg } (W): \Omega = \Pi^\alpha V^{1-\alpha}$$

$$\Pi := P q^\rho - W$$

$$V := W(1-t) - \underline{W}$$

Reservation wage, replacement rate and unemployment rate

$$\underline{W} := \beta \underline{W}_{official} + (1-\beta) \underline{W}_{informal}$$

$$\underline{W}_{official} := u R \underline{W} (1-t) + (1-u) \underline{W} (1-t)$$

$$\underline{W}_{informal} := \gamma P_c q^p$$

Definition replacement rate

*R = average net social benefit for an unemployed/
average net wage income for an employed in the official sector*

$$\underline{W}_{official} := u R \underline{W} (1-t) + (1-u) \underline{W} (1-t)$$

Solution : Non-linear wage equation

$$\log W = \log P + \rho \log q + \log \left[1 + \left(\frac{\alpha(1-\beta)\gamma}{1-\alpha + \alpha(1-\beta)\gamma} \right) \left(\frac{P_c}{P(1-t)} - 1 \right) \right]$$
$$- \log \left[1 + \frac{\alpha}{1-\alpha} \left[1 - \beta(1-u(1-R)) \right] \right] + \log \left[1 + \frac{\alpha(1-\beta)\gamma}{1-\alpha} \right]$$

Long-term elasticities of the determinants

- $\partial \log W / \partial \log q = \rho$
- $\partial \log W / \partial \log P + \partial \log W / \partial \log P_c = 1$
- $\partial \log W / \partial t > 0$
- $\partial \log W / \partial u < 0$
- $\partial \log W / \partial R > 0$

Calculation of contribution determinant i

$$\varepsilon_i := \partial \log W / \partial \log i * \partial i / i$$

Calculation of total contribution

$$\Delta \log W = \sum_{i=P, P_c, q, tm, t, u, R} \varepsilon_i$$

Features wage equation

- Decomposition of wage development in components: labour productivity, producer and consumer prices, average and marginal tax rates, unemployment and replacement rates
- Non-linear, so not necessarily constant elasticities
- Contributions different components to wage determination over time

Estimated wage equation for The Netherlands

Long-term coefficients

α	0.77 (9.34)
β	0.92
γ	0.95 (31.13)
ρ	0.67 (9.31)
η	-0.32 (3.12)

Short-term coefficients

$\Delta \log(w_{-1})$	0.40 (3.48)
$\Delta \log(P)$	0.52 (3.25)

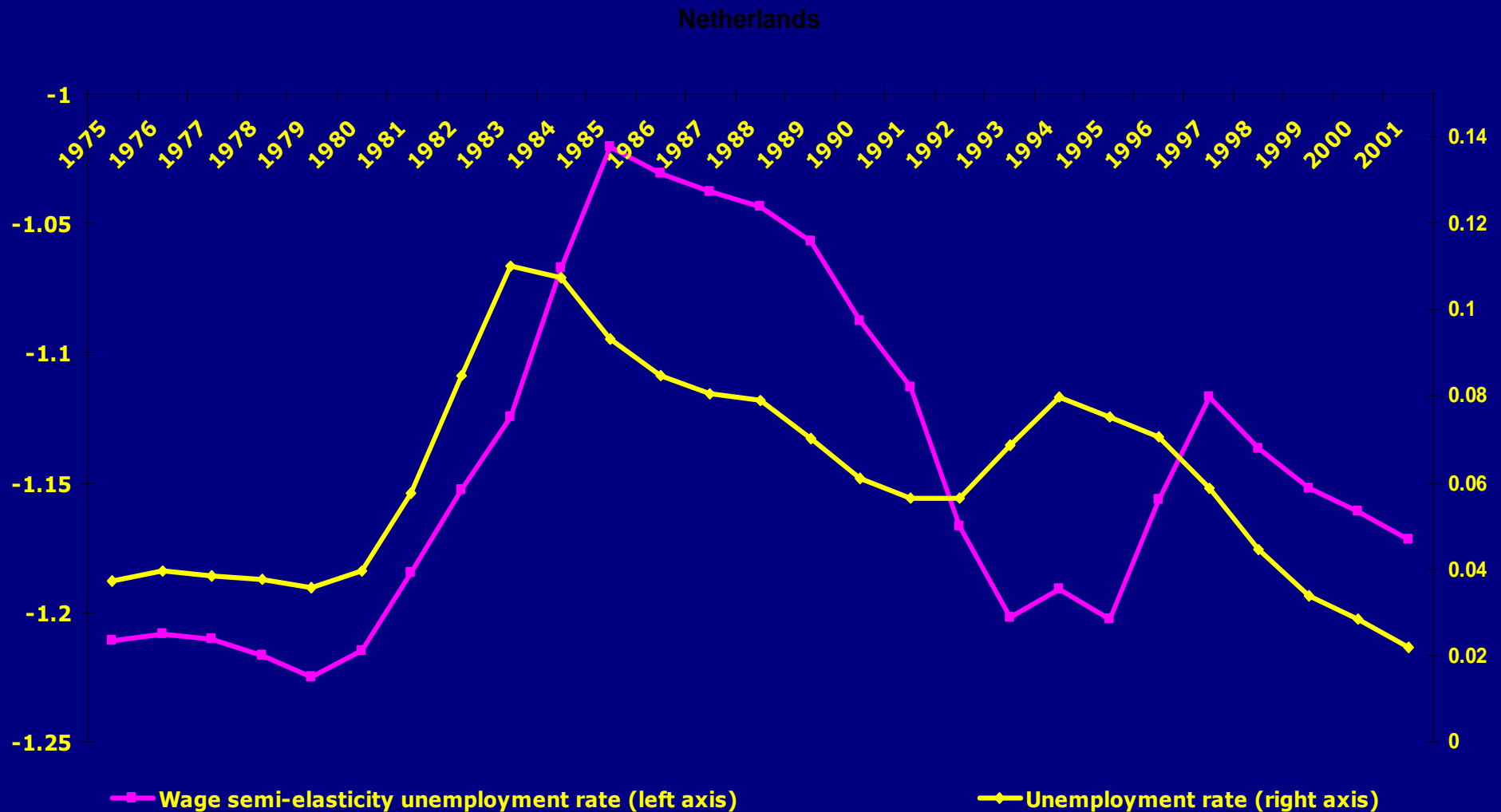
Statistics

R^2_{adj}	0.95
Standard error(*100)	0.69
Jarque-Bera	0.22 [p=0.89]



