Diverging TFP/Innovation trends

Facts and policies

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Motivation

Over the medium- to longer term, trends in innovation capacity and total factor productivity growth will determine the growth and convergence trajectories of the EU economies.

Moreover, persistent innovation and productivity growth divergences among EU, and in particular euro area, countries raise concerns of rising income differentials and long-term cohesion across countries.

- **What are the major trends and drivers of total factor productivity growth in the EU? And of innovation capacity more specifically?**
- **How different are the TFP and Innovation numbers for EU member countries?**
- **Are the differences diminishing over time, establishing convergence?**
- **Are the laggards catching up?**
- **Impact of the crisis?**
- **What policy recommendations to re-ignite a sustainable convergence process?**

Assessing heterogeneity and convergence

We will look at trends in TFP growth and **Innovation capacity** more particularly & directly

Because of different capacities to put in place a virtuous innovation-growth eco-system, but also because of differences in initial conditions requiring innovation systems to be composed in a different way, we can expect substantial heterogeneity among European countries in innovation capacity.

We expect the process of EU and economic integration to push convergence in innovative capacity and TFPgrowth

To measure heterogeneity in innovation capacity, we use the **σ-coefficient** or the **coefficient of variation CV (**√VAR/MEAN).

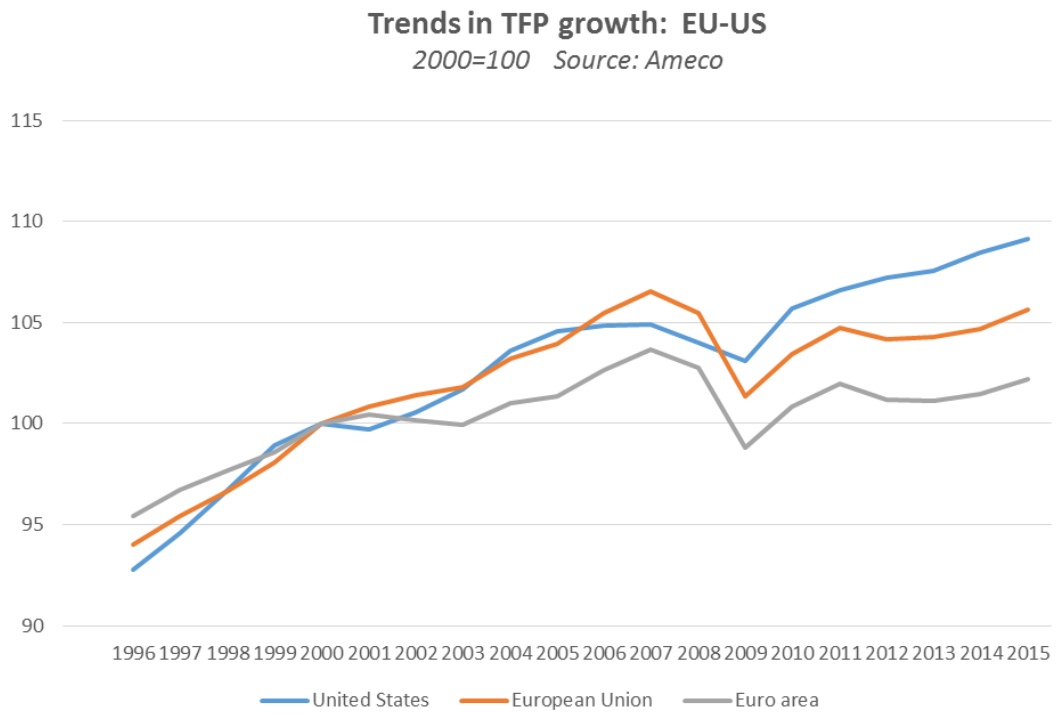
σ-convergence occurs when the dispersion (CV) across a group of economies, decreases over time.

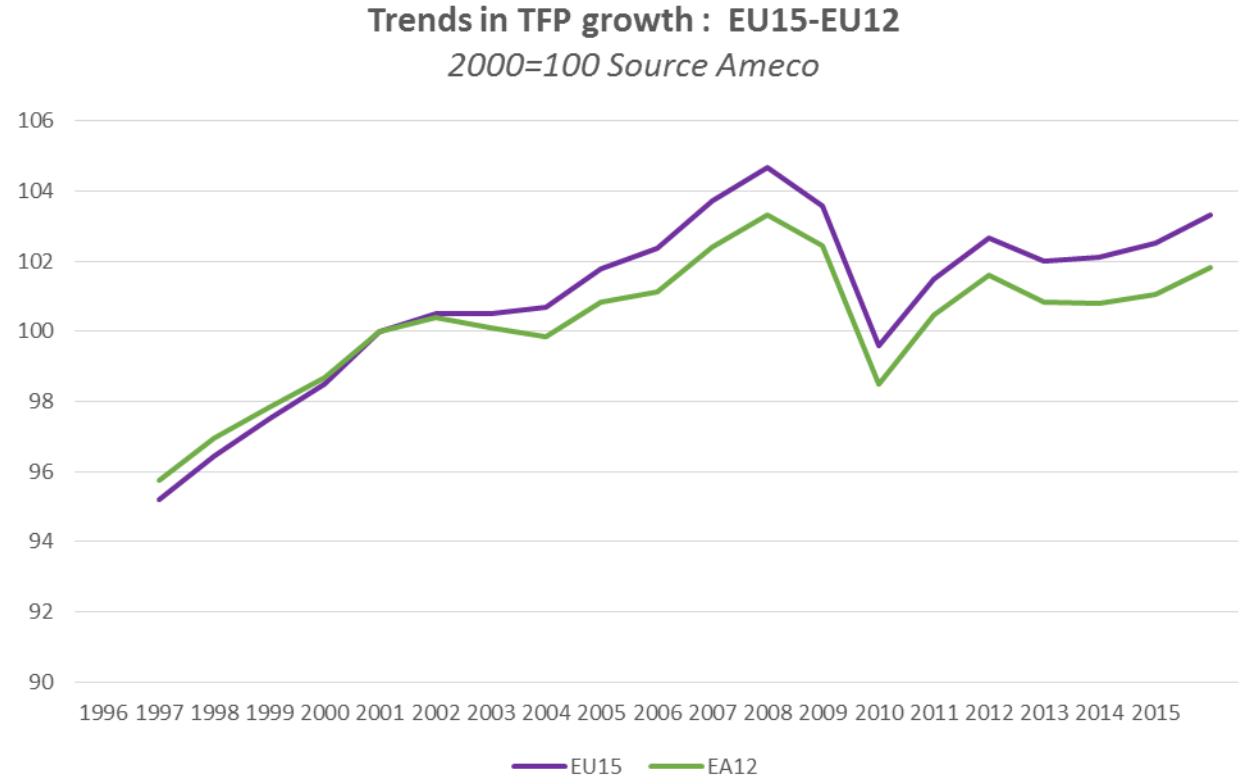
We will look within the EU, to different groups, reflecting different (initial) conditions and capacities:

- EURO vs NON-EURO
- EU15 vs EU13
- EU SOUTH vs EU NORTH
- Innovation leaders vs Innovation laggards

We will disentangle overall EU heterogeneity (and its trend) into **between** group gaps (and its trend) and **within** group heterogeneity (and its trend)

