

The vulnerability of regions in Euroland in relation to monetary union

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The vulnerability of regions in Euroland

- I expected Euroland regions to have different levels of vulnerability to economic shocks
- Because they evidently did not conform to the ideal of an Optimal Currency Area (OCA)
- From a regional perspective, Euroland is heterogeneous, not homogeneous

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- Magnifico(1973) warned us!

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- there are still ways in which the shock effects can be moderated
- But evidently labour migration and wage flexibility across Euroland was not sufficient to moderate shock impacts

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- Uncoordinated National automatic stabilizers produced wide regional disparities across Euroland

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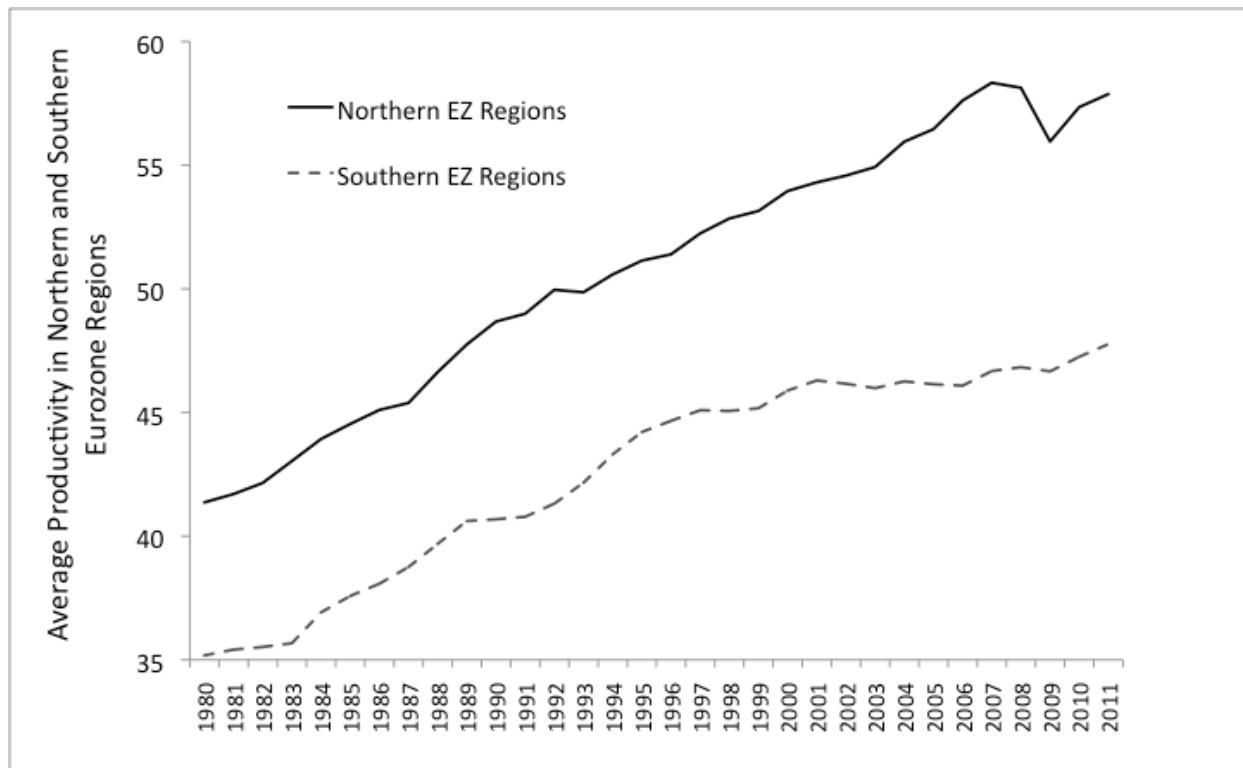
- Euroland does not have automatic stabilizers capable of evening out the differential impact of a shock

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- Evidence for the heterogeneity of Euroland regions