Semi-elasticity of wages with respect to unemployment & unemployment

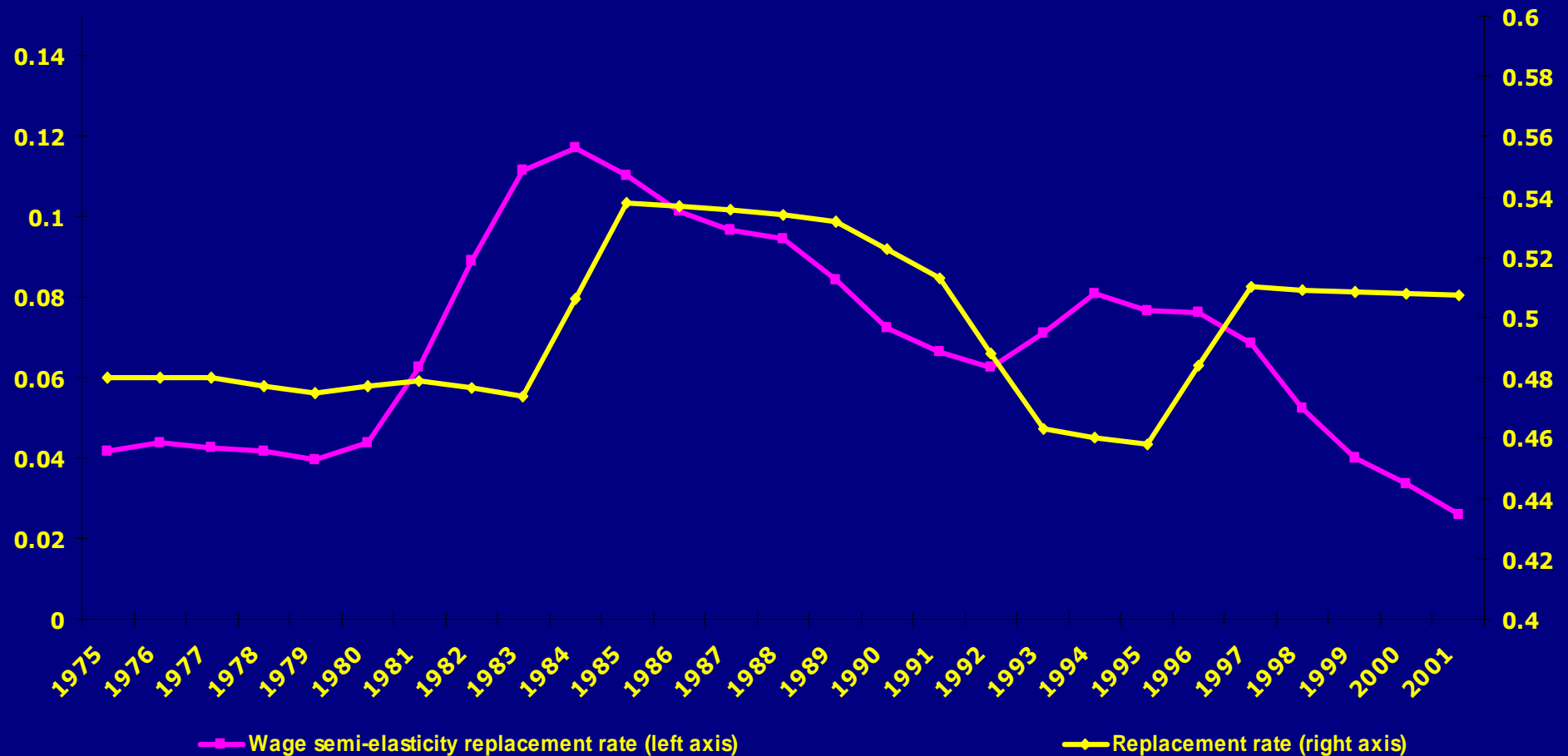
The Netherlands



Semi-elasticity of wages with respect to the replacement rate & the replacement rate