Trends in TFP growth

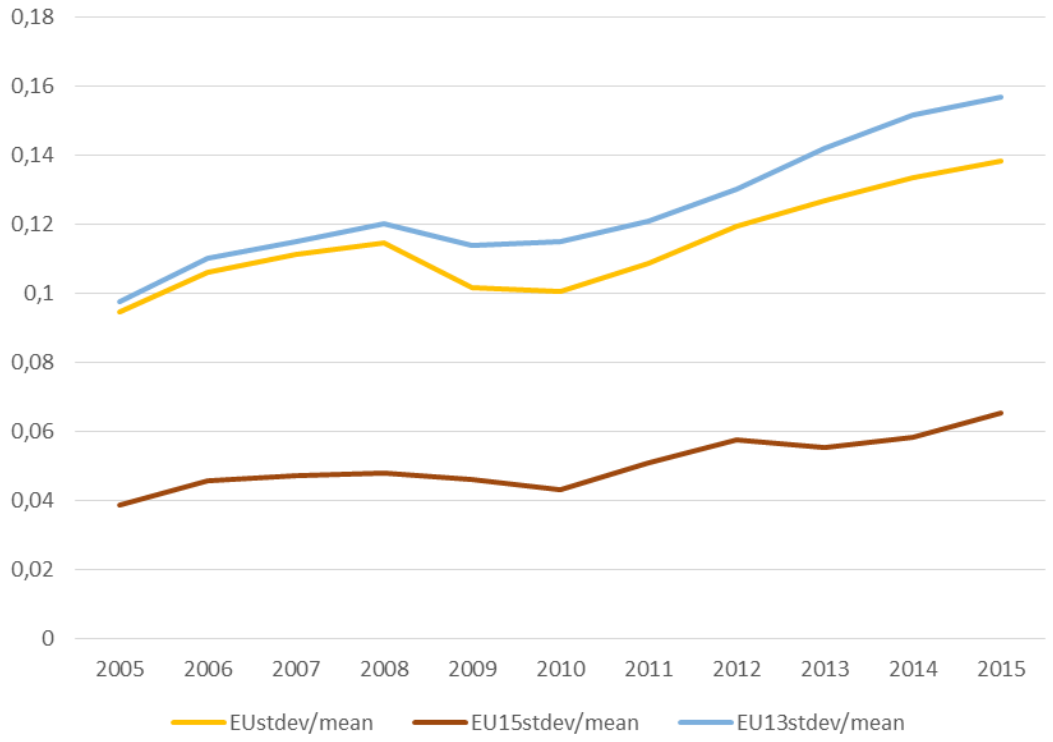




Dispersion in TFP growth: trend

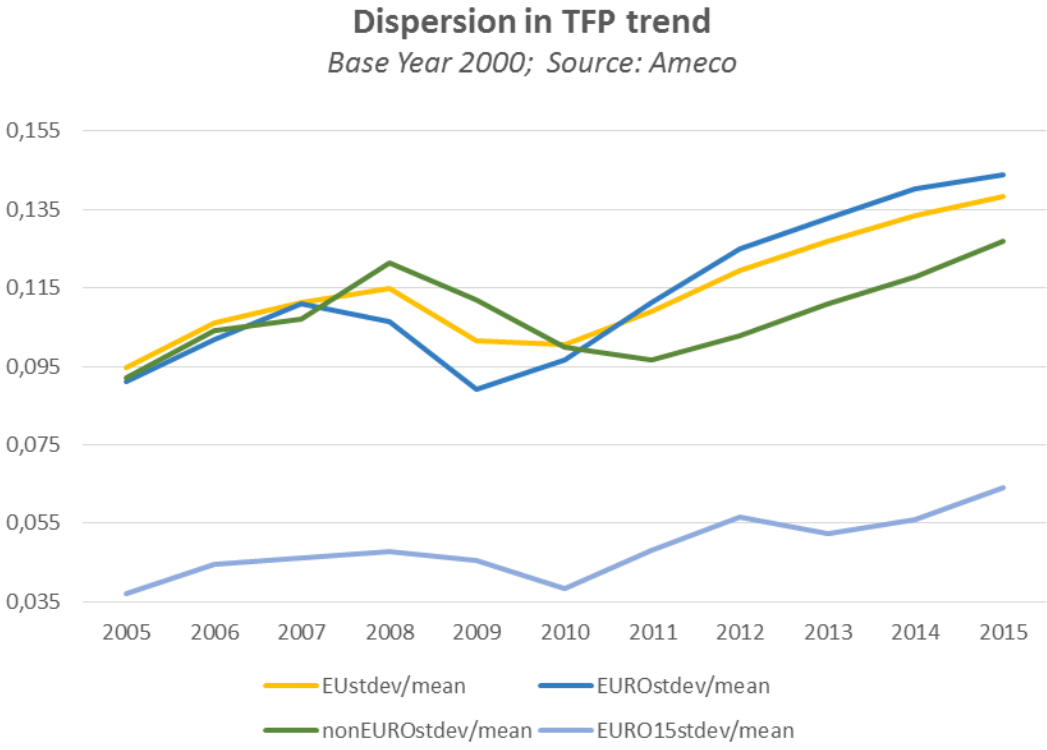
Sigma convergence (coefficient of variation)

EU: EU 15 vs EU13

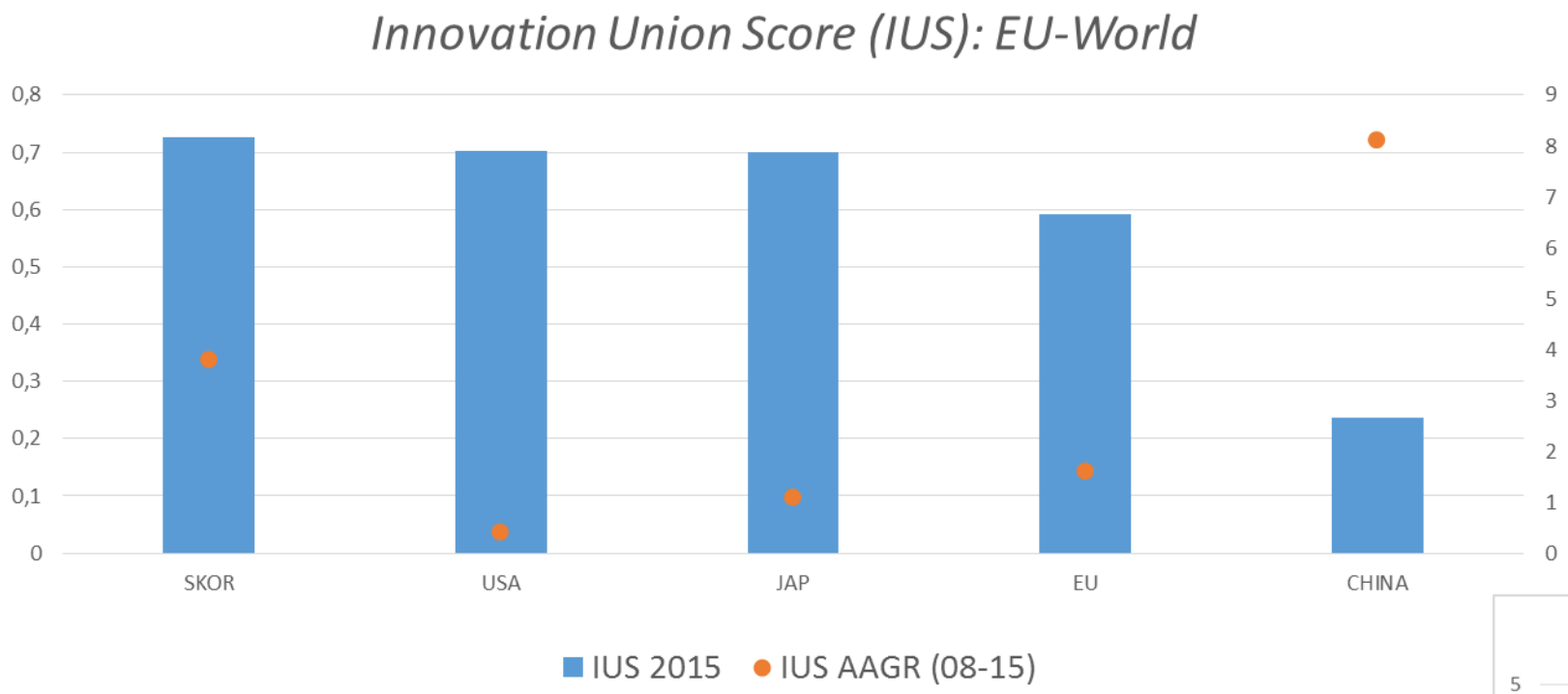


Sigma convergence (coefficient of variation)