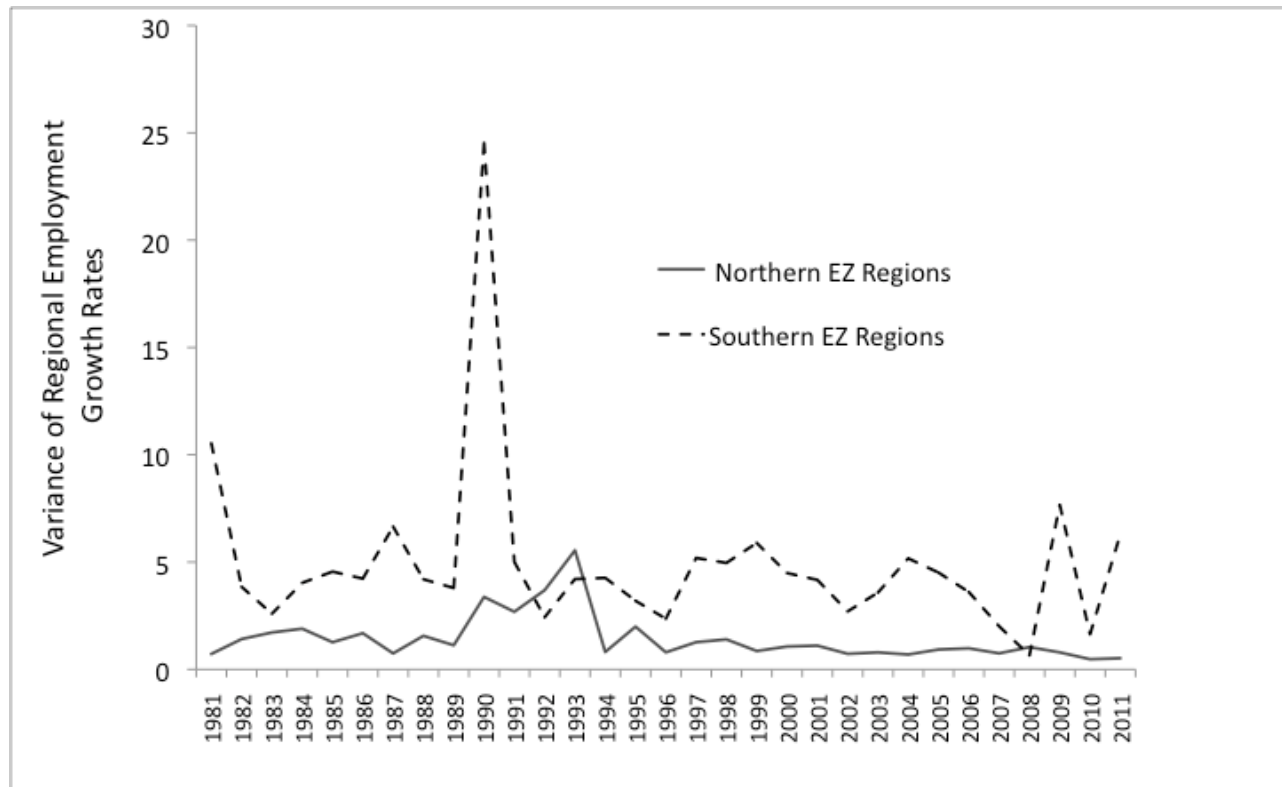
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Figure 3: Regional Productivity Levels in Northern and Southern Eurozone States, 1980-2011



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Figure 5: The Variance in Regional Employment Growth in Northern and Southern Eurozone States, 1980-2011



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- The evidence is that many Euroland regions did not conform to the ideal of an OCA
- But the authorities pursued the Euroland project anyway, possibly with political reasons uppermost
- And the hope was, presumably, that Euroland would become an OCA as an endogenous outcome of its creation

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- The big test of whether, despite all, Euroland was on a path towards an OCA, came as a result of the 2007/8 crisis
- In an OCA, the shock should impact all regions more or less equally
- But big regional disparities would support the view that the Eurozone was far from becoming an OCA

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- In order to show the impact by region of the 2007/8 shock and its aftermath, we need a model
- The counterfactual provided by the model shows what would have happened in each region had the shock not occurred
- We then compare the counterfactual to the actual data, in our case, keeping to the Mundell tradition, focussing on employment

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- Clearly the model used for the counterfactual is crucial to our interpretation
- My approach is theory neutral

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- The model is written with the level of employment as the dependent variable, and elaborated by introducing
 - temporal spillovers
 - spatial spillovers

the model

Trade-based connectivity matrix



$$\ln E_t = \gamma \ln E_{t-1} + \rho_1 W_N \ln E_t + \beta_1 \ln Q_t + \beta_2 \ln K_t + \varepsilon_t$$

Temporal lag



Endogenous spatial lag giving SAR process



Calculation of the endogenous spatial lag $W_N \ln E_t$

Hypothetical matrix of export shares 5 region system

export region		export shares					employment	spatial lag of employment	
		1	2	3	4	5			
	1	0	0.95	0.05	0	0	$\ln E_t = \begin{bmatrix} 10 \\ 3 \\ 2 \\ 4 \\ 6 \end{bmatrix}$	$W_N \ln E_t = \begin{bmatrix} 2.95 \\ 8.20 \\ 6.75 \\ 3.00 \\ 4.10 \end{bmatrix}$	
Region 2 →	2	0.75	0	0.20	0	0.05			← Region 2
	3	0.50	0.25	0	0.25	0			
	4	0	0	0.75	0	0.25			
	5	0.10	0.30	0.10	0.50	0			

in detail

$$W_N \ln E_{1t} = 0.00 * 10 + 0.95 * 3 + 0.05 * 2 + 0.00 * 4 + 0.00 * 6 = 2.95$$

$$W_N \ln E_{2t} = 0.75 * 10 + 0.00 * 3 + 0.20 * 2 + 0.00 * 4 + 0.05 * 6 = 8.20$$

etc

75% of region 2's exports go to region 1, which has the highest employment level (10)

So this connection means there is a relatively big contribution to region 2's employment level

$$\text{Equal to } \rho_1 W_N \ln E_{2t} = \rho_1 8.20$$

the model

Trade-based connectivity matrix

$$\ln E_t = \gamma \ln E_{t-1} + \rho_1 W_N \ln E_t + \beta_1 \ln Q_t + \beta_2 \ln K_t + \varepsilon_t$$

$$u_{it} = \mu_i + v_{it}$$

$$\varepsilon_t = u_t - \rho_2 M_N u_t$$

remainder

Normalised contiguity matrix

Time-invariant
regional component

Spatial moving average (SMA) error process

Here unlike previous estimation, I assume that the error dependence follows a SMA, not a SAR, process