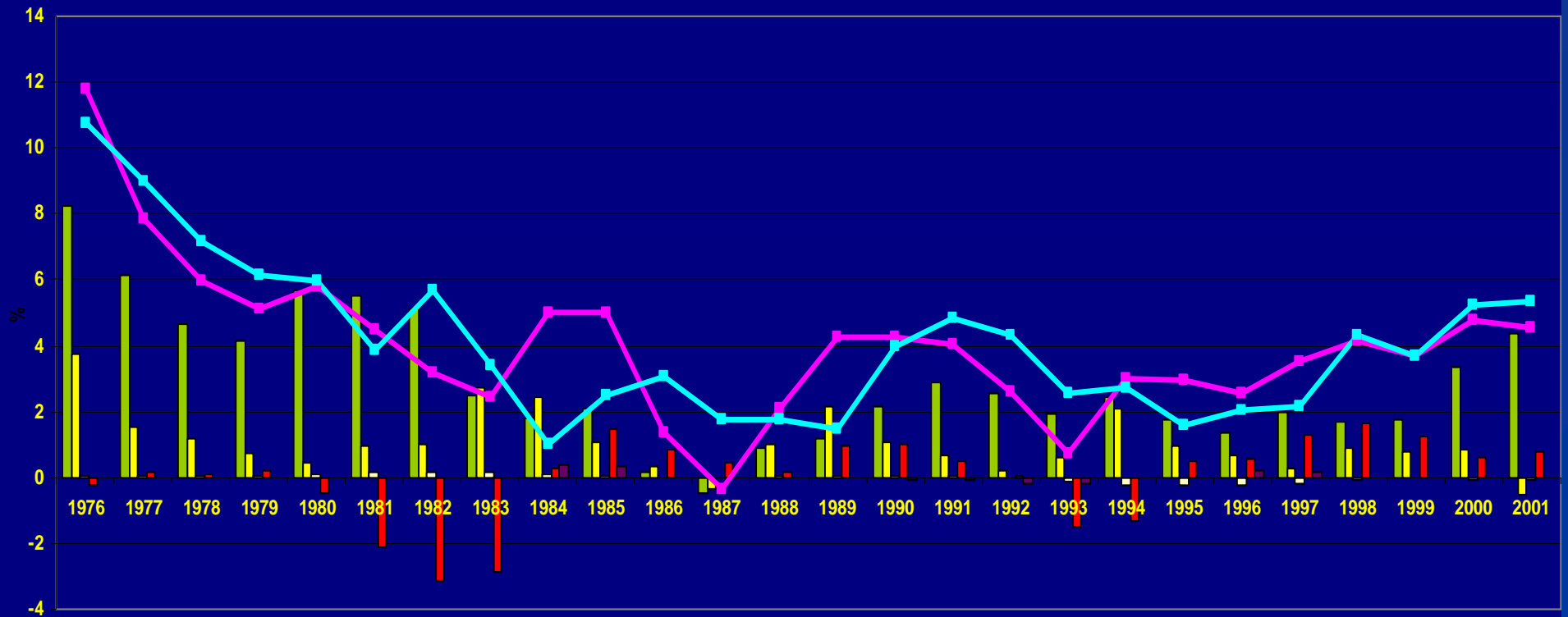
The Netherlands

Netherlands



Wage Contributions The Netherlands

The Netherlands



Time

Prices

Labour productivity

Taxes

Unemployment

Replacement rate

Wage growth according to model

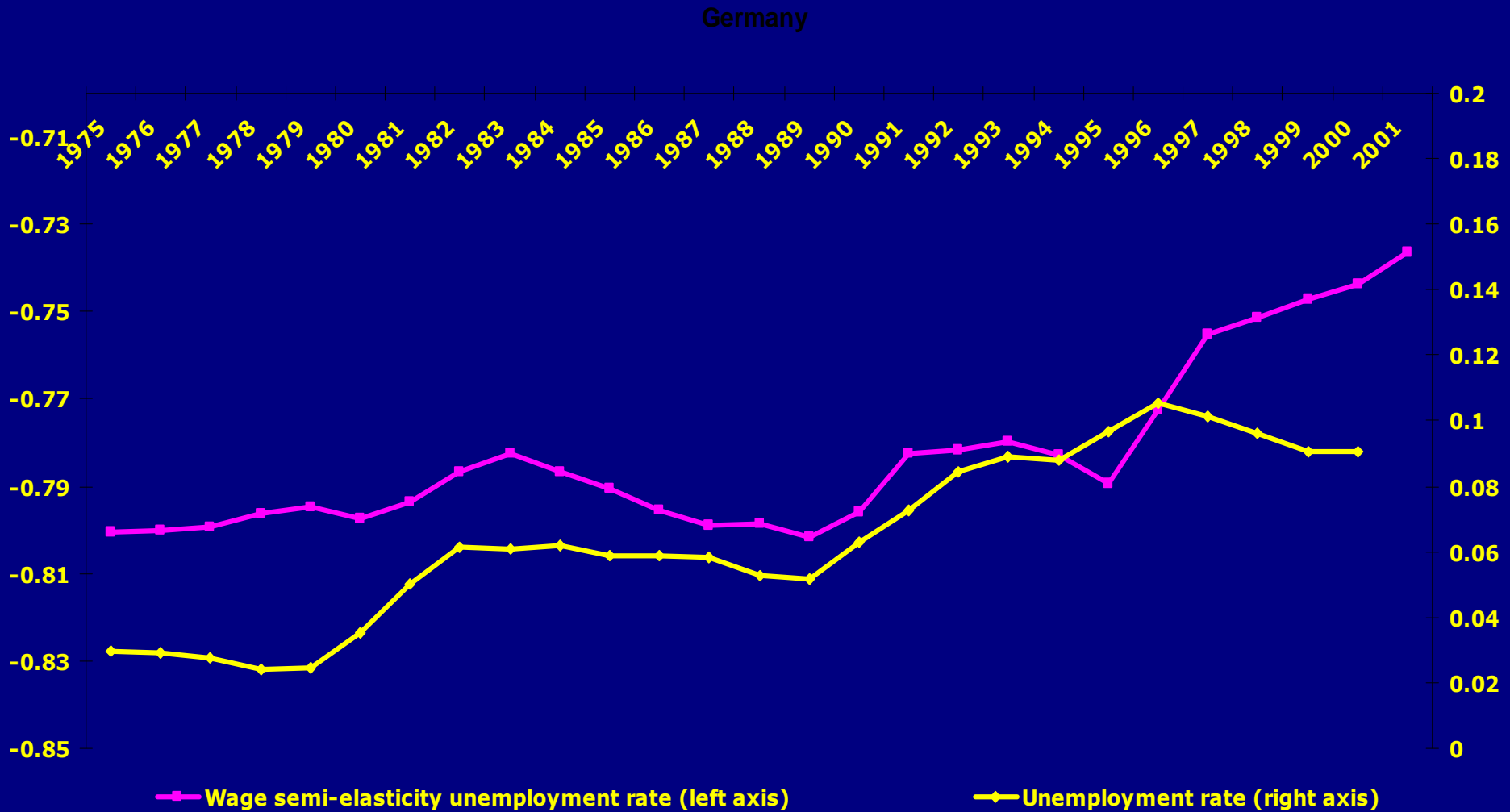
Realised wage growth

3-SLS Results All Countries

	Netherlands	Germany	Spain	France	United States
<i>Long term coefficients</i>					
α	0.77 (9.34)	0.58 (2.44)	0.95 (13.94)	0.76 (3.10)	0.40 (0.93)
β	0.92 (-)	0.92 (-)	0.83 (-)	0.80 (-)	0.89 (-)
γ	0.95 (31.13)	0.83 (8.04)	0.98 (19.16)	0.83 (28.67)	0.68 (0.96)
ρ	0.67 (9.31)	0.88 (10.94)	0.94 (5.41)	0.38 (2.27)	0.93 (4.53)
η	-0.32 (3.12)	-0.38 (3.59)	-0.36 (3.44)	-0.29 (3.70)	-0.39 (2.15)
<i>Short term coefficients</i>					
$\Delta \log(w_{-1})$	0.40 (3.48)		0.26 (1.99)		0.63 (3.60)
$\Delta \log(q)$		0.64 (4.43)			0.74 (2.79)
$\Delta \log(P)$	0.52 (3.25)	1.38 (8.26)			
$\Delta \log(P_c)$			0.88 (3.96)	0.95 (10.50)	0.55 (2.52)
$\Delta \log(q)$		0.64 (4.43)			0.74 (2.79)
<i>Statistics</i>					
R^2_{adj}	0.95	0.90	0.96	0.98	0.84
Standard error(*100)	0.69	0.84	1.42	0.71	0.88
Jarque-Bera	0.22 [p=0.89]	0.58 [p=0.75]	0.05 [p=0.97]	0.40 [p=0.82]	0.22 [p=0.65]

