

# Research & Innovation in Southern Europe

2007-2016: a troubled decade

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# “EU cohesion”

- Dynamics center-periphery (...or EU North - EU South)
- Convergence, catching up... or divergence?
- What are the factors behind these dynamics?
- Economic structure; International Specialization and trade patterns; Institutional setting; Accumulation patterns (choices: resources allocation, intensity, orientation)
- R&I activities; S&T accumulation
- Outcomes (Growth, Social Cohesion, Welfare, Economic and environmental sustainability...)
- How did the “Great Recession” interfere with the EU convergence/divergence dynamics?
- How big was that impact? Will it have a lasting effect or just temporary?



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# We will focus on R&I activities:

- R&D investment
- Scientific publications
- Patent applications

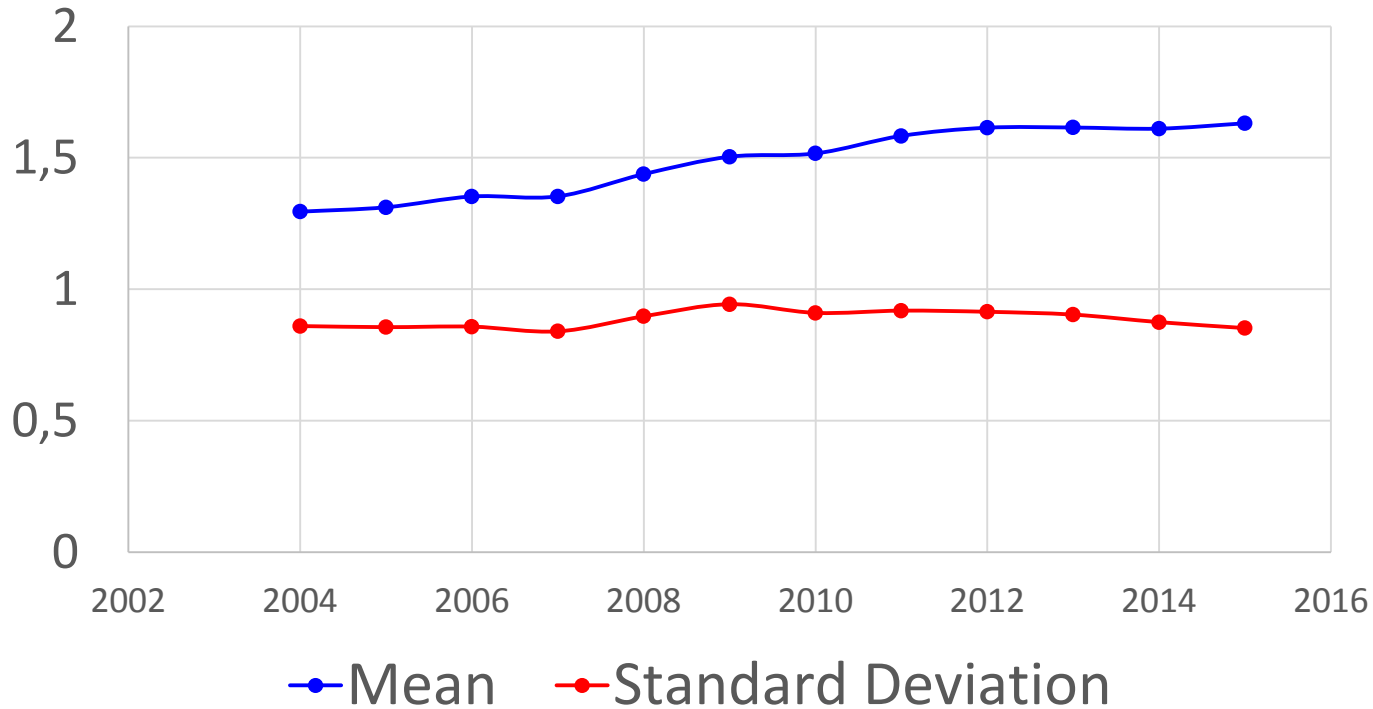
# We will focus on R&I activities:

- R&D investment (EUROSTAT: Gross Expenditure on R&D as a % of GDP)
- Scientific publications (SCIMAGO: “Documents published”)
- Patent applications (EPO: patent filings per country of residence of first applicant)