A typical row-normalised contiguity matrix

Hypothetical row-normalised contiguity matrix for 5 regions

$$M_N = \begin{bmatrix} 0 & 0.333 & 0.333 & 0.333 & 0 \\ 0.25 & 0 & 0.25 & 0.25 & 0.25 \\ 0.5 & 0.5 & 0 & 0 & 0 \\ 0.333 & 0.333 & 0 & 0 & 0.333 \\ 0 & 0.5 & 0 & 0.5 & 0 \end{bmatrix}$$

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- Estimation is in the spirit of Arellano and Bond, mixing spatial and non-spatial instruments together with a GMM estimator for spatially dependent errors
- Additionally, unlike previous estimation, I assume that the drivers of employment, namely output and capital, are endogenous not exogenous

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Table 1: Parameter Estimates

		Exogenous $\mathbf{X}_{1t}, \mathbf{X}_{2t}$			Endogenous $\mathbf{X}_{1t}, \mathbf{X}_{2t}$		
variable	parameter	Param. Est.	Standard error	t ratio	Param. Est.	Standard error	t ratio
$\mathbf{y}_{t-1} = \ln \mathbf{E}_{t-1}$	γ	0.6261	0.01035	60.48	0.5222	0.03309	15.78
$\mathbf{W}_N \mathbf{y}_t = \mathbf{W}_N \ln \mathbf{E}_t$	ρ_1	0.2068	0.01588	13.02	0.3702	0.05675	6.52
$\mathbf{x}_{1t} = \ln \mathbf{Q}_t$	β_1	0.1390	0.005201	26.72	0.1042	0.02032	5.13
$\mathbf{x}_{2t} = \ln \mathbf{K}_t$	β_1	0.01542	0.0009967	15.48	0.01502	0.004759	3.16
	ρ_2	-0.3431			-0.2864		
	σ_μ^2	0.5283			0.5870		
	σ_v^2	0.0008			0.0007		

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- The counterfactual employment series depends on the assumed paths for each region's output and capital. What could happen to these variables?

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How were the counterfactual series for output and capital in each region created?

$$\ln \tilde{Q}_t = \tau_0 + \tau_1 \ln \tilde{Q}_{t-1} + \tau_2 \ln \tilde{Q}_{t-2} + \tau_3 \ln \tilde{K}_{t-1} + \tau_4 \ln \tilde{K}_{t-2} + D_{1t} + D_{2t} + \zeta_t$$

↑
region k 's output at time t

$$\ln \tilde{K}_t = \kappa_0 + \kappa_1 \ln \tilde{Q}_{t-1} + \kappa_2 \ln \tilde{Q}_{t-2} + \kappa_3 \ln \tilde{K}_{t-1} + \kappa_4 \ln \tilde{K}_{t-2} + D_{1t} + D_{2t} + \zeta_t$$

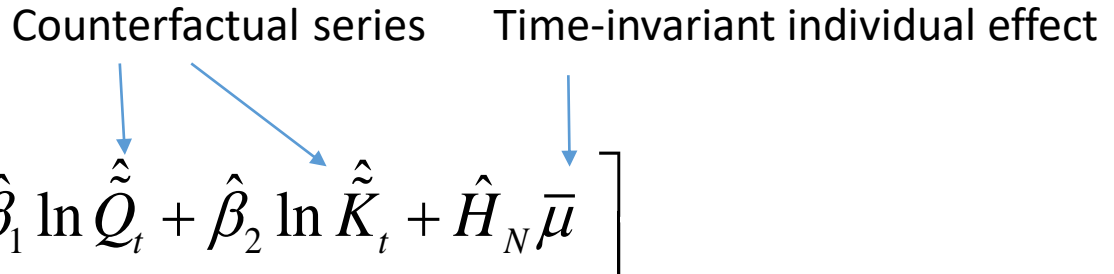
↑
region k 's capital stock at time t

↑ ↑ ↑
dummy variable(s) to allow for the slowdown in GVA growth across the EU in the years 2002 and 2003 and also in 1993

Prediction equation

$$\ln \hat{E}_t = \hat{B}_N^{-1} \left[\hat{\gamma} \ln \hat{E}_{t-1} + \hat{\beta}_1 \ln \hat{\hat{Q}}_t + \hat{\beta}_2 \ln \hat{\hat{K}}_t + \hat{H}_N \bar{\mu} \right]$$