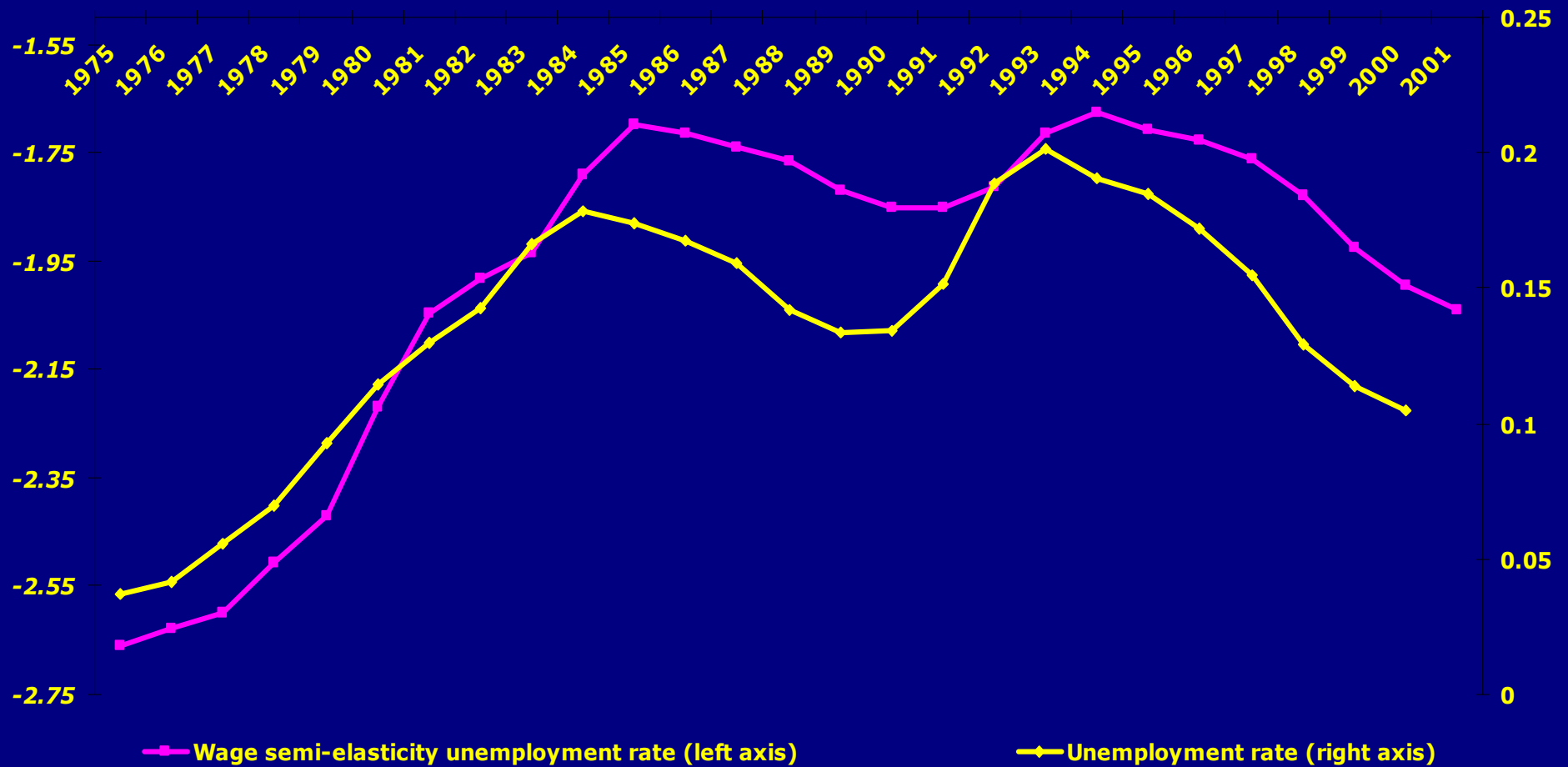


Semi-elasticity of wages with respect to unemployment & unemployment Germany



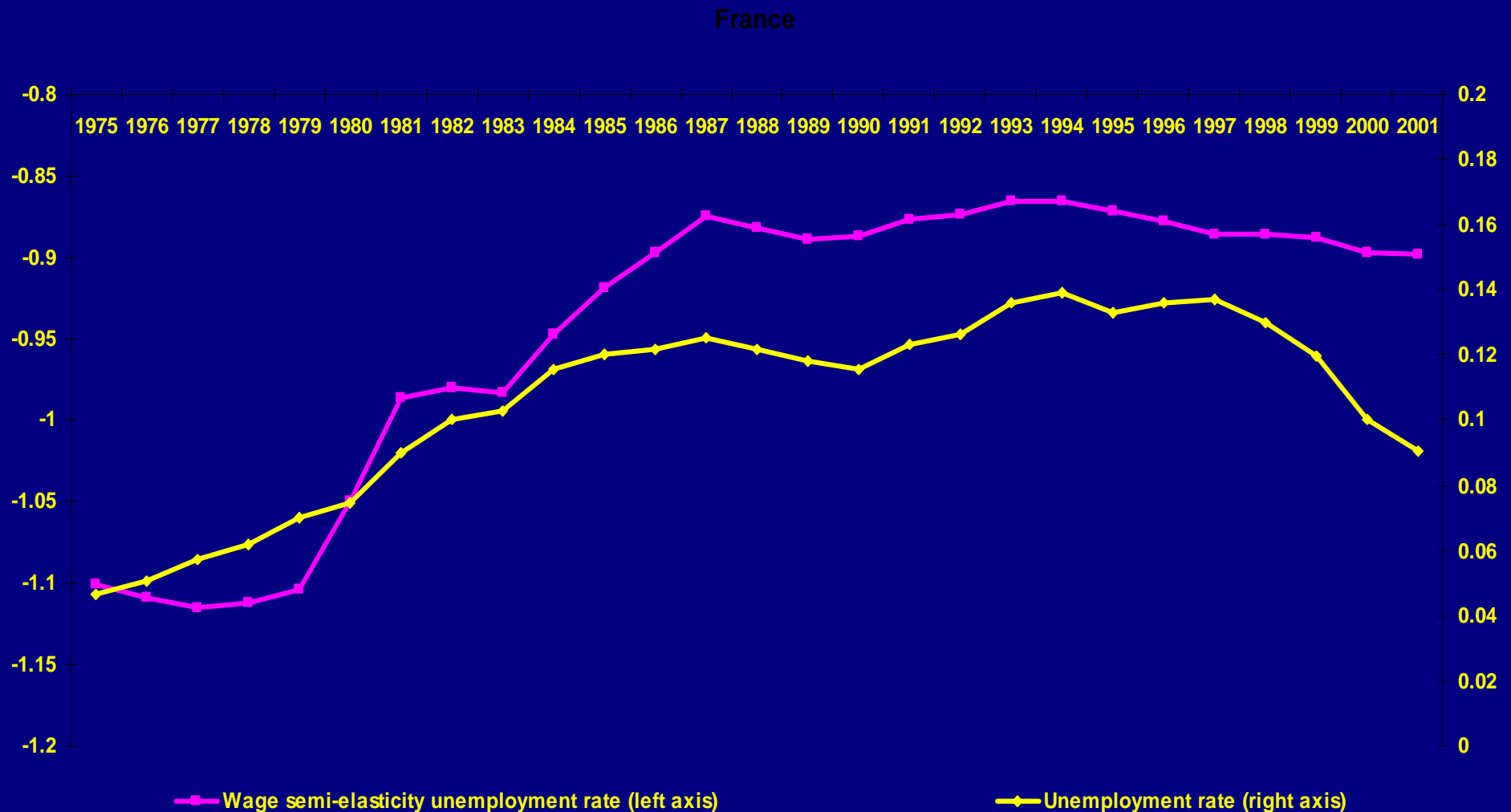
Semi-elasticity of wages with respect to unemployment & unemployment Spain