# EU 28

## Sigma-Convergence in R&D (GERD/GDP)...

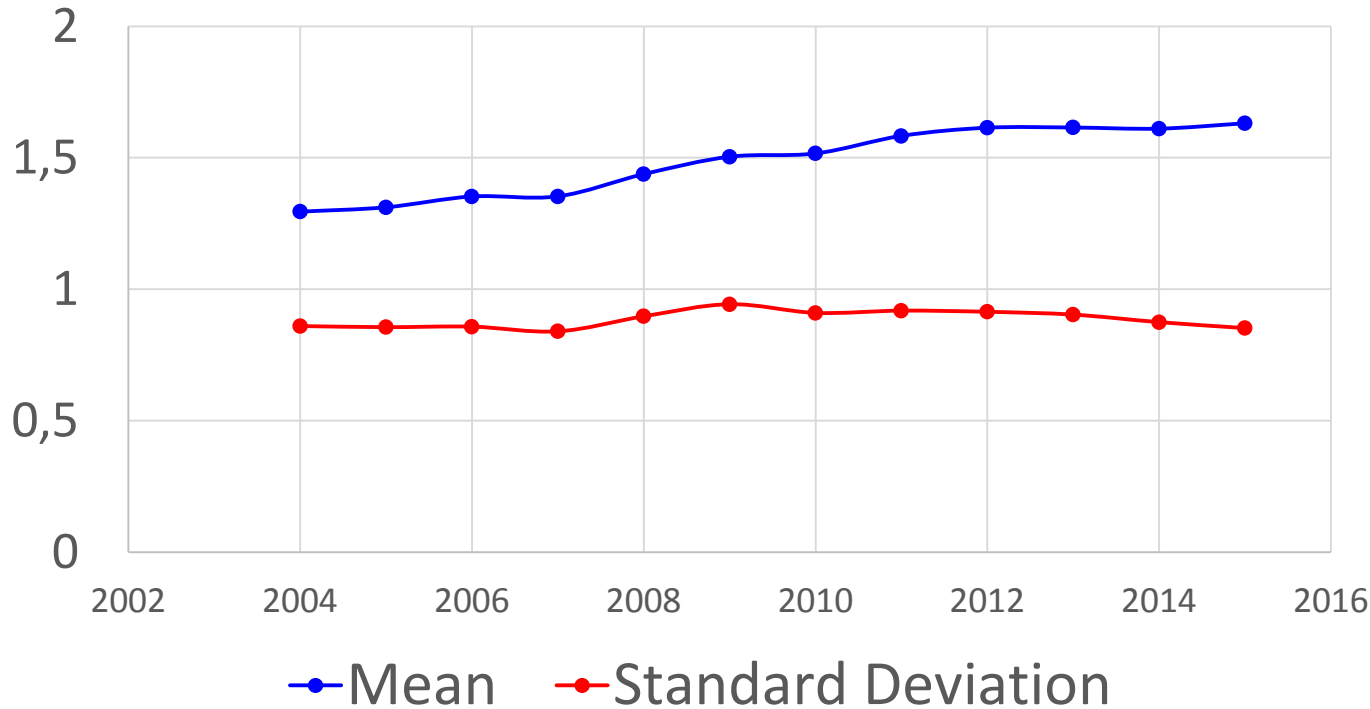
GERD to GDP (%) 2004-2015 EU28



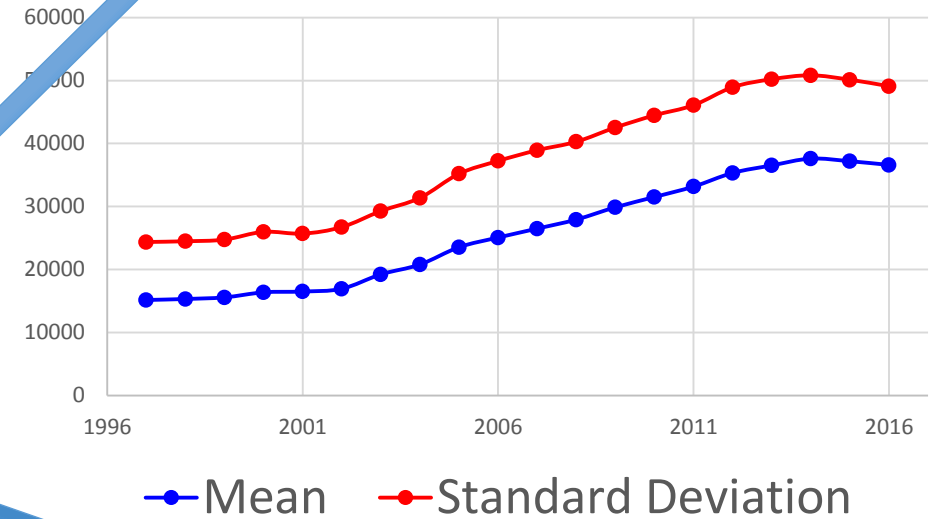
# EU 28

Sigma-Convergence in R&D (GERD/GDP)..  
...but not in Patents or Publications

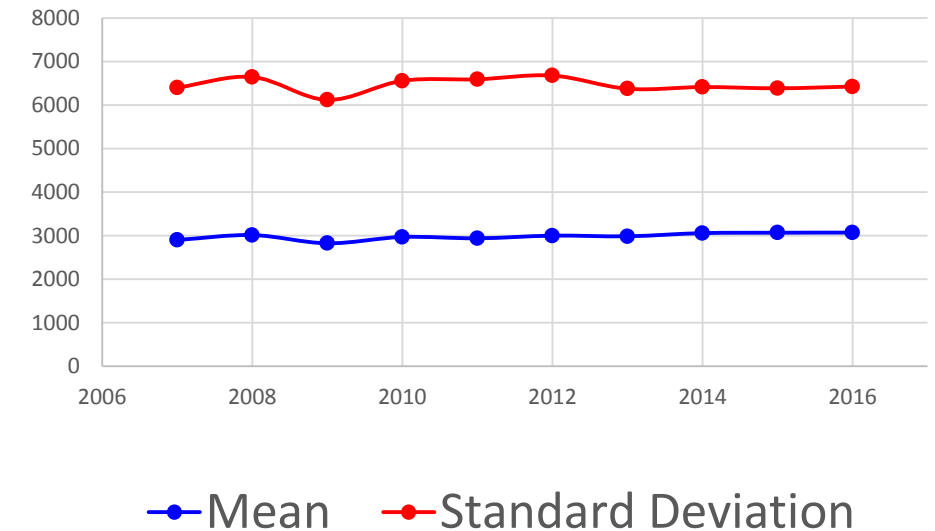