Counterfactual series Time-invariant individual effect



$$\hat{B}_N^{-1} = (I_N - \hat{\rho}_1 W_N)^{-1}$$

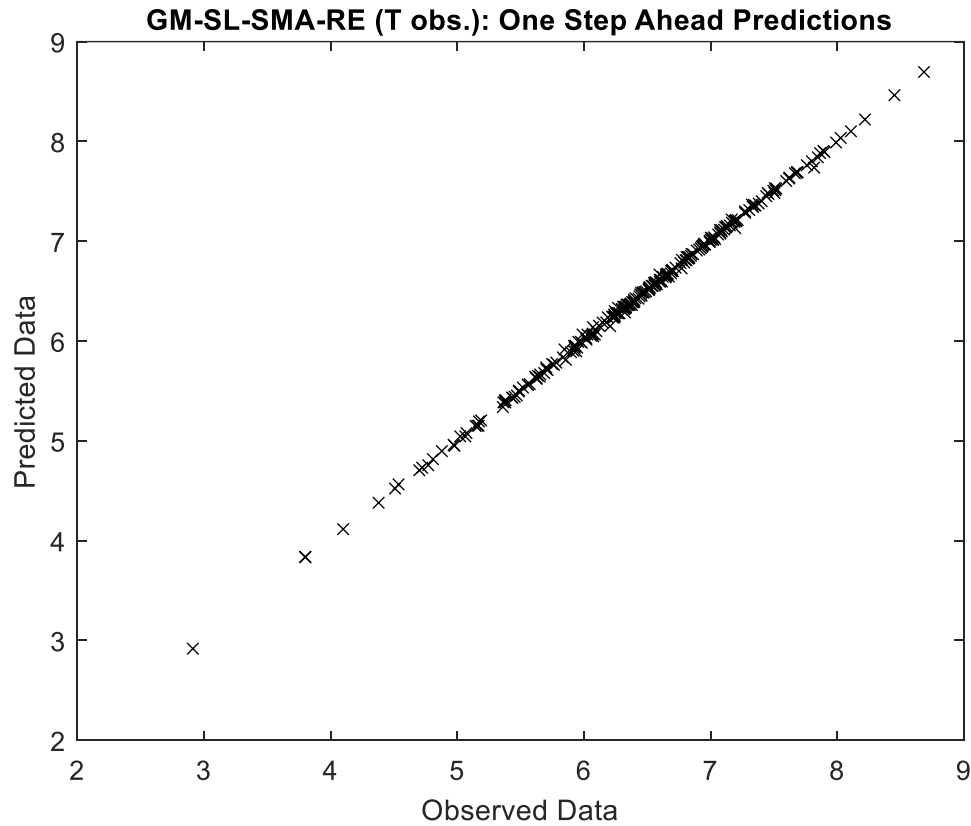
← To allow for SAR process via the spatial lag