Spain

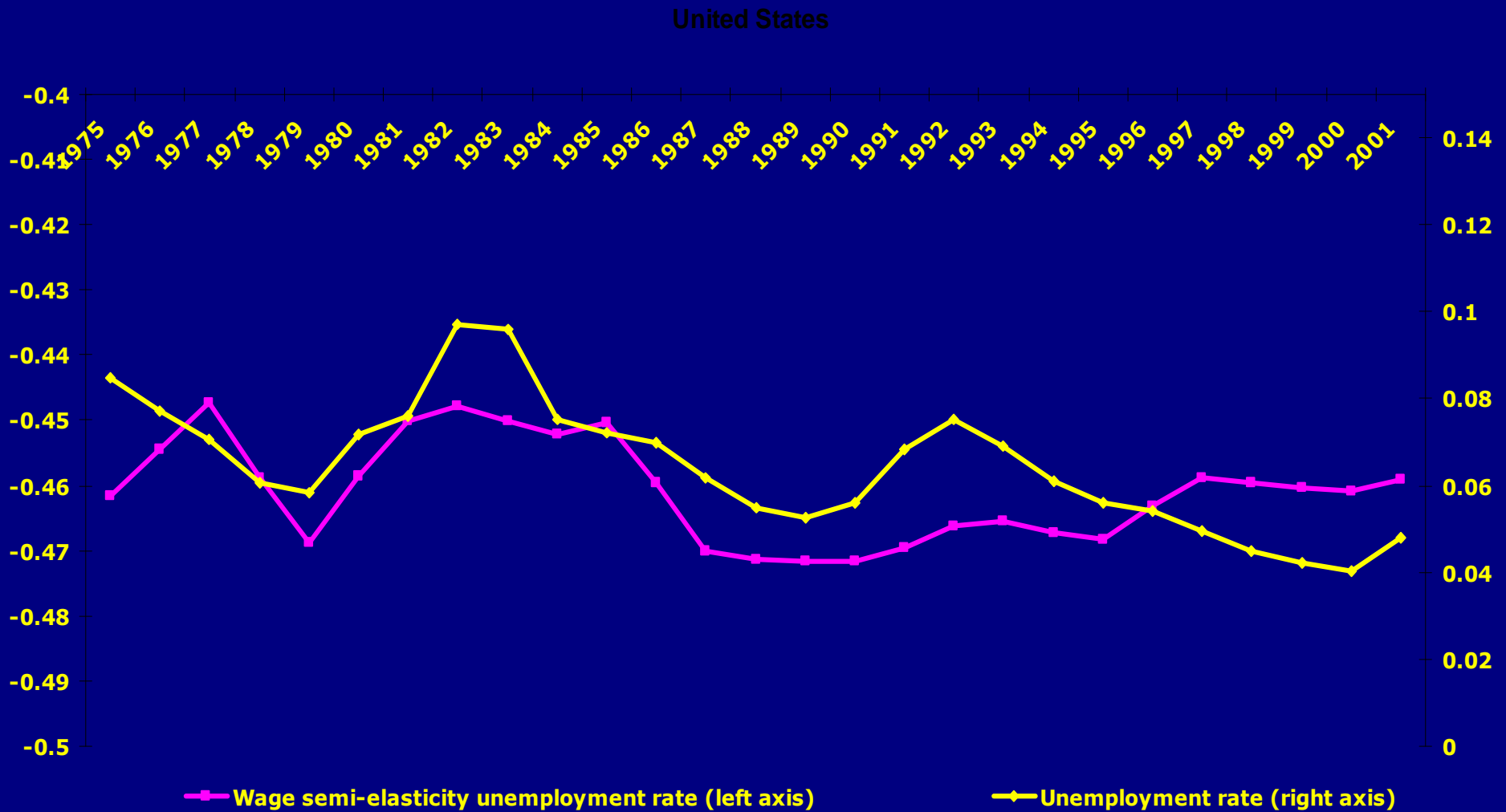


Semi-elasticity of wages with respect to unemployment & unemployment

France

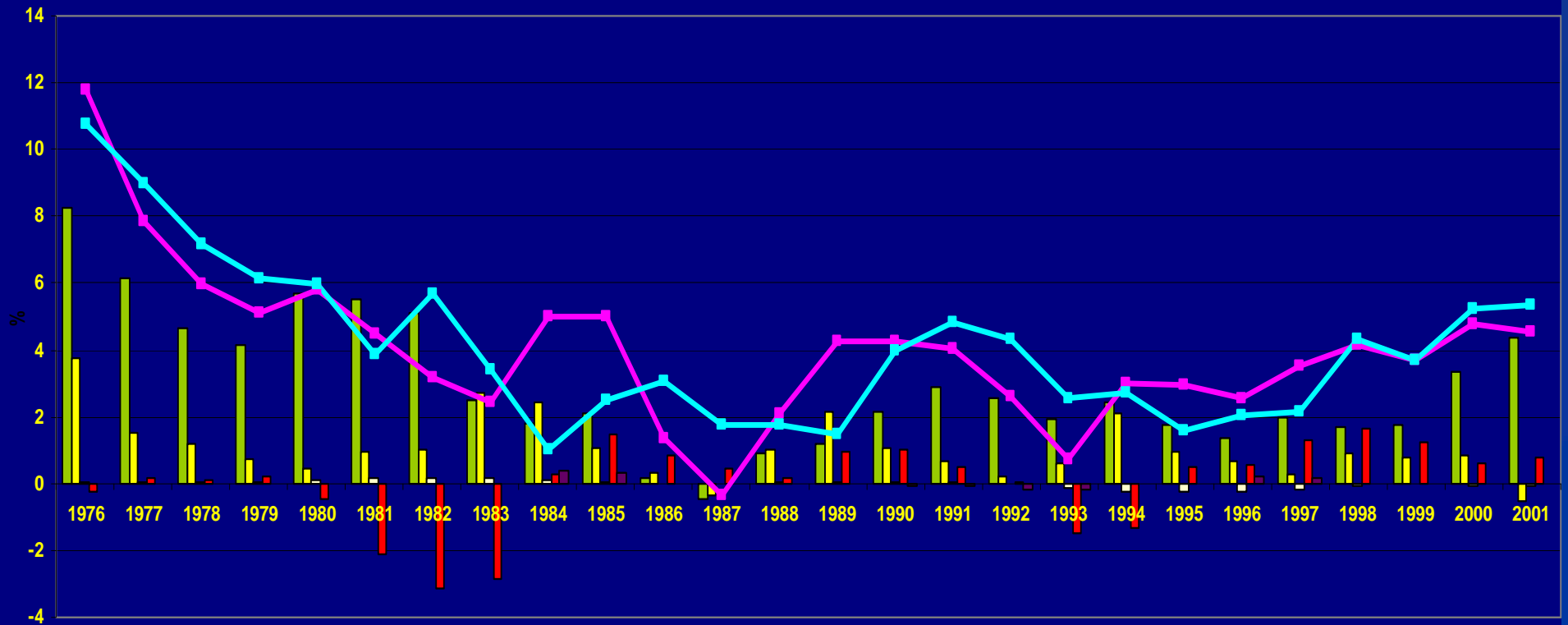


Semi-elasticity of wages with respect to unemployment & unemployment United States