### GERD to GDP (%) 2004-2015 EU28



### Scientific Output 1997-2016 EU28



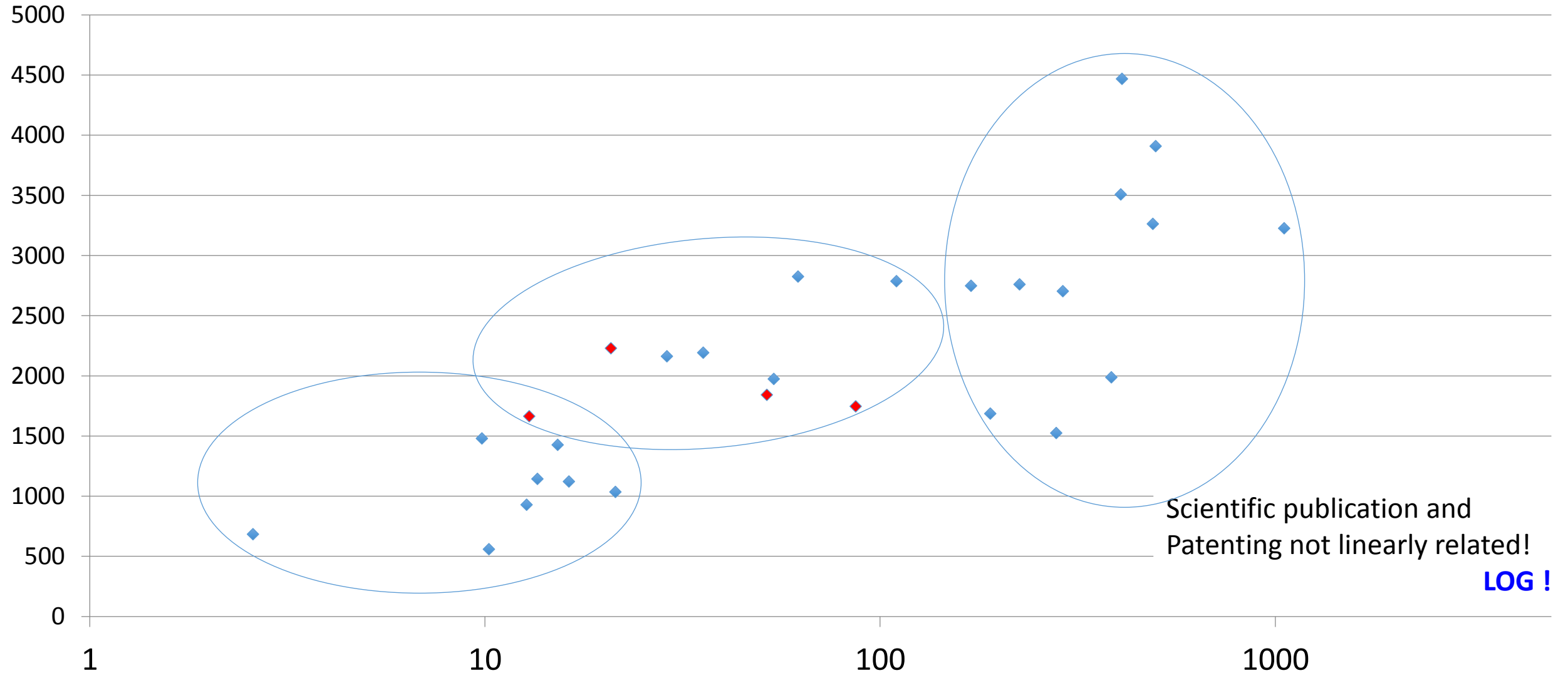
### EPO Patents 2007-2016 EU28



# 2016 EU28

Y = Publications per  $10^6$ ; X = Log Patents per  $10^6$

From L to R: Greece, Portugal, Spain, Italy

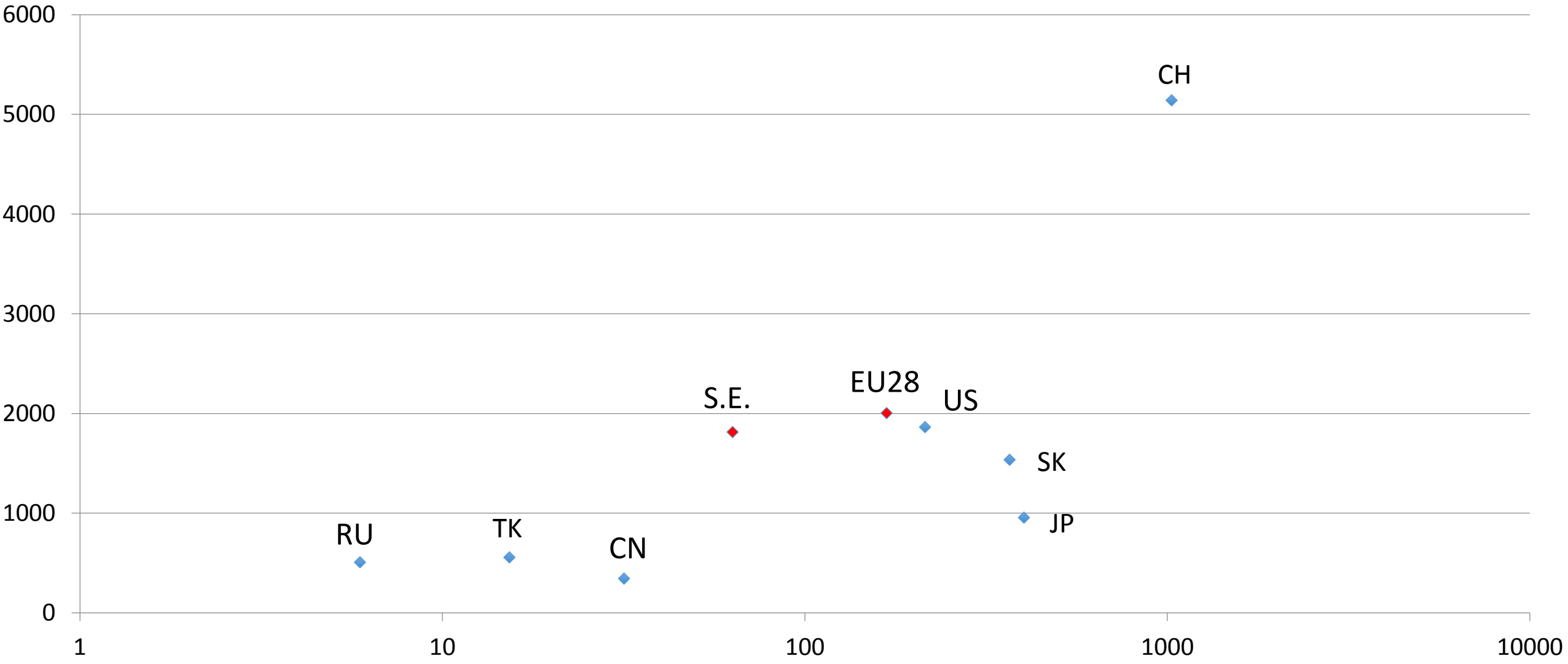