$$\hat{H}_N = (I_N - \hat{\rho}_2 M_N)$$

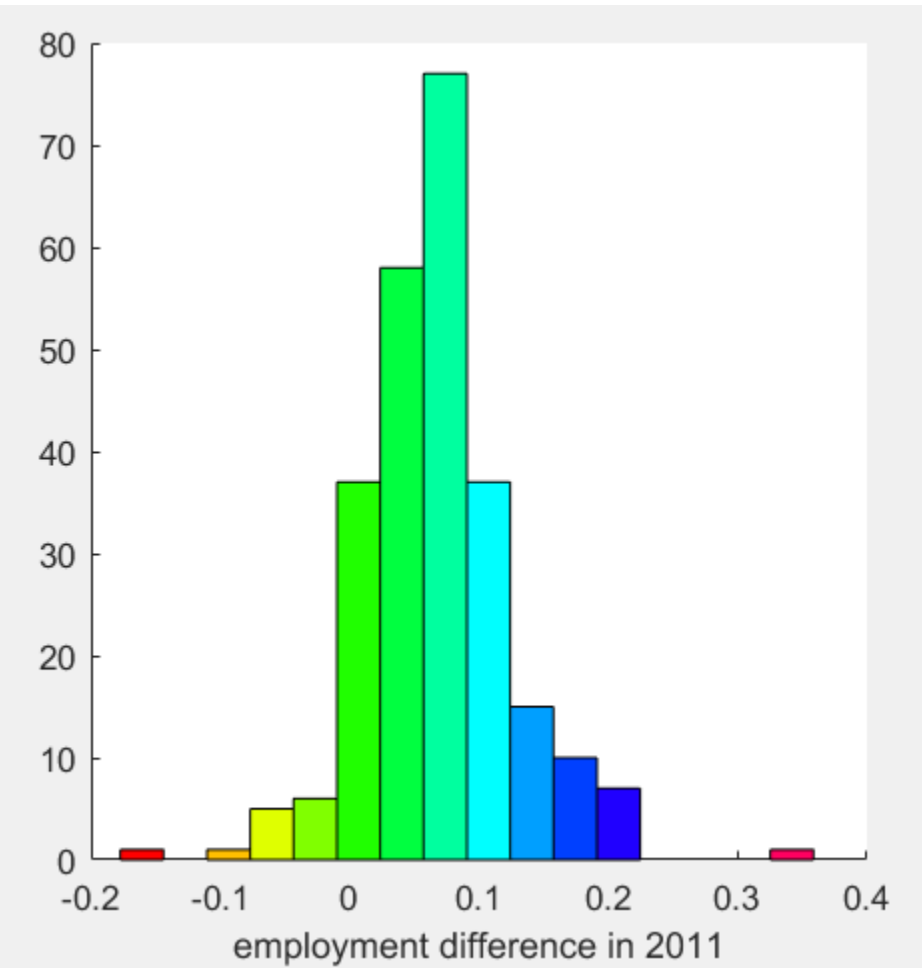
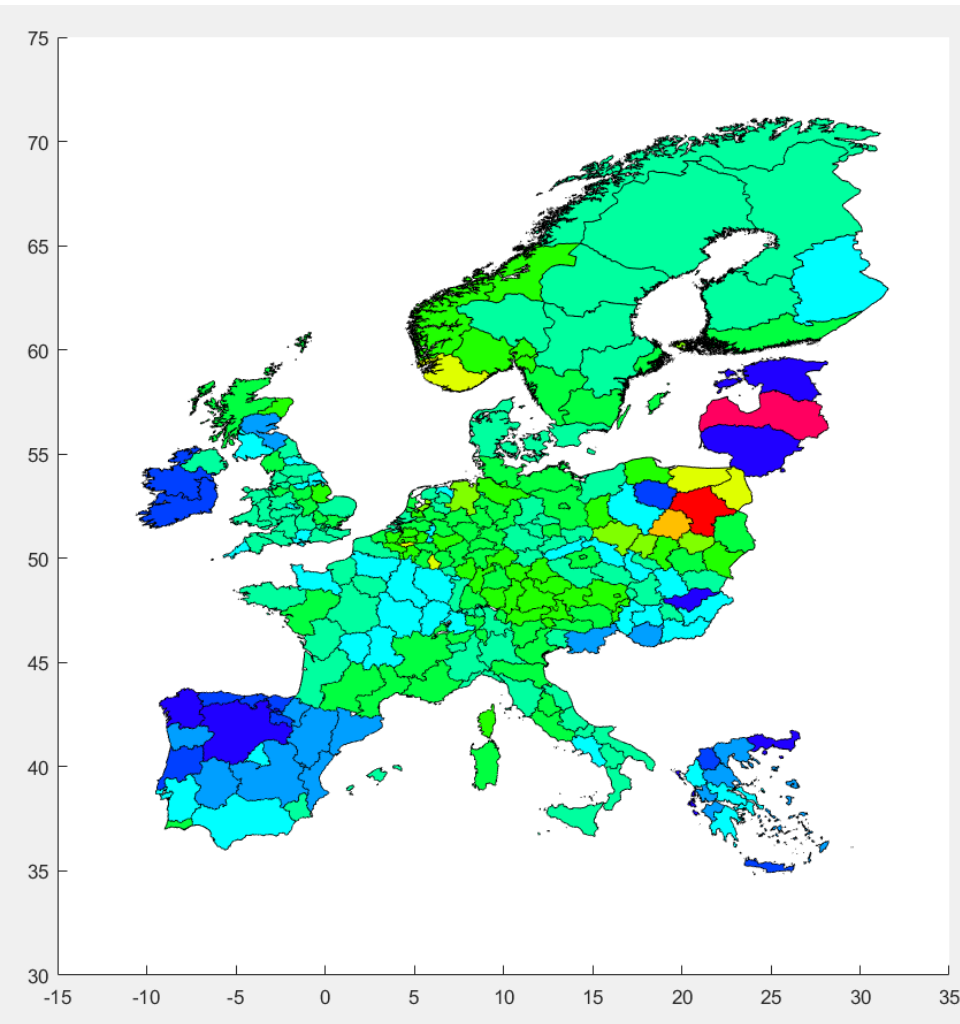
← To allow for SMA error process