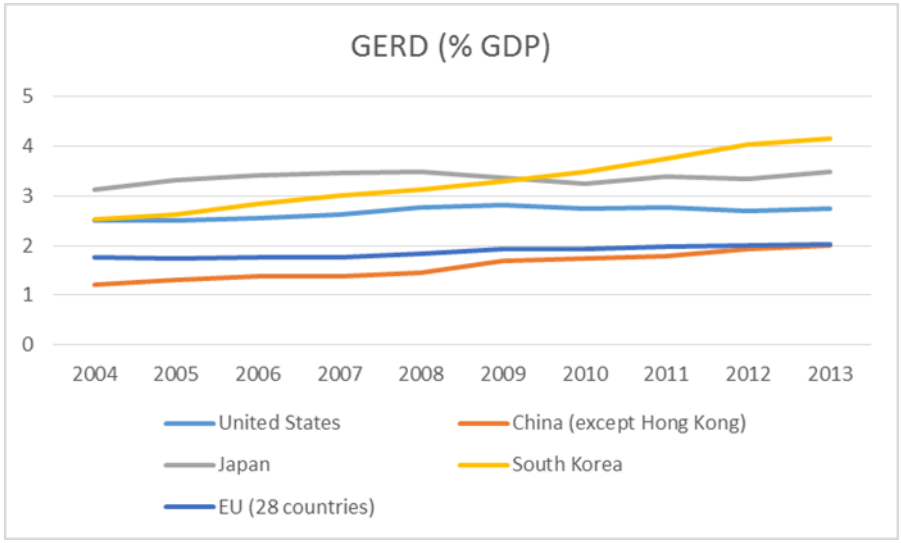
Eurozone



Trends in Innovation Capacity



Source: EC, Innovation Union Scoreboard, 2016

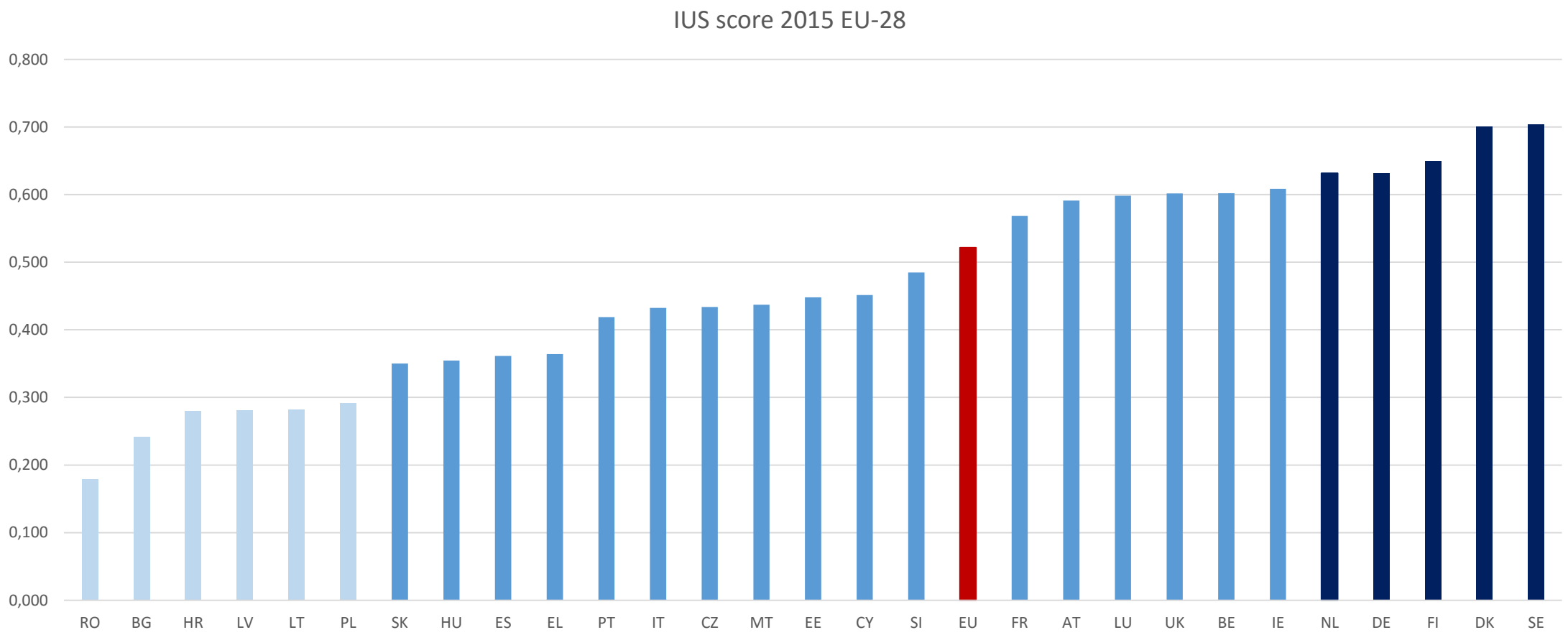


Source: EUROSTAT (2016)

[1] IUS is a composite indicator capturing 8 dimensions of innovation: Human Resources, Research Systems, Finance, Firm Investment, Linkages, IPR, Innovations, Economic Effects. For the international benchmarking of Europe, it uses information from 12 indicators to assess these 8 dimensions.

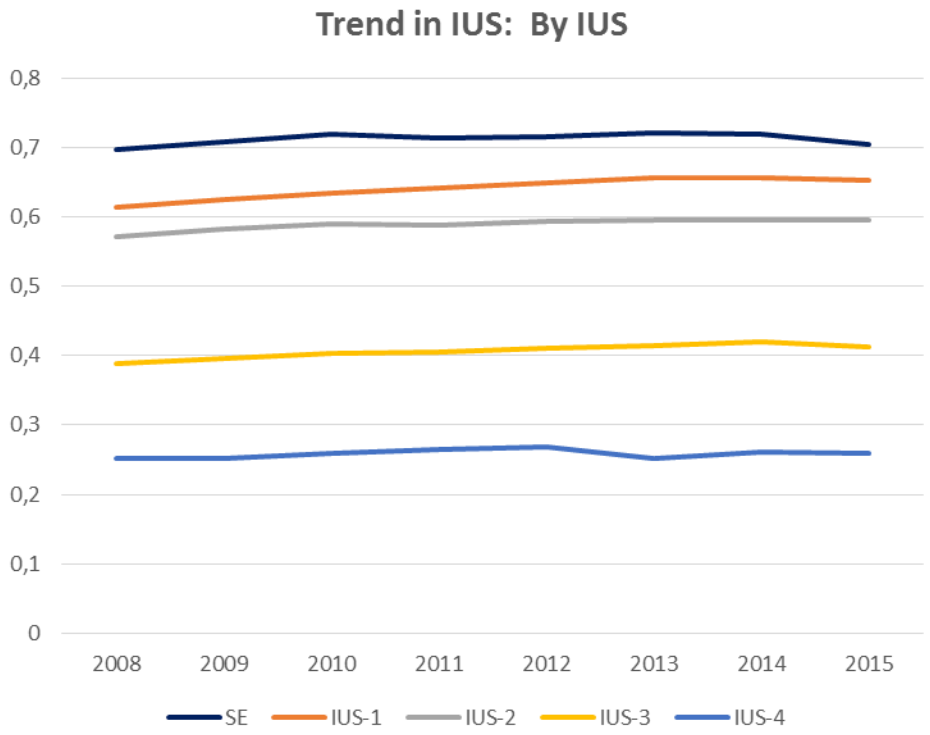
Innovation Capacity within EU

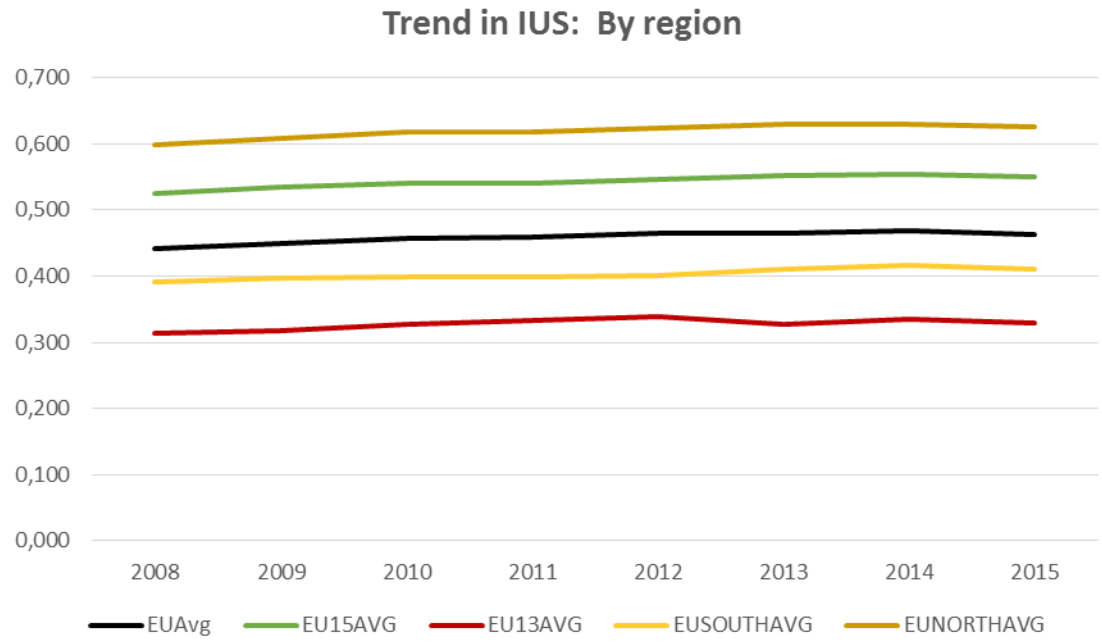
Innovation Union Score by EU Member States