Wage Contributions Germany

The Netherlands



Time

Prices

Labour productivity

Taxes

Unemployment

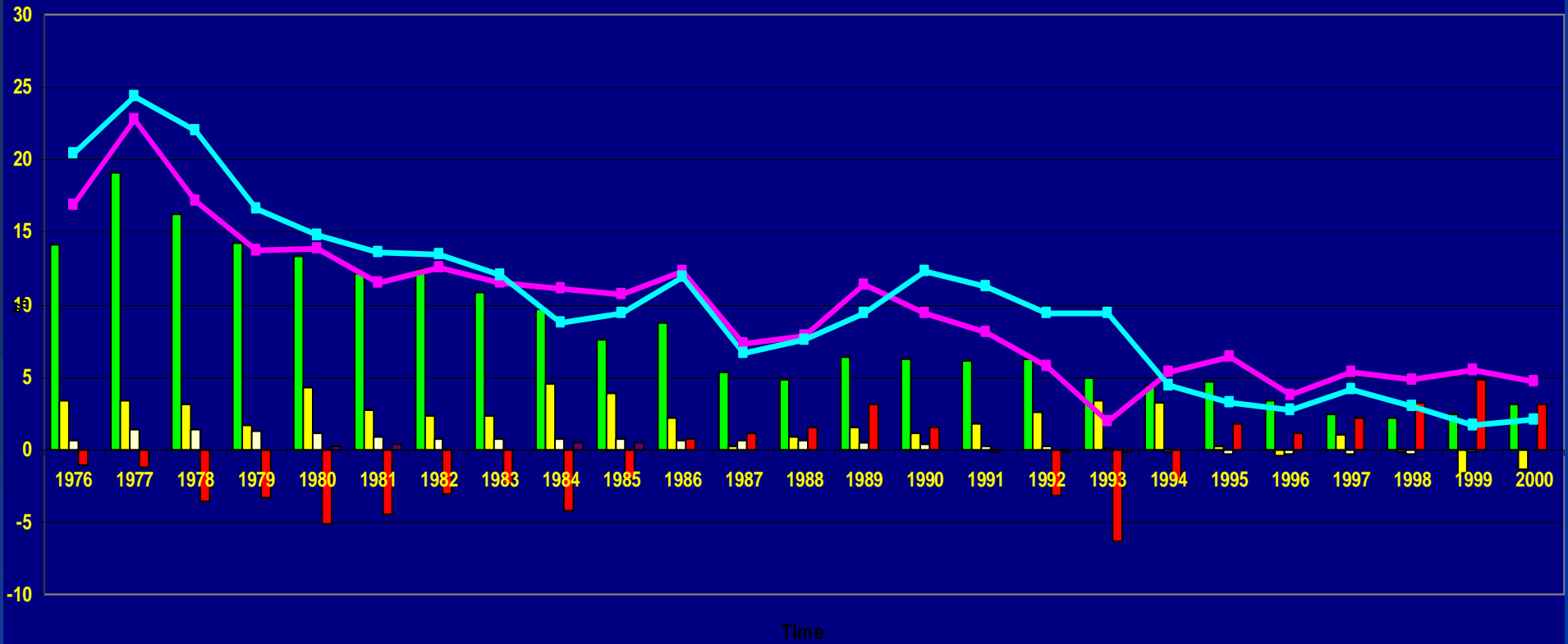
Replacement rate

Wage growth according to model

Realised wage growth

Wage Contributions Spain

Spain



Prices

Labour productivity

Taxes

Unemployment