This is solved recursively. We start with 2008 and predict employment up to 2011

One step ahead prediction

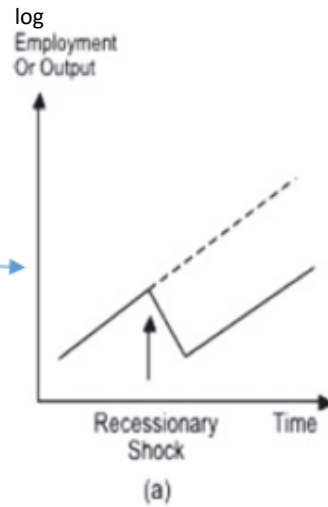


Difference : Counterfactual employment minus actual employment in 2011

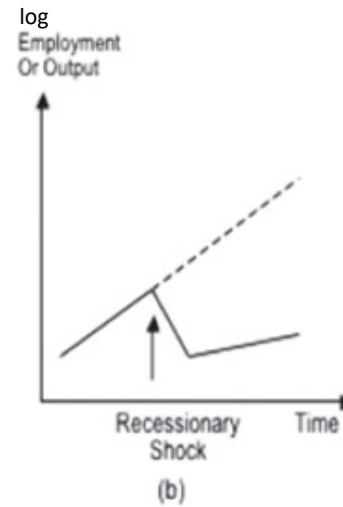


Implications of growth rate differences

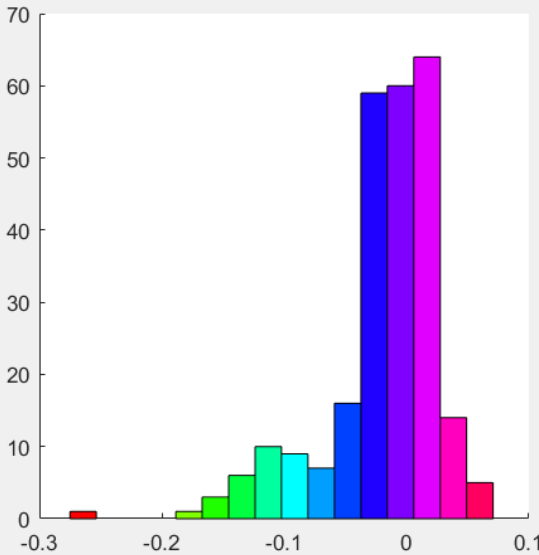
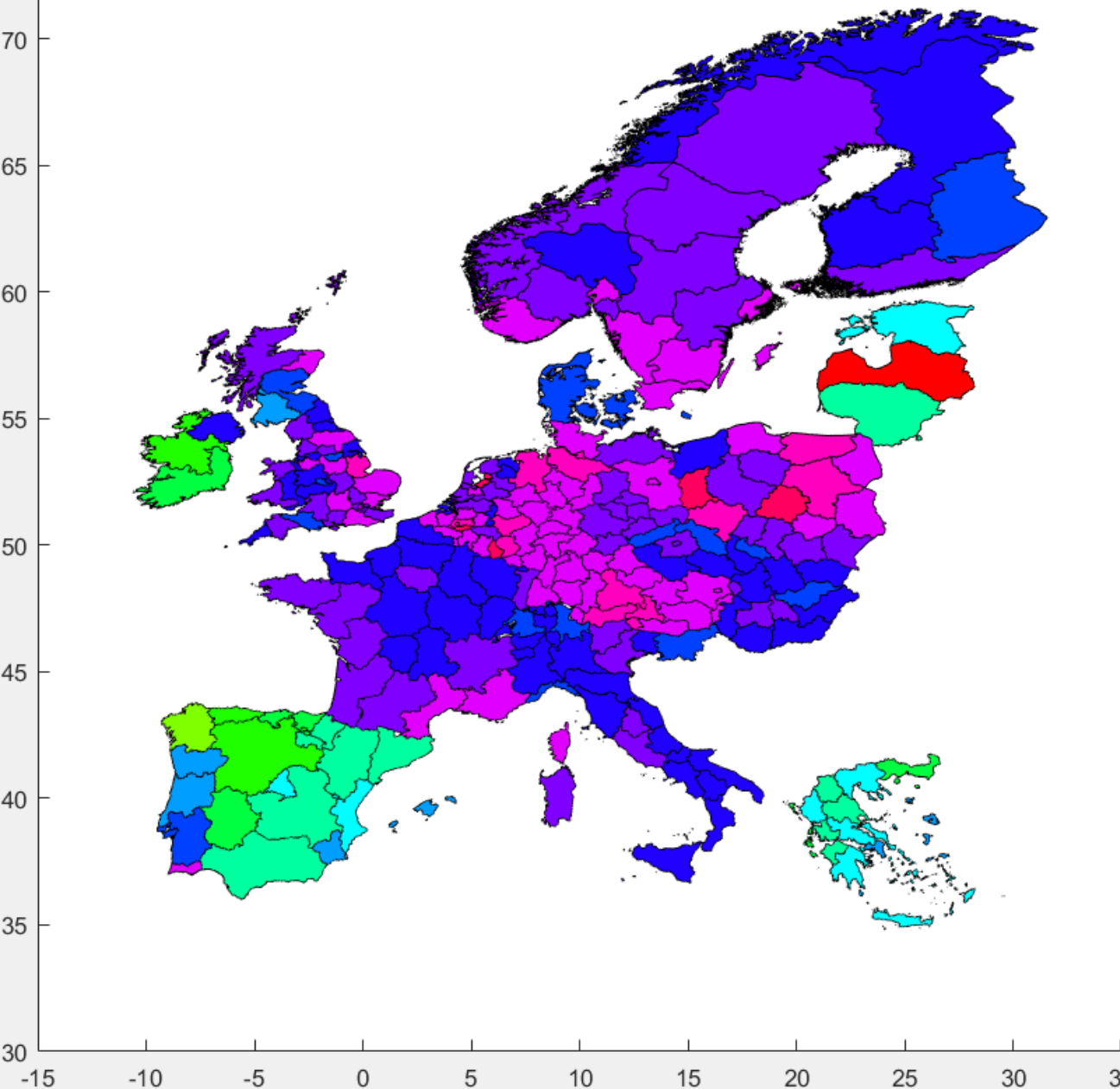
After shock :
Permanently lower level
growth rates same