Source: EC, Innovation Union Scoreboard, 2016

Trends in Innovation Capacity within EU

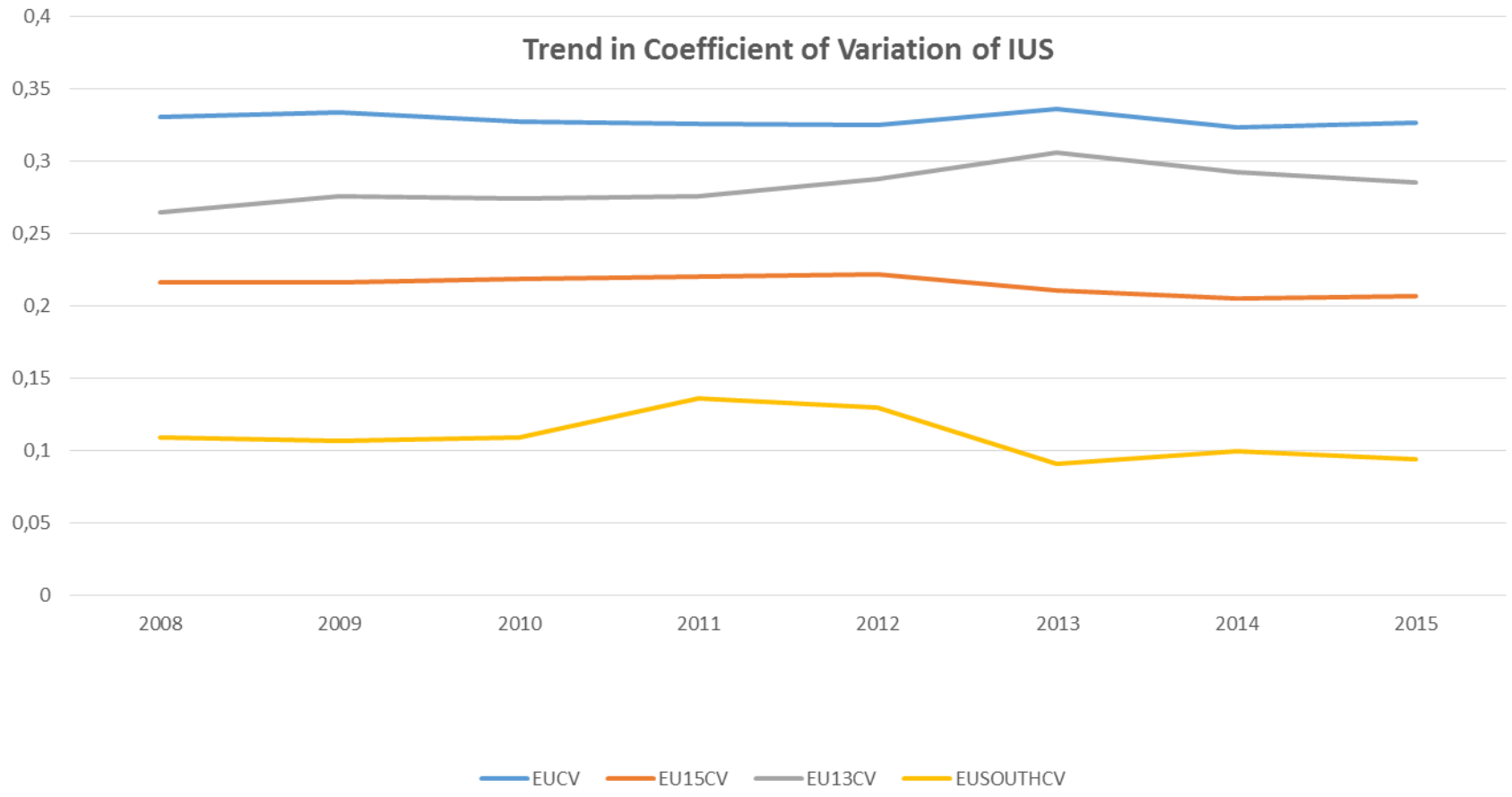




Source: Own calculation on basis of EC, Innovation Union Scoreboard, 2016

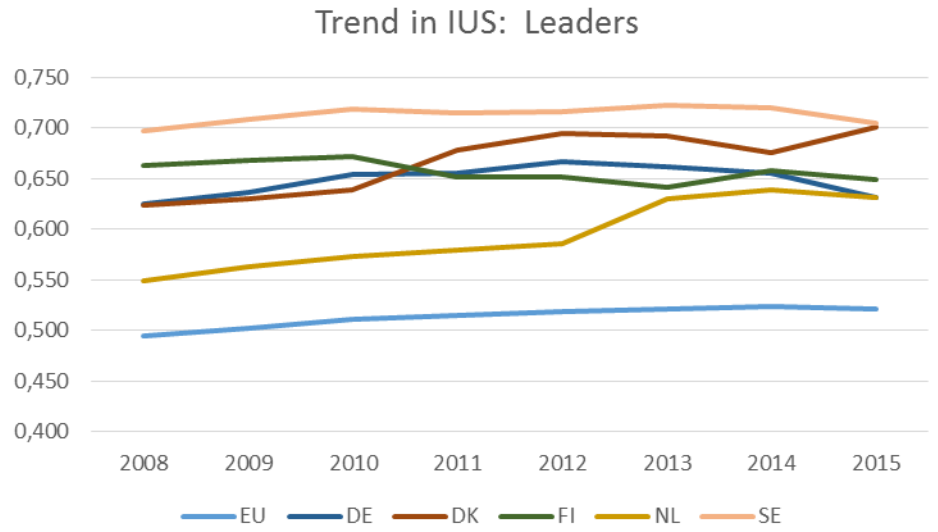
Convergence in Innovation Capacity within EU

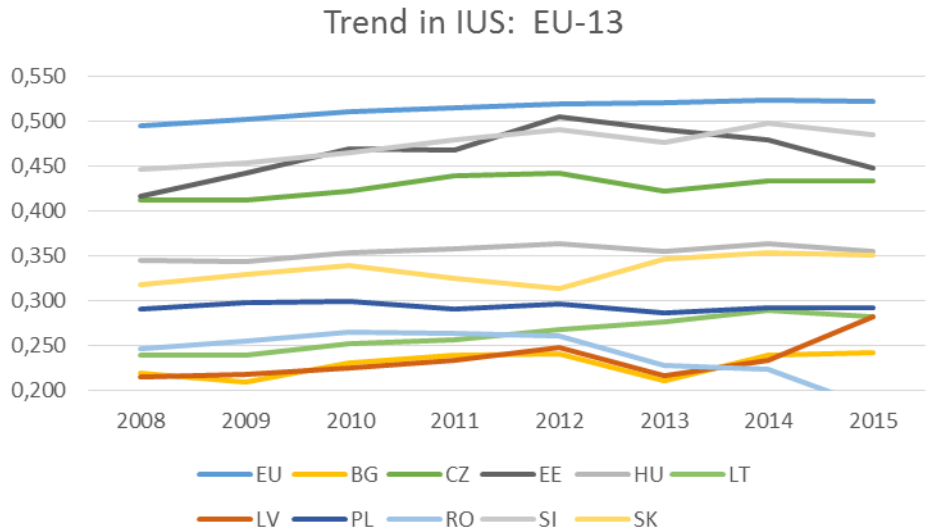
σ-convergence in Innovation Capacity

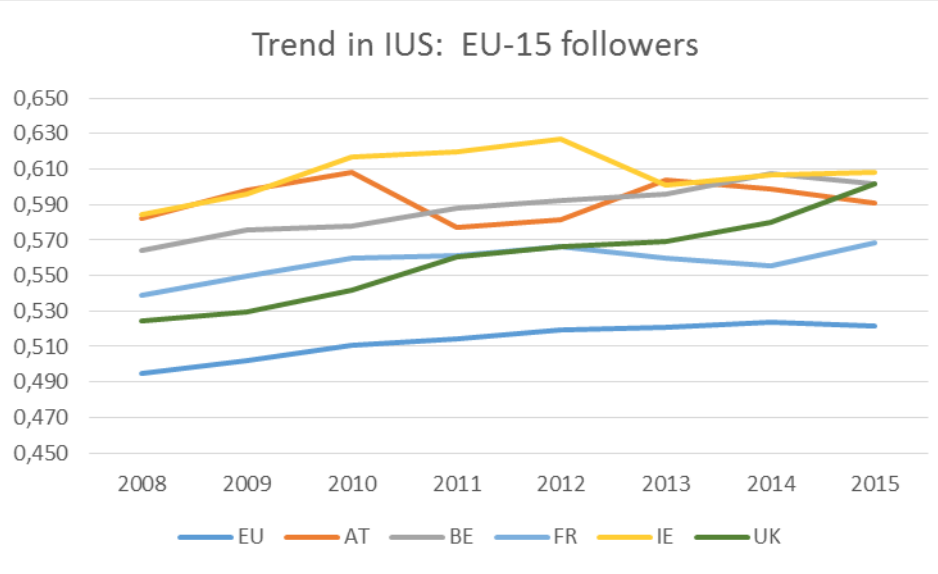


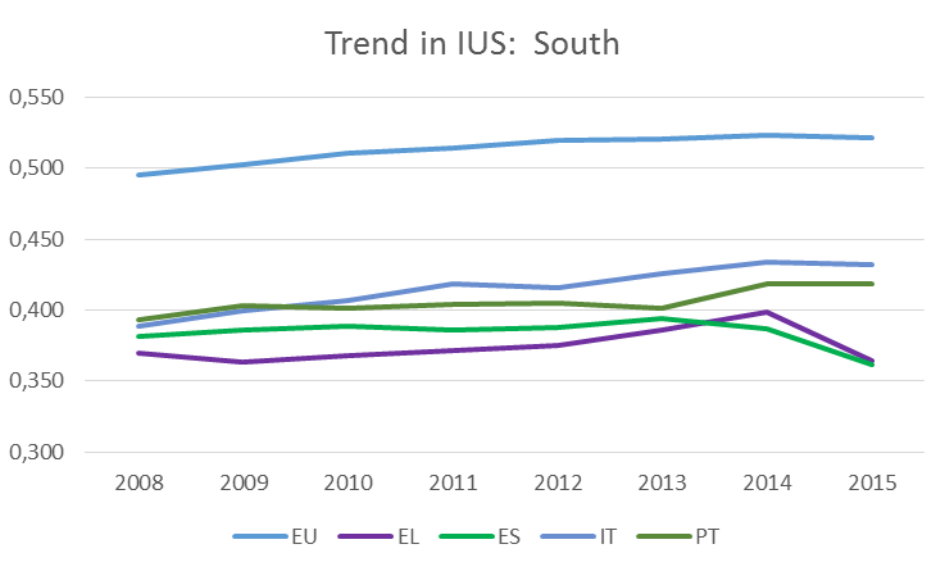
Source: Own calculation on basis of EC, Innovation Union Scoreboard, 2016