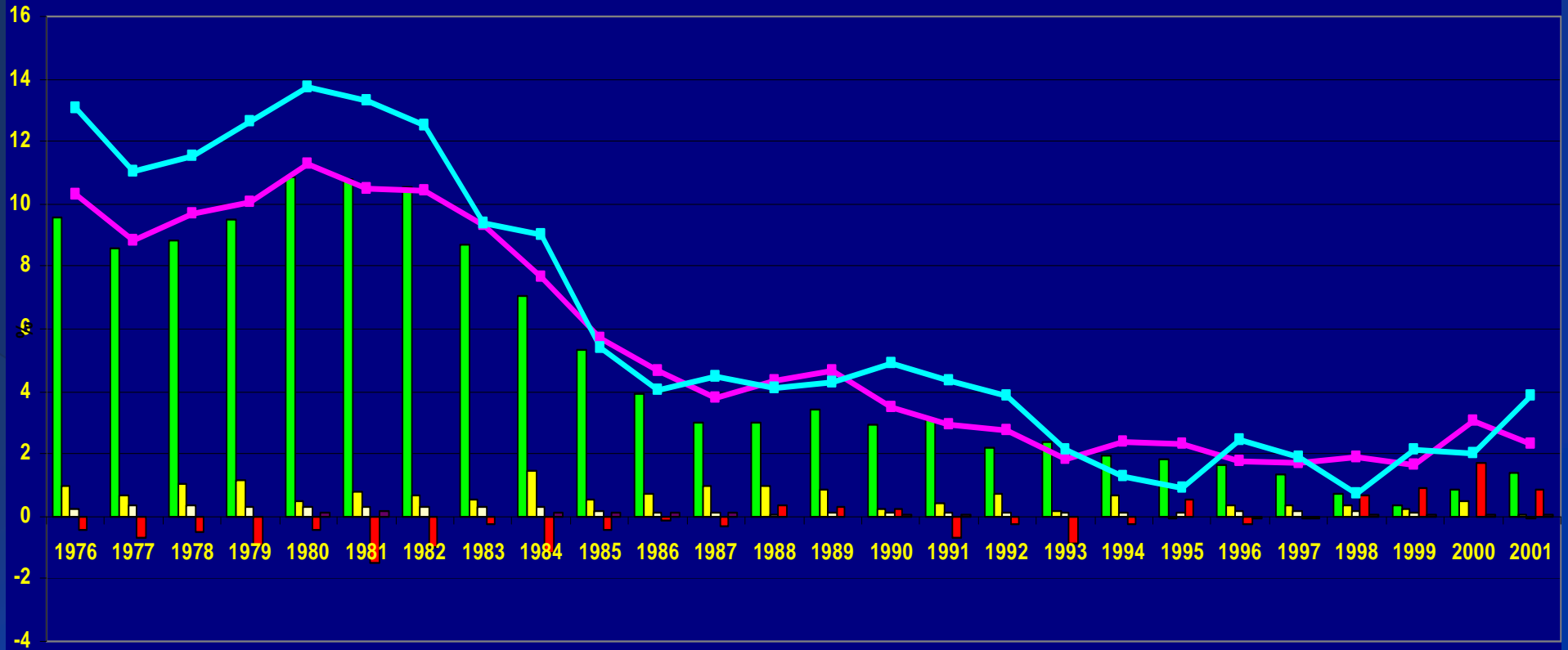
Replacement rate

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Wage Contributions France

France



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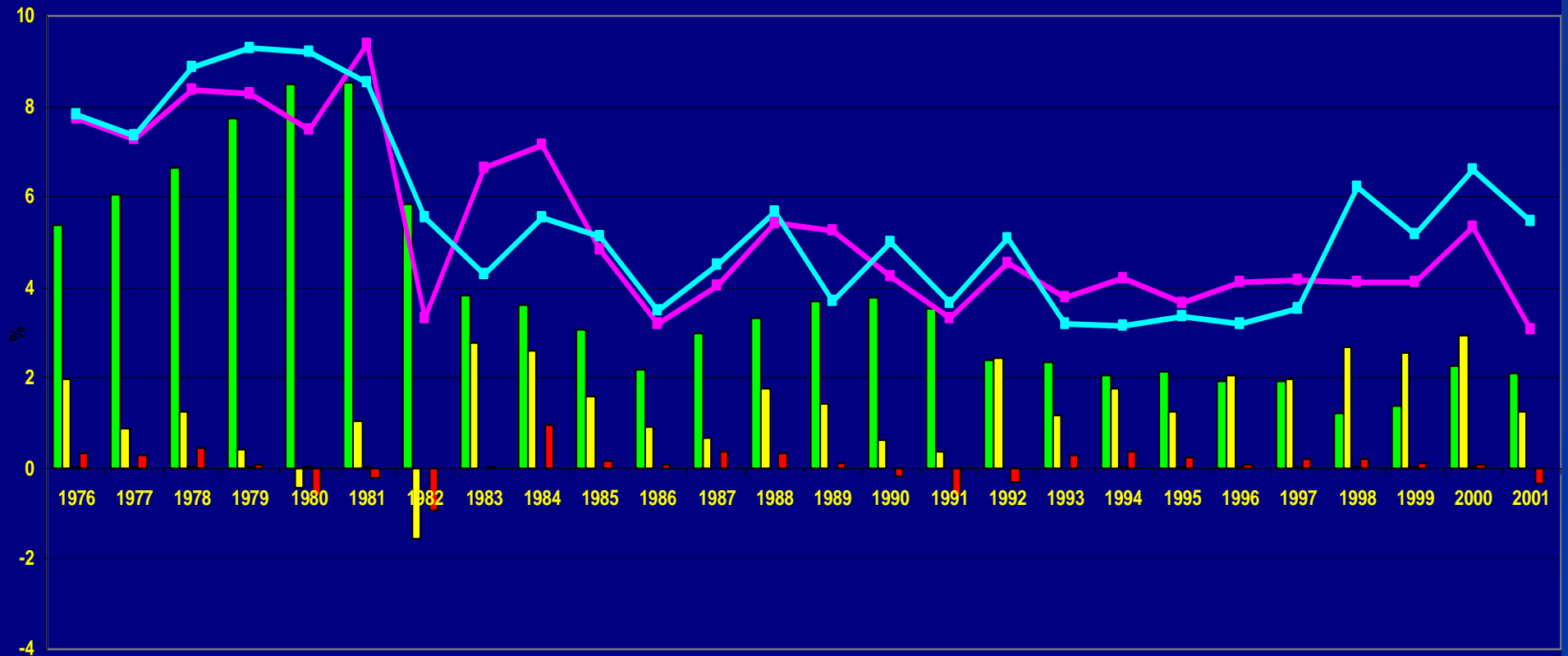
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Wage Contributions United States