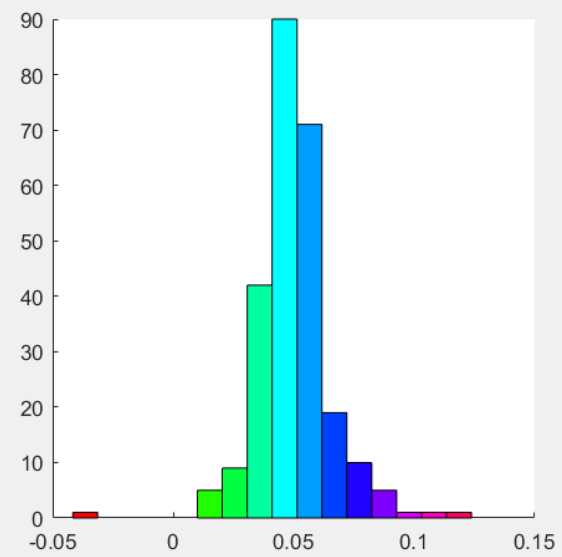
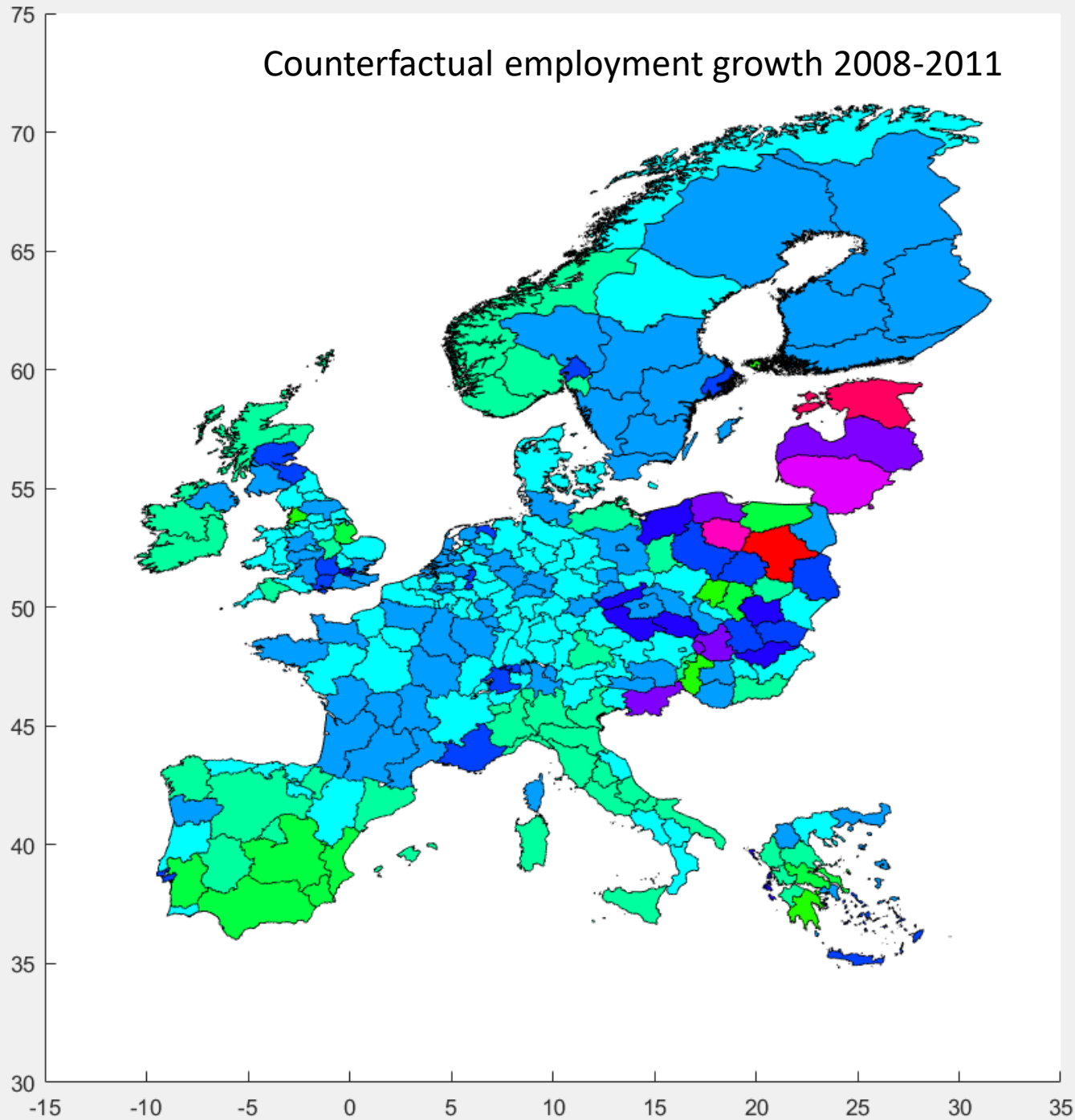
After shock :
levels diverge
actual growth rate
lower than counterfactual