Selected Countries





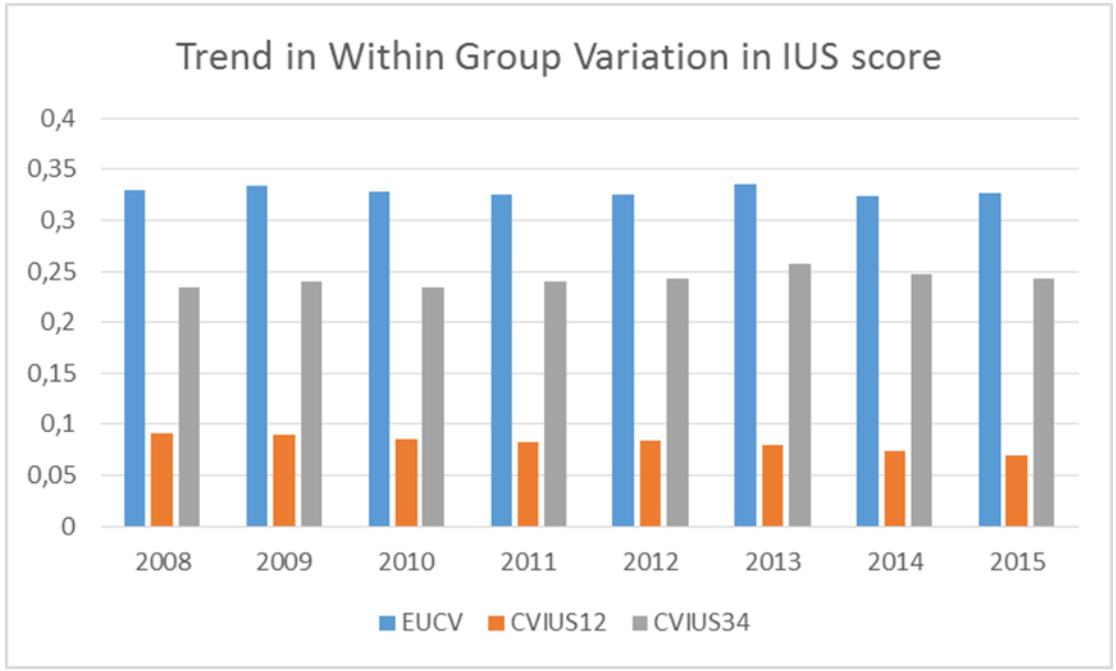


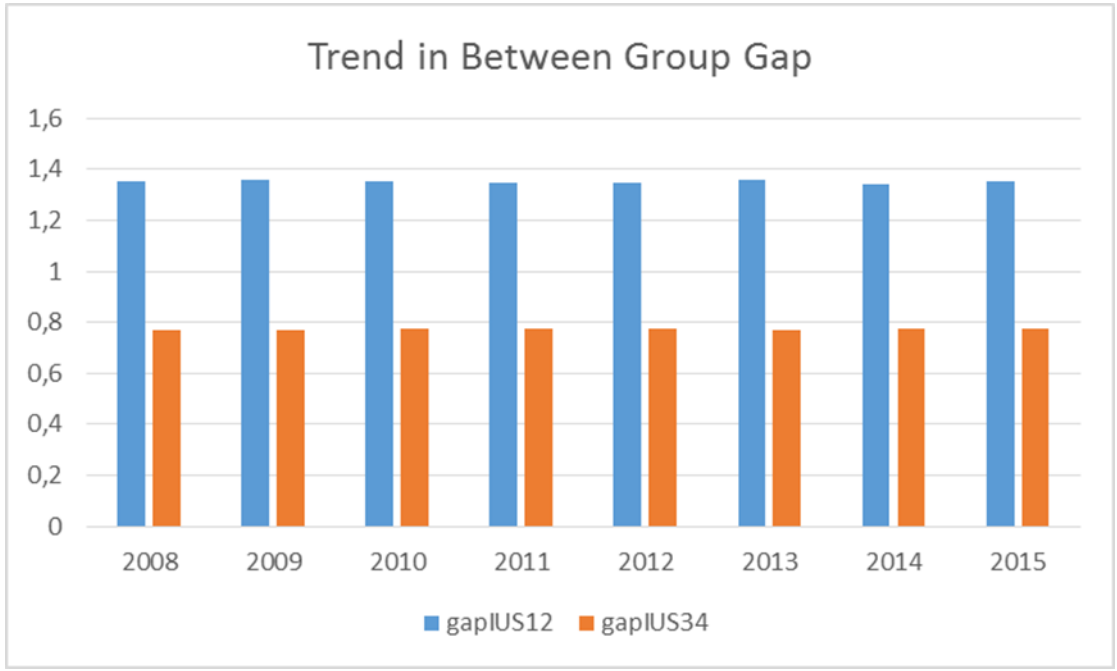


Source: EC, Innovation Union Scoreboard, 2016

Trends in Within and Between Group Variation in IUS

By IUS groups

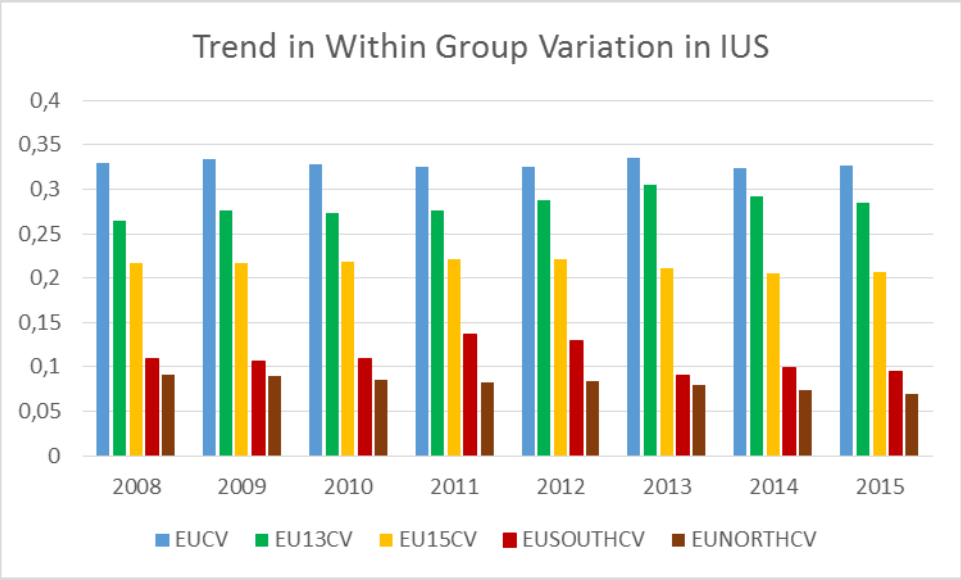


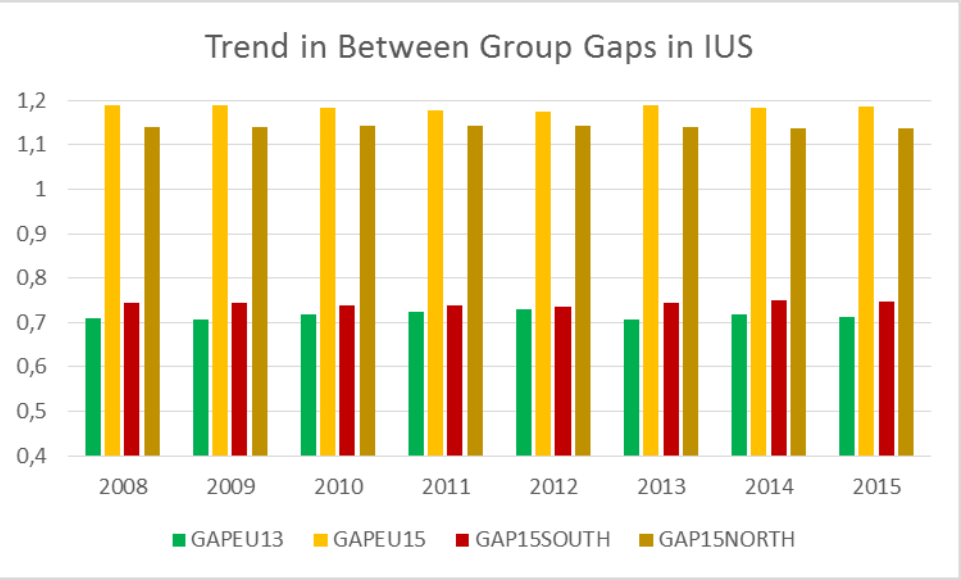


Source: Own calculation on basis of EC, Innovation Union Scoreboard, 2016