United States



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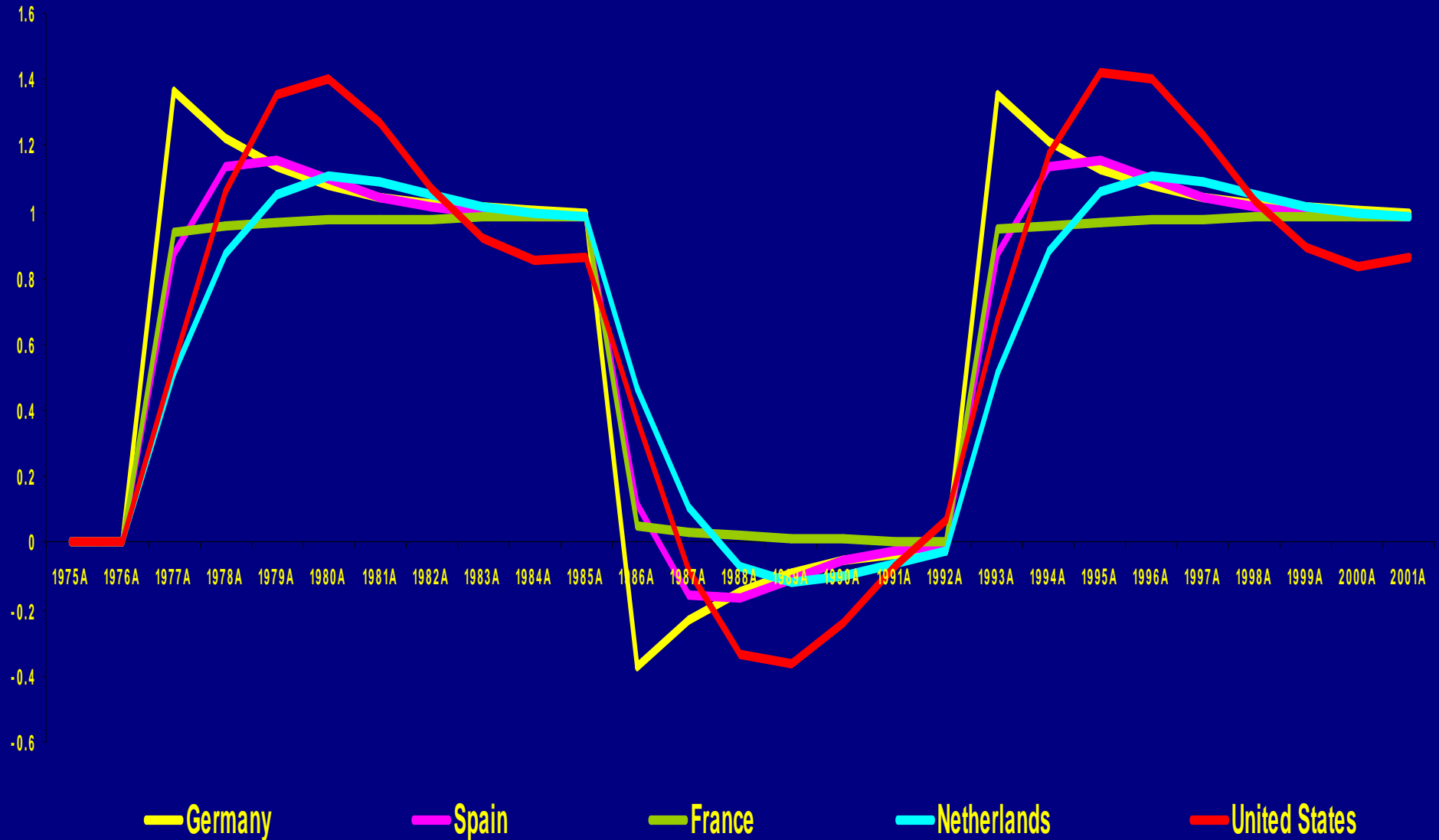
Wage growth according to model

Realised wage growth

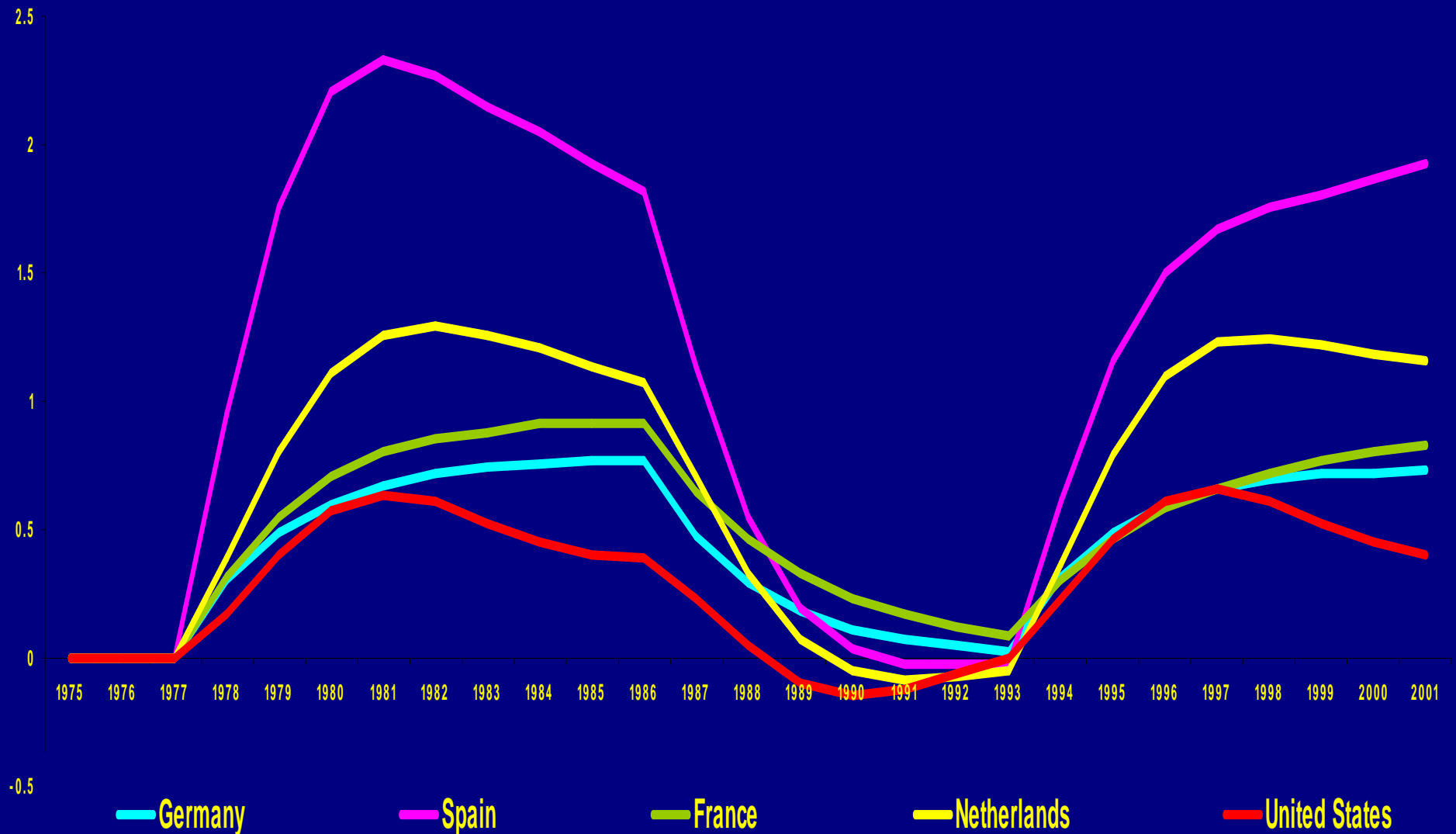
Wage Increase (%) due to a 1 %-point Decrease in Unemployment in the long term

	This Study 1975-2001	Layard, Nickell and Jackman (1991)
Germany	0.74 to 0.81	1.01
Spain	1.60 to 2.60	1.21
France	0.85 to 1.15	4.35
Netherlands	1.00 to 1.25	2.28
US	0.44 to 0.48	0.94

Simulations of a Price Shock



Simulations of a Shock to Unemployment



New avenues

- Updating ... as there are new developments since 2001
- More thorough study of the labour market reforms
- Wage coordination within EMU