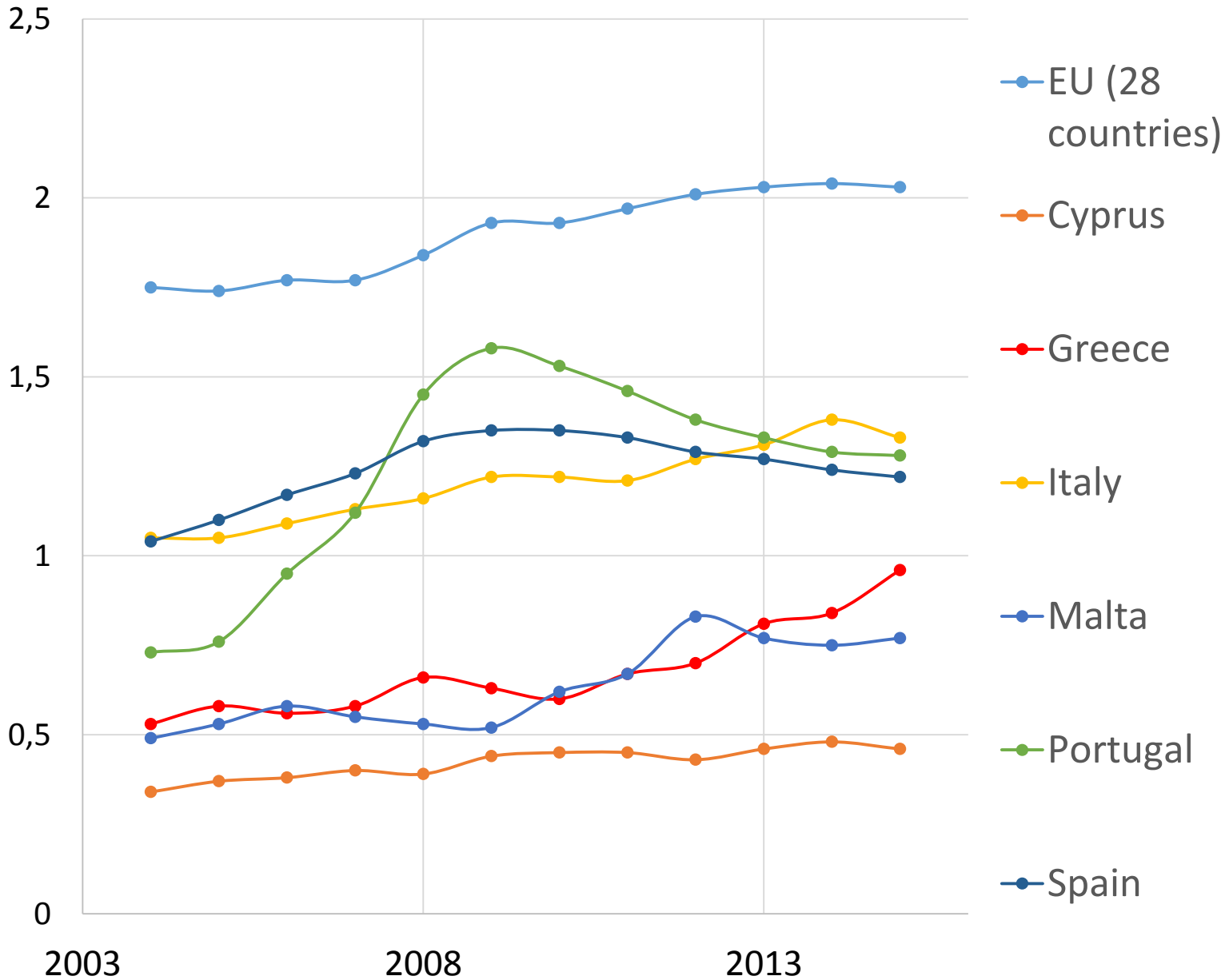
# 2016 GLOBAL

**Y = Publications per 10<sup>6</sup>; X = Log Patents per 10<sup>6</sup>**

**From L to R : RU; TK; CN; Southern Europe; EU28; US; SK; JP**

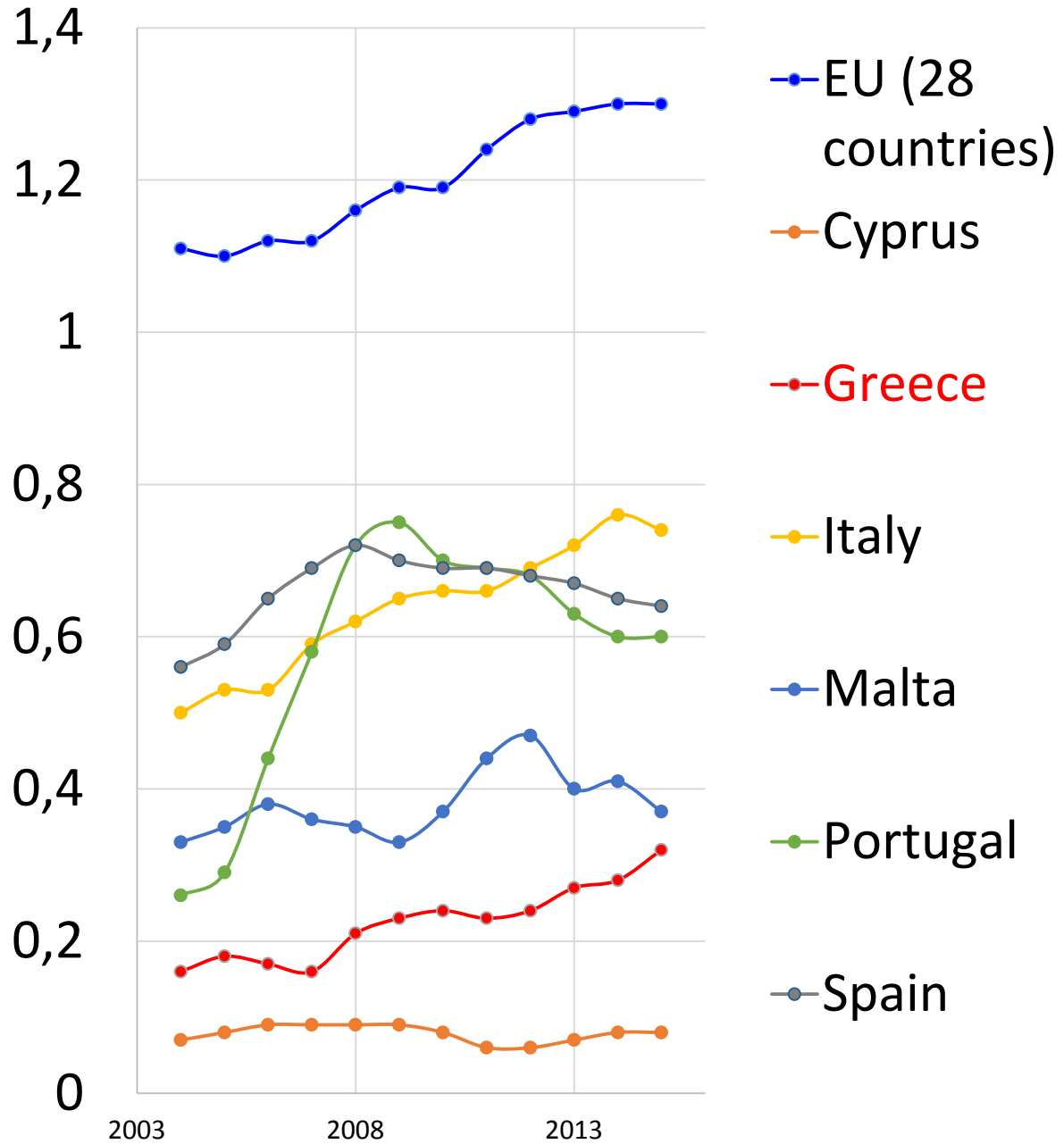


# GERD to GDP (%) 2004-2015

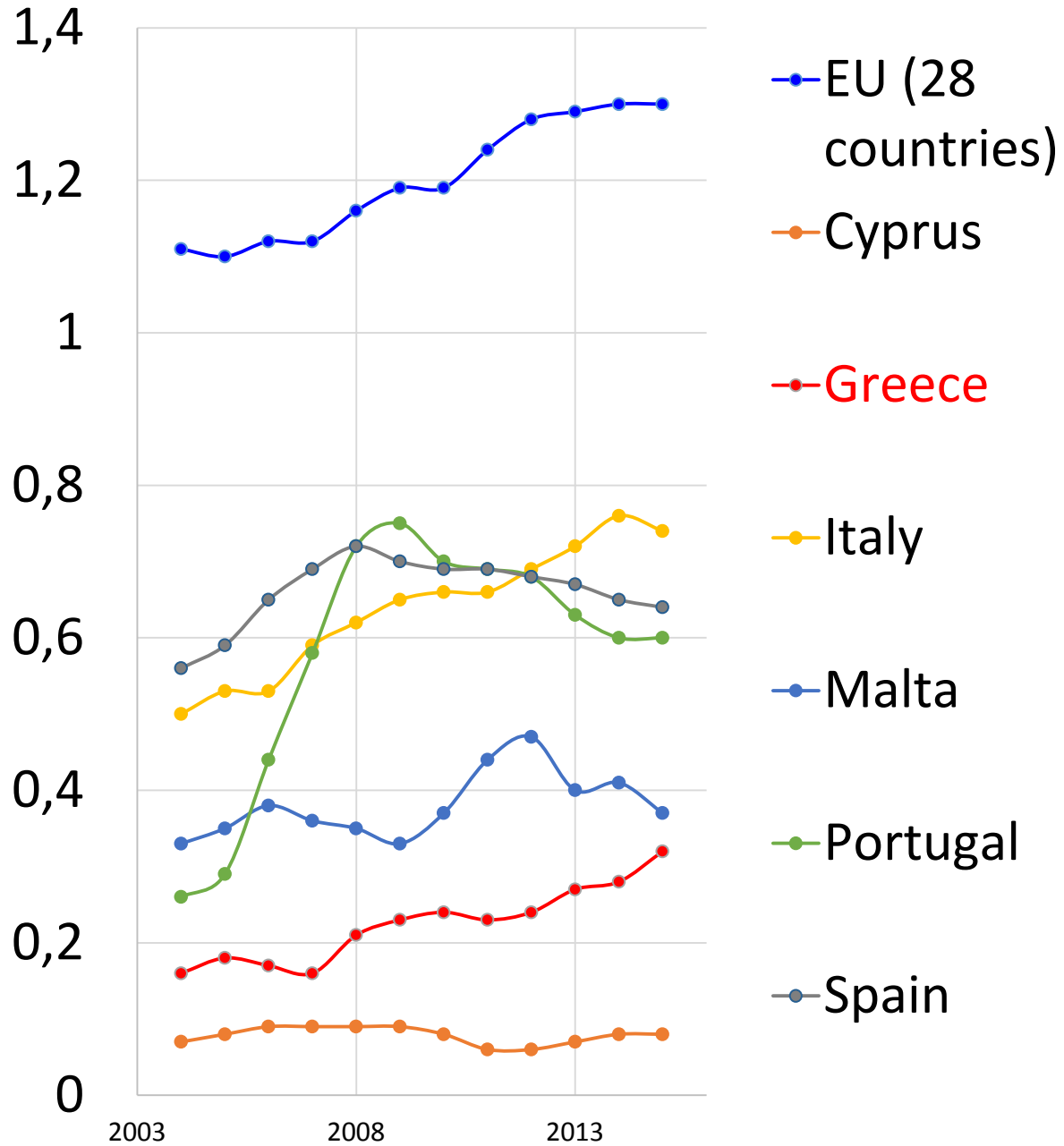


- We saw sigma convergence on EU's GERD/GDP
- However Southern Europe doesn't account for that
- Possibly East Europe is catching up
- GERD/GDP evolution was countercyclical in Greece
- Though remains low (<1%)
- The EU Southern country where the Great Recession impacted most in R&D was PT