Trends in Within and Between Group Variation in IUS

By Region

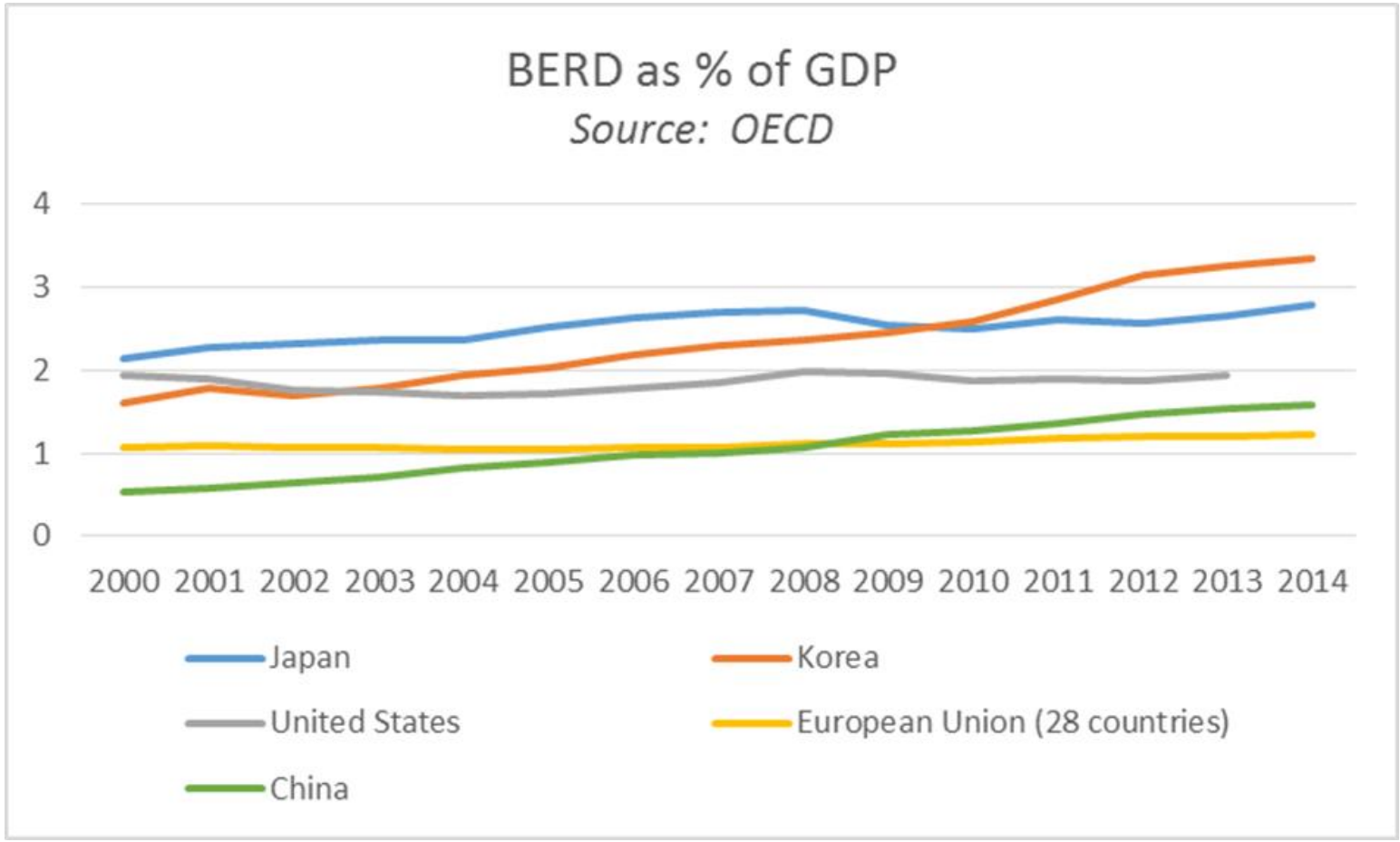




Source: Own calculation on basis of EC, Innovation Union Scoreboard, 2016

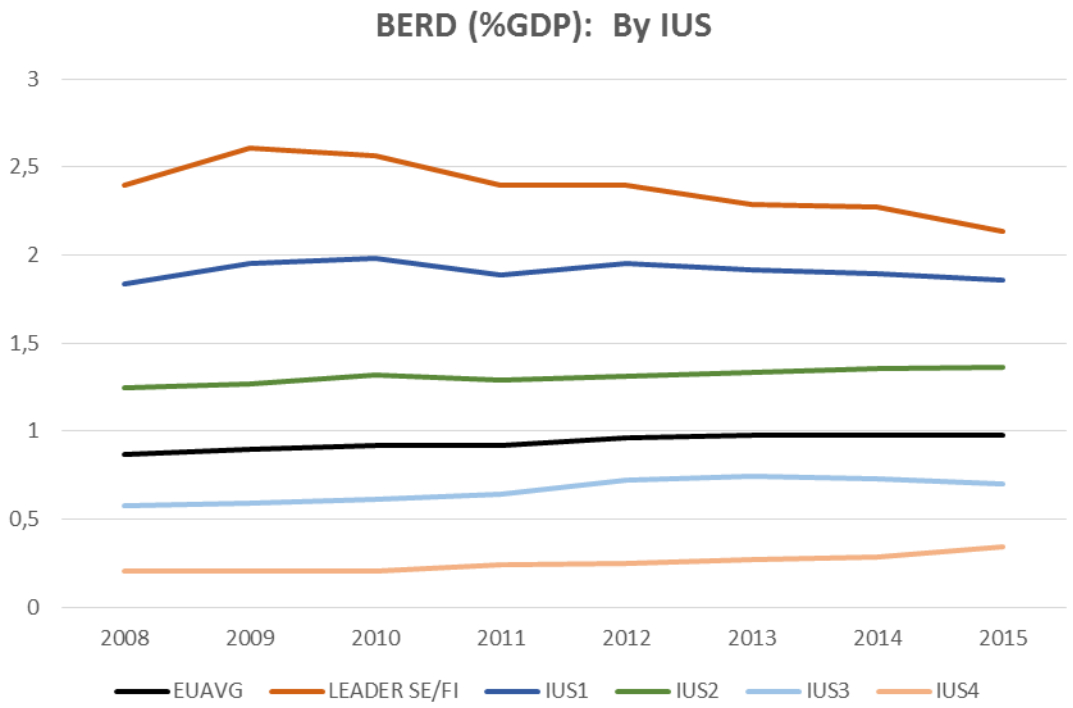
Private Sector Innovation Capacity

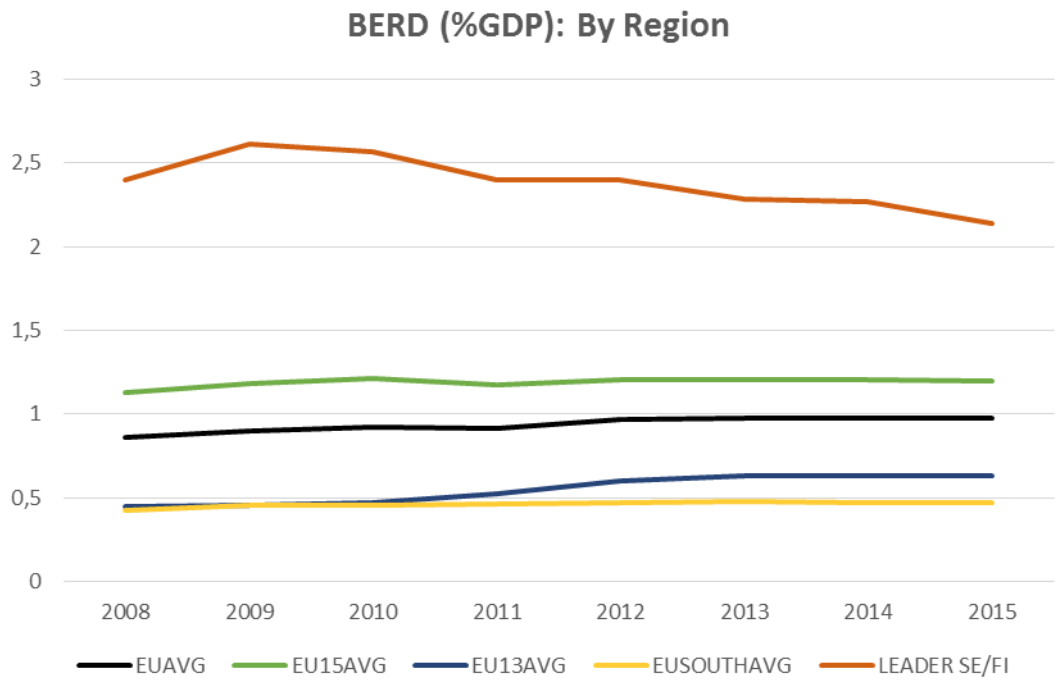
Business Expenditures on R&D: EU-World



Private Sector Innovation Capacity