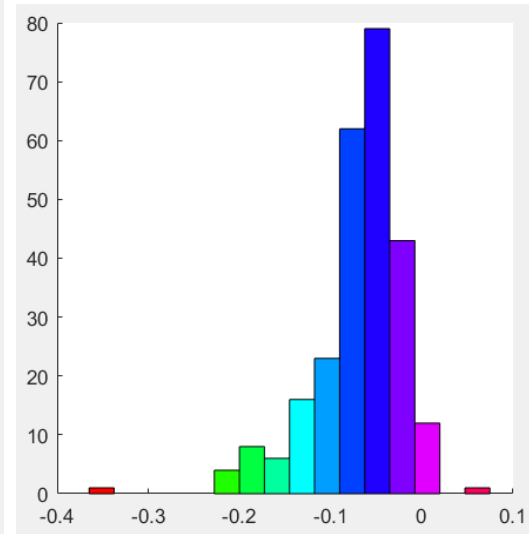
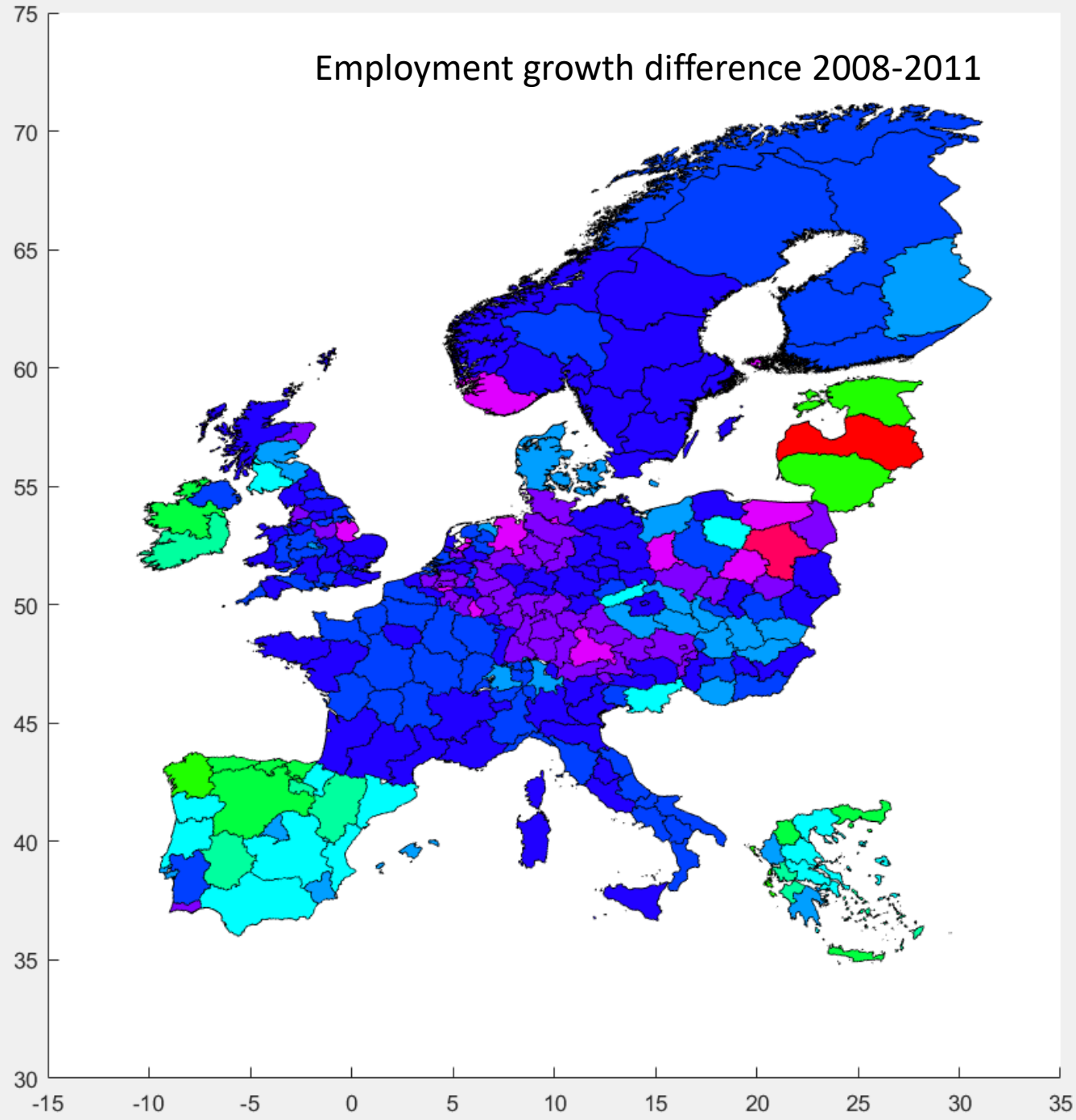
Employment growth 2008-2011



Counterfactual employment growth 2008-2011



Employment growth difference 2008-2011



Conclusions 1

- The early academic consensus that the Eurozone did not constitute an OCA has been highlighted by the differentiated response to the shock
- Evidence comes from reactions following the most severe economic recession since the 1930s
- The reaction to the crisis was different in different parts of the Eurozone
- when it came to the acid test of the 2008 shock, some regions lacked the adjustment mechanisms needed to avoid a severe negative impact, as is evident in the employment data

Conclusions 2

- there does appear to be two Eurolands
- the dramatic recessionary shock, caused by the financial crisis of 2008 emphasised this division
- The evidence comes from a counterfactual methodology

Conclusions 3

- What have we learned?

Conclusions 4

- What have we learned?

Conclusions 5

- Thank you
- And Happy Christmas!