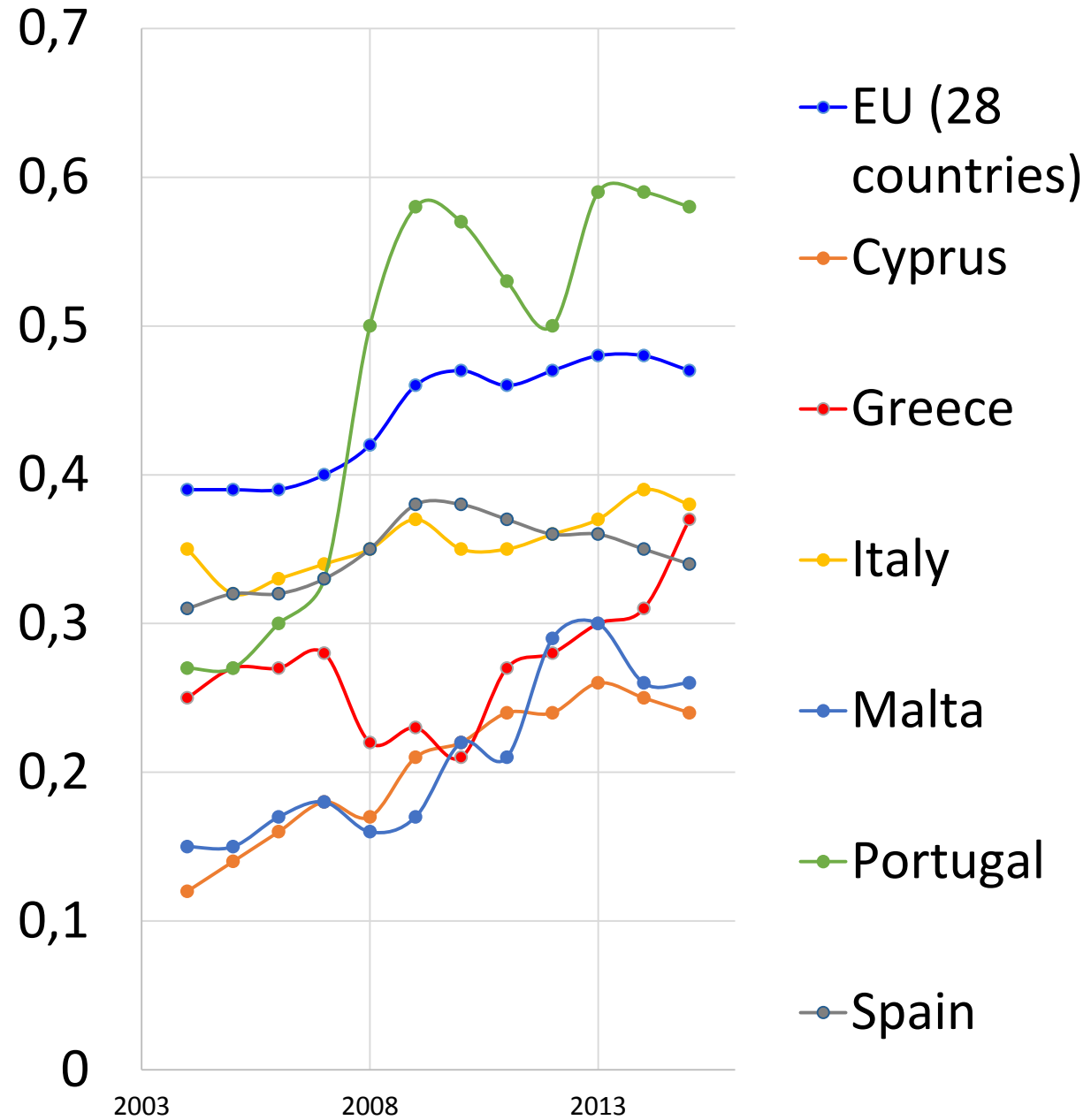
# BERD to GDP % 2004-2015



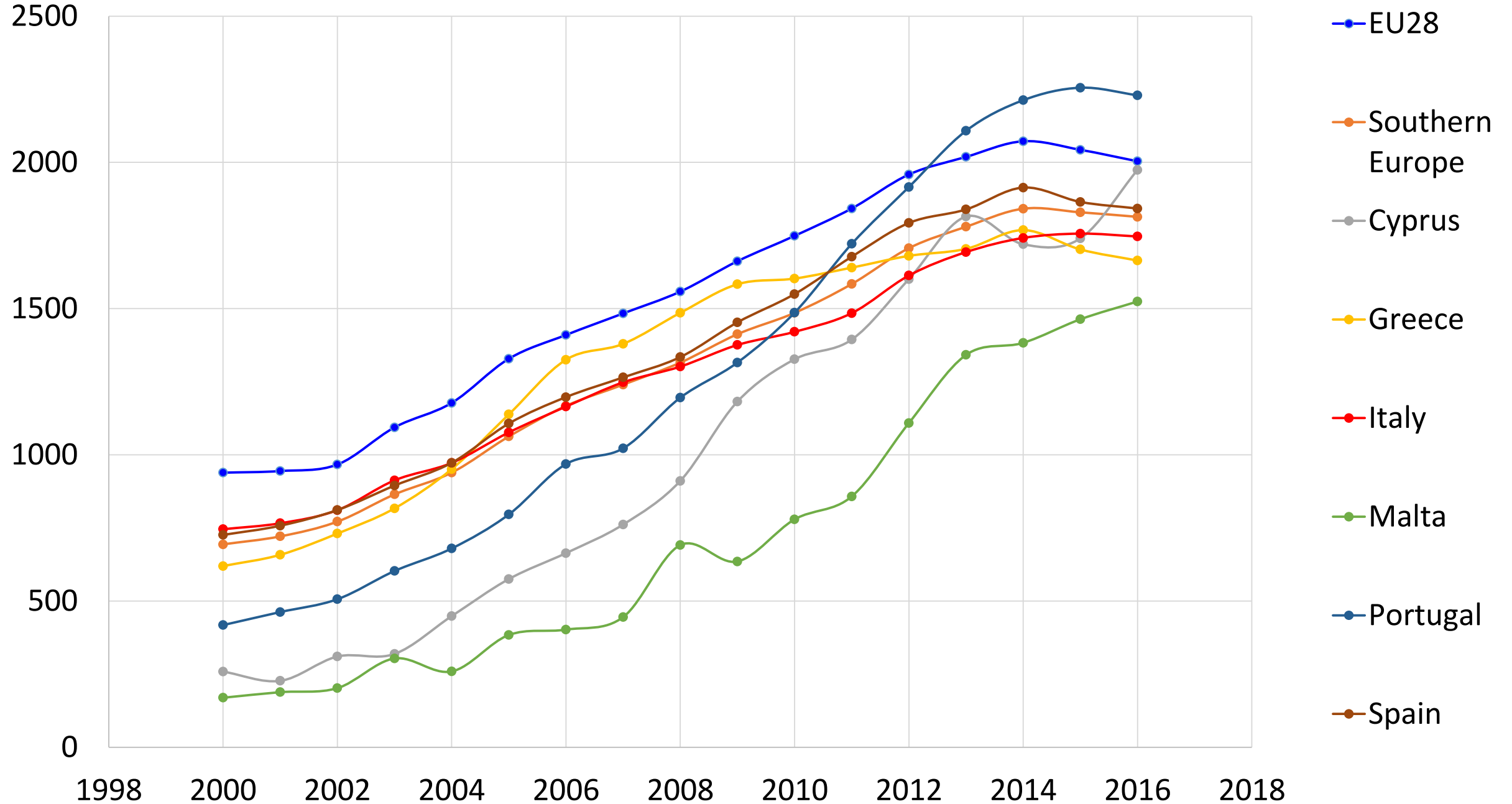
# BERD to GDP % 2004-2015



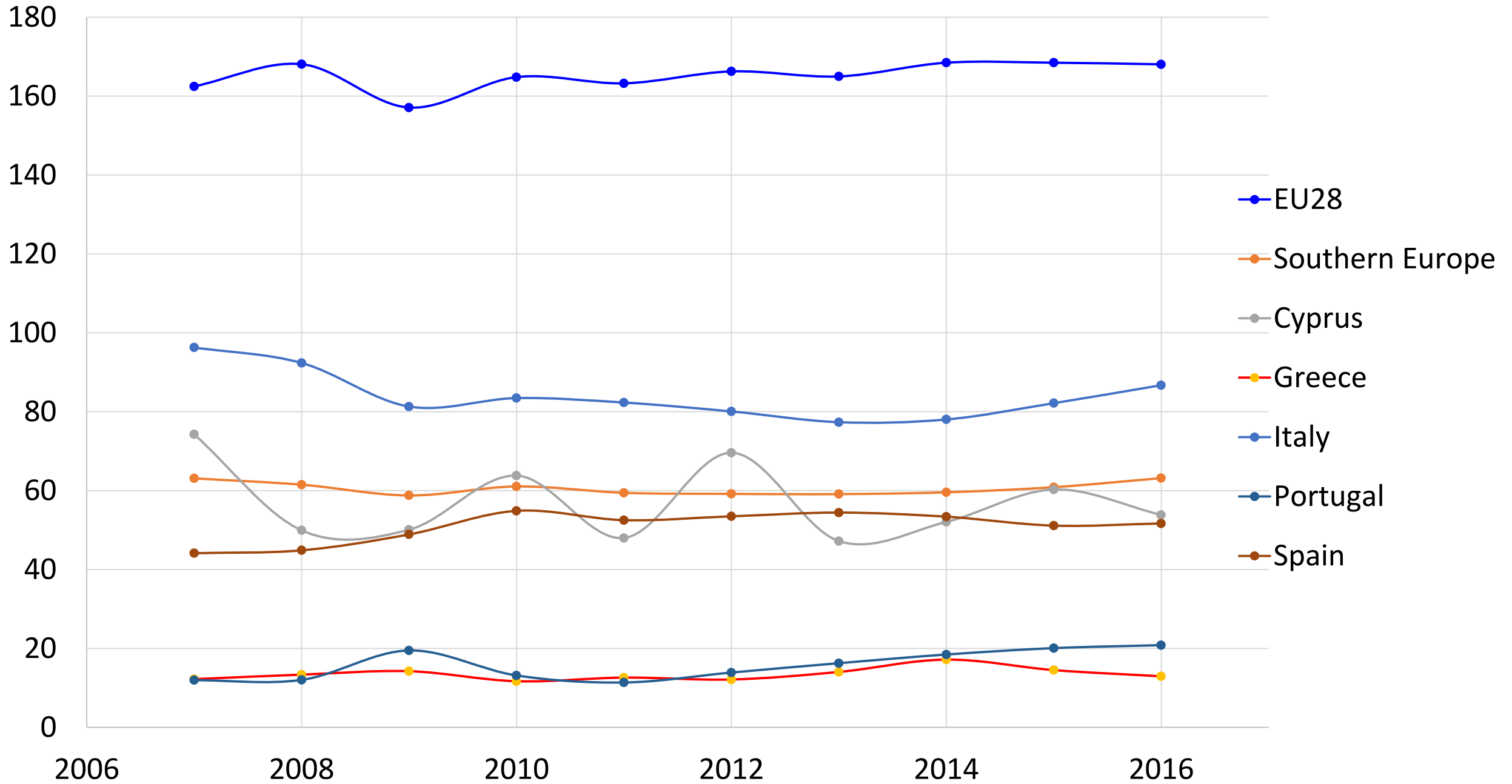
# HERD to GDP % 2004-2015



# Scientific Output per 10<sup>6</sup> People, 2000-2016



# EPO Patents 10<sup>6</sup> People, 2007-2016



Average yearly values over one decade (...not implying causality)

	<b>GERD/GDP 2006-15</b>	<b>BERD/GDP 2006-15</b>	<b>Patents per m. 2007-16</b>	<b>HERD/GDP 2006-15</b>	<b>Publications per m. 2007-16</b>
EU	1.93	1.22	<b>165</b>	0.45	<b>1839</b>
GR	0.70	0.24	<b>13</b>	0.27	<b>1442</b>
IT	1.23	0.66	<b>84</b>	0.36	<b>1538</b>
PT	1.33	0.64	<b>16</b>	0.51	<b>1746</b>
SP	1.27	0.68	<b>51</b>	0.35	<b>1653</b>