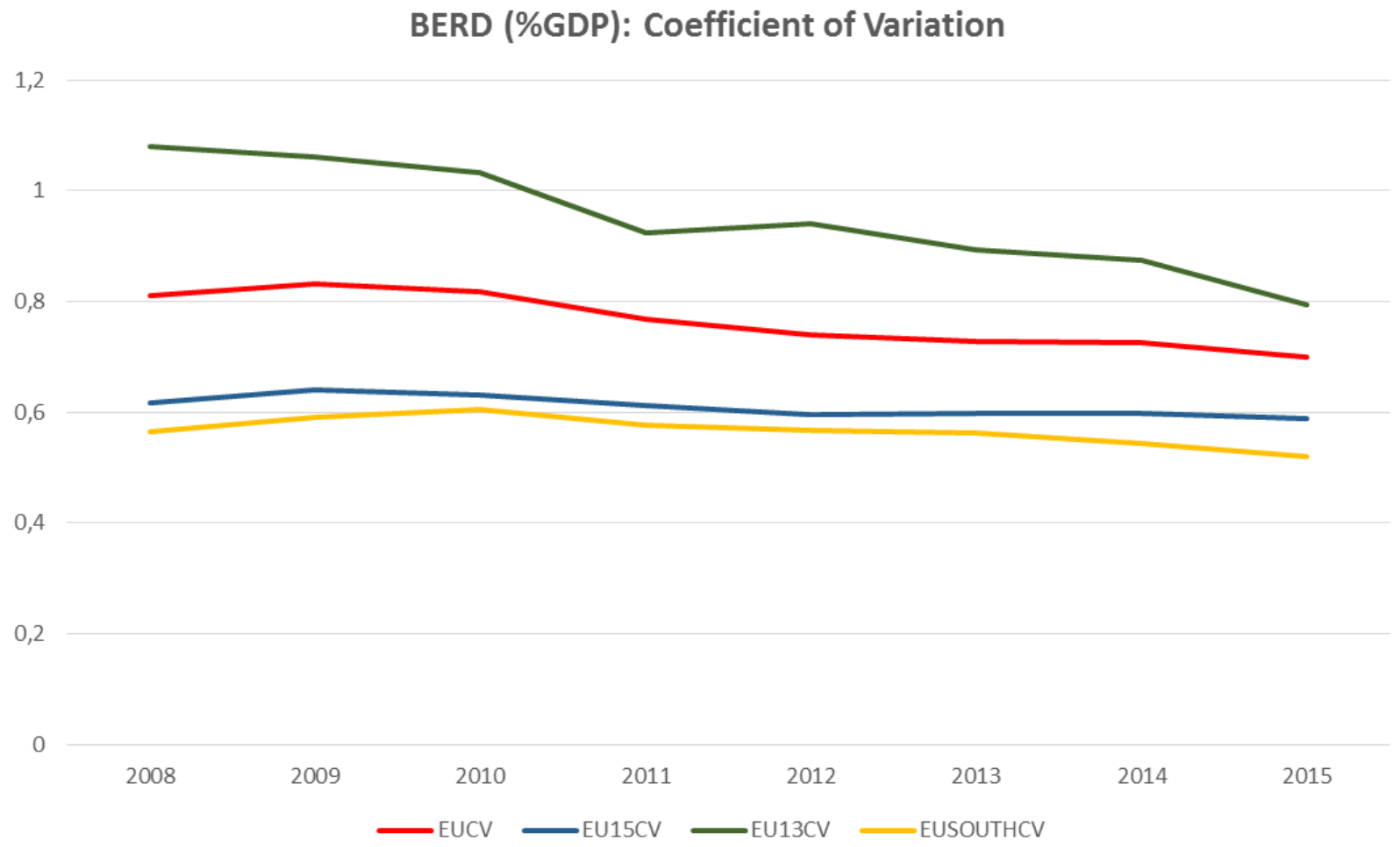
Business Expenditures on R&D





Source: Own calculation on basis of EC, Innovation Union Scoreboard, 2016

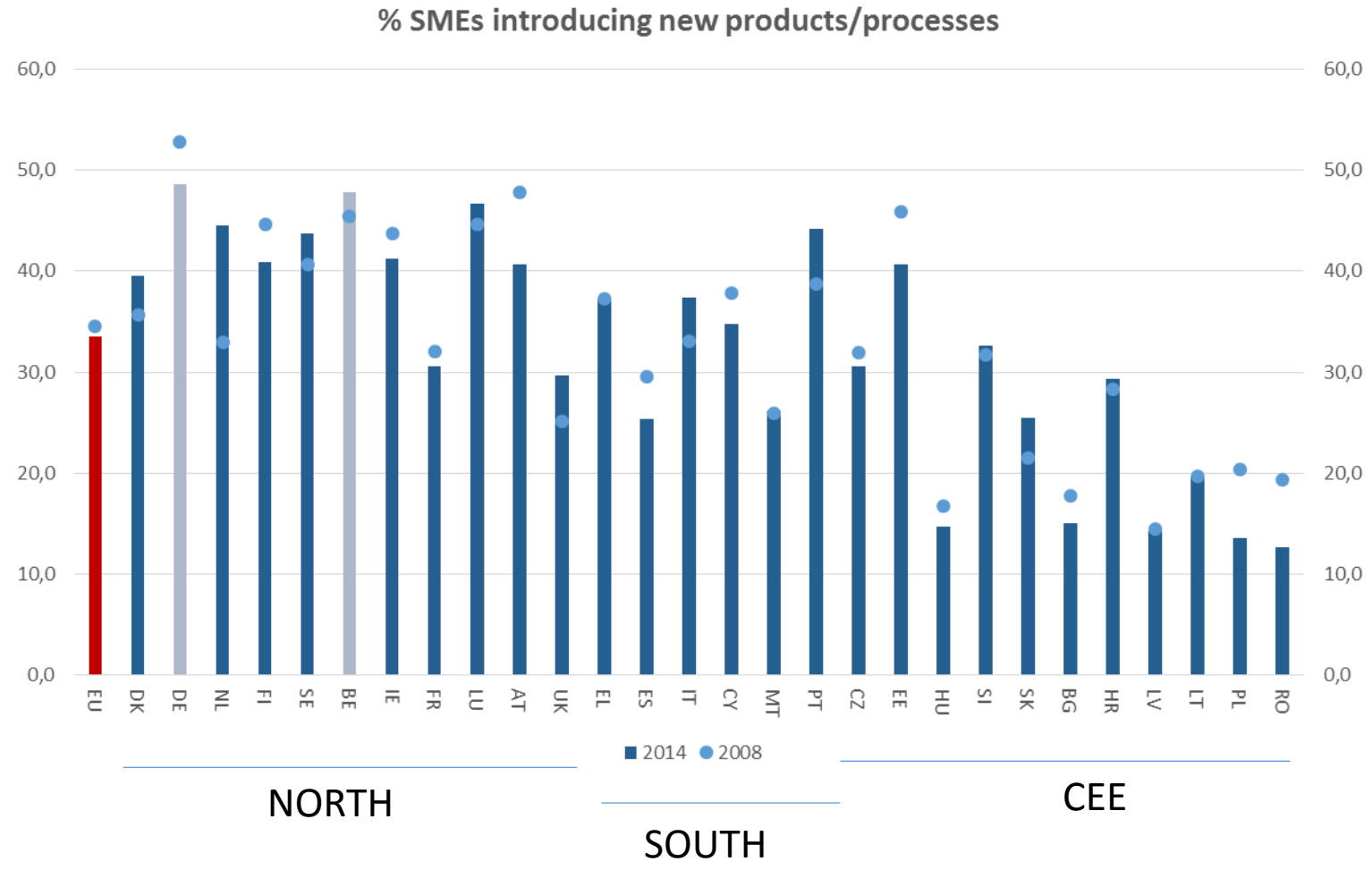
Convergence in Private Sector Innovation Capacity within EU



Source: Own calculation on basis of EC, Innovation Union Scoreboard, 2016

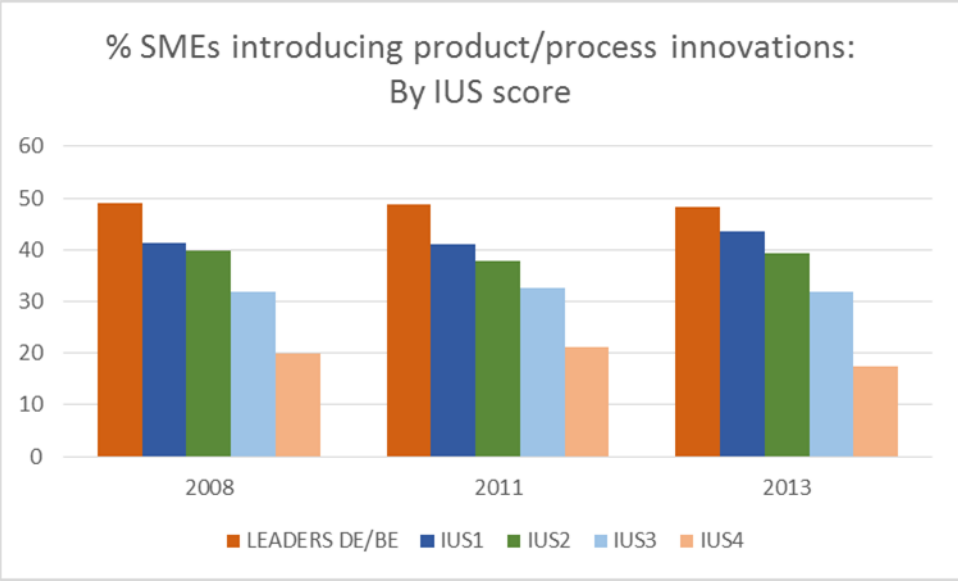
Private Sector Innovation Capacity:

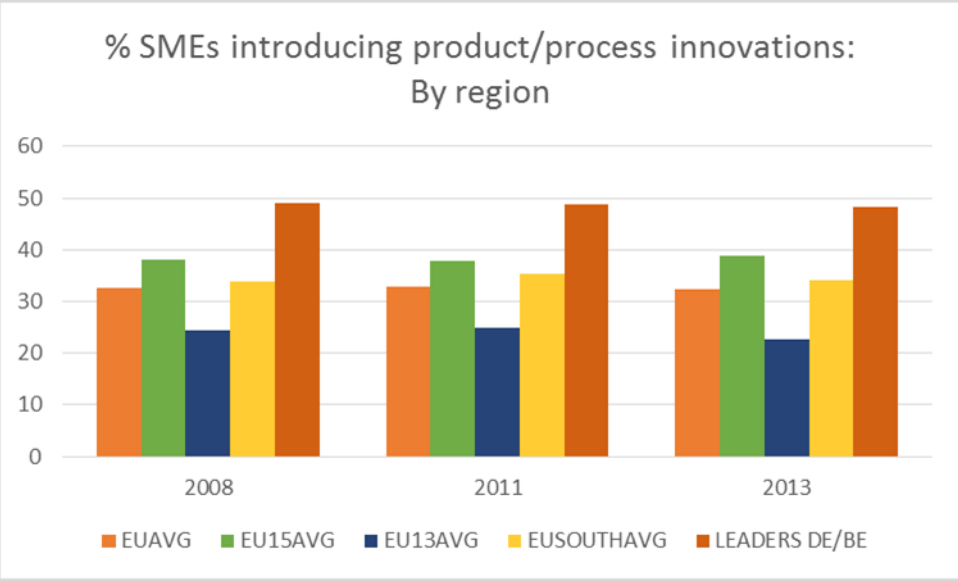
SMEs introducing innovations



Source: EC, Innovation Union Scoreboard, 2016 on basis of different waves of CIS

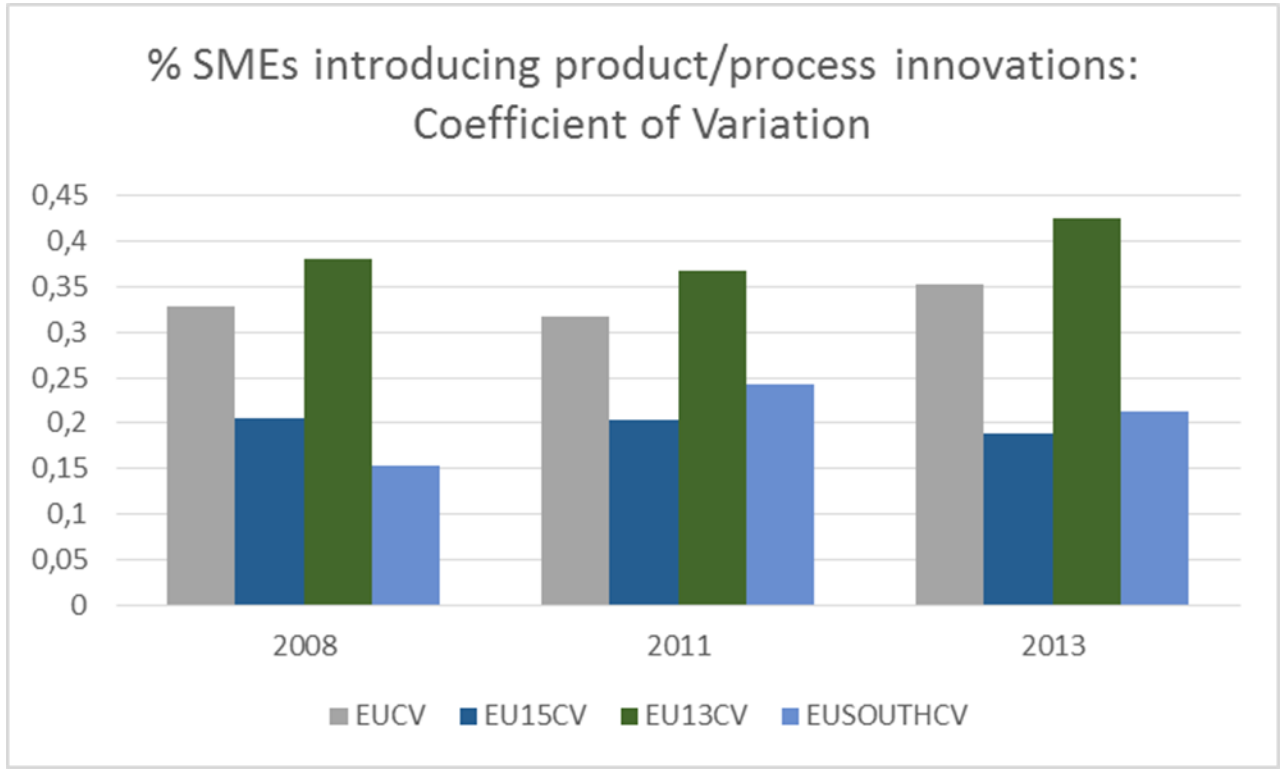
Private Sector Innovation Capacity:
SMEs introducing innovations





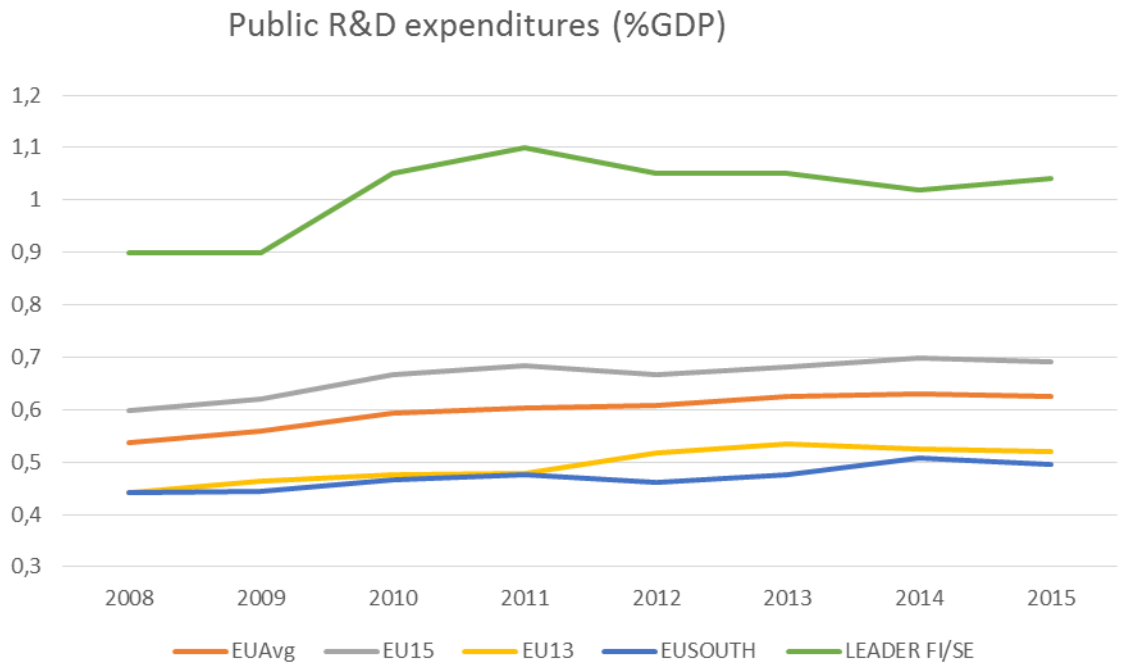
Source: Own calculations on basis of EC, Innovation Union Scoreboard, 2016 on basis of different waves of CIS

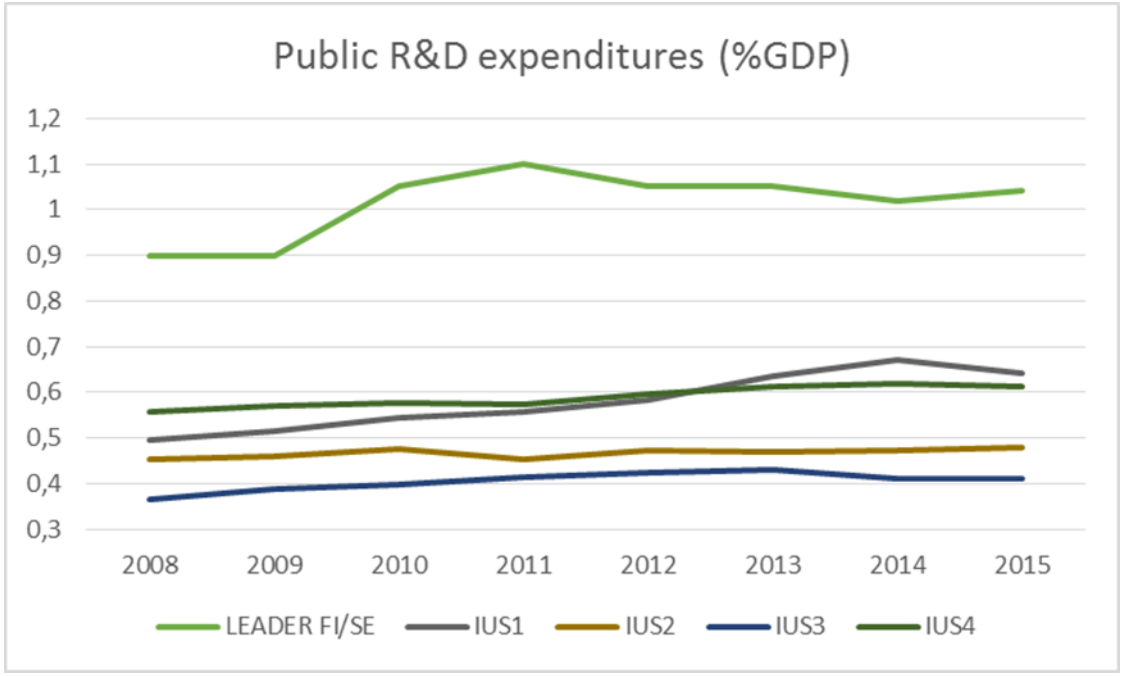
Convergence in Private Sector Innovation Capacity



Source: Own calculations on basis of EC, Innovation Union Scoreboard, 2016 on basis of different waves of CIS

Enablers of innovation capacity:
public R&D expenditures