## Average values, two 5-years periods

	<b>GERD/GDP</b> 2006-10, 2011-15	<b>BERD/GDP</b> 2006-10, 2011-15	<b>Patents pm</b> 2007-11, 2012-16	<b>HERD/GDP</b> 2006-10, 2011-15	<b>Publicat. pm</b> 2007-11, 2012-16
EU	1.85 / 2.02	1.16 / 1.28	163 / 167	0.43 / 0.47	1659/2019
SE			61/60		1407/1794
GR	0.61 / 0.80	0.20 / 0.27	13 / 14	0.24 / 0.31	1538/1704
IT	1.16 / 1.30	0.61 / 0.71	87 / 81	0.35 / 0.37	1336/1710
PT	1.33 / 1.35	0.64 / 0.64	14 / 18	0.46 / 0.56	1348/2144
SP	1.28 / 1.27	0.69 / 0.67	49 / 53	0.35 / 0.36	1456/1851



## Some conclusions from the last two tables

- Recession impacted on both GERD/GDP and BERD/GDP in Spain and Portugal, which remained flat over the decade
- Italy and Greece progressed well on those two indicators (like the EU) – though Greece's GERD still < 1% of GDP
- **However** the former two improved their patenting performance, while the latter two didn't – but all 4 remained too far of both the EU's patenting average and international '*best practice*'
- All the 4 countries progressed well in publications (specially Portugal)
- The gap between S.E. and the EU much bigger for patenting (*gap going up!*) than for publications (*gap going down*)

What are the policy implications?

Simplistic analysis ← R&D, patenting, publications...

We didn't discuss neither the quality of the publications nor the economic relevance of patenting activities

Determinants of scientific impact (Confraria et al 2017):

- Impact of publication not linearly related to GDP per capita
- Others factors seem more relevant, including international and industrial co-authorships and existence of minimal critical mass in different areas

# How to connect S&T?

EU Southern countries have a relatively good scientific performance

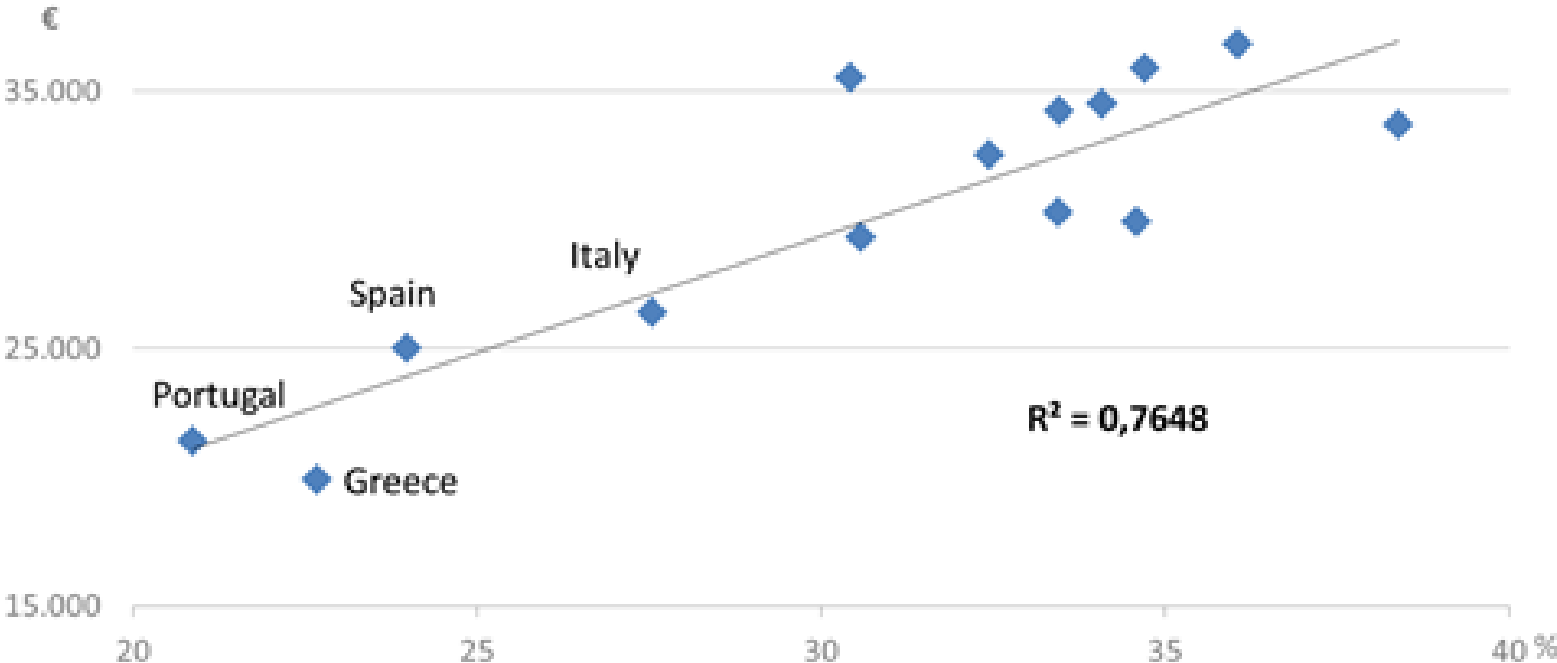
(at least much better than some countries which are patenting a lot more)

How to get the return from existing “scientific knowledge stock”?

[Arqué-Castells et al \(2016\)](#) show that for Spain and Portugal university researchers do not respond to higher royalty shares for patent licensing; most university patents have low commercial value; TTOs not enough focused on patent licensing

# The structural disadvantage

**GDP per capita (in PPS) vs. Technology- and knowledge-intensive activities (as % of manufacturing and market services)**



## Godinho & Mamede (2016), Southern Europe in crisis: industrial policy lessons from Italy and Portugal

- Lucchese, Nascia & Pianta (2016) argue that deindustrialization in Italy stems partially from the shortcomings of industrial policy.
- Our assessment of industrial policy in Portugal indicate that the absence of structural change does not seem to stem from the absence of adequate industrial policy measures.
- We concluded that despite existing room for improvements in the industrial policies, overcoming the current crisis in Southern Europe will require changes in macroeconomic policies.

# To finalise

- Keep open the channels to absorb external S&T knowledge
- Need of institutional change and adaptation
- Improvements in the macroeconomic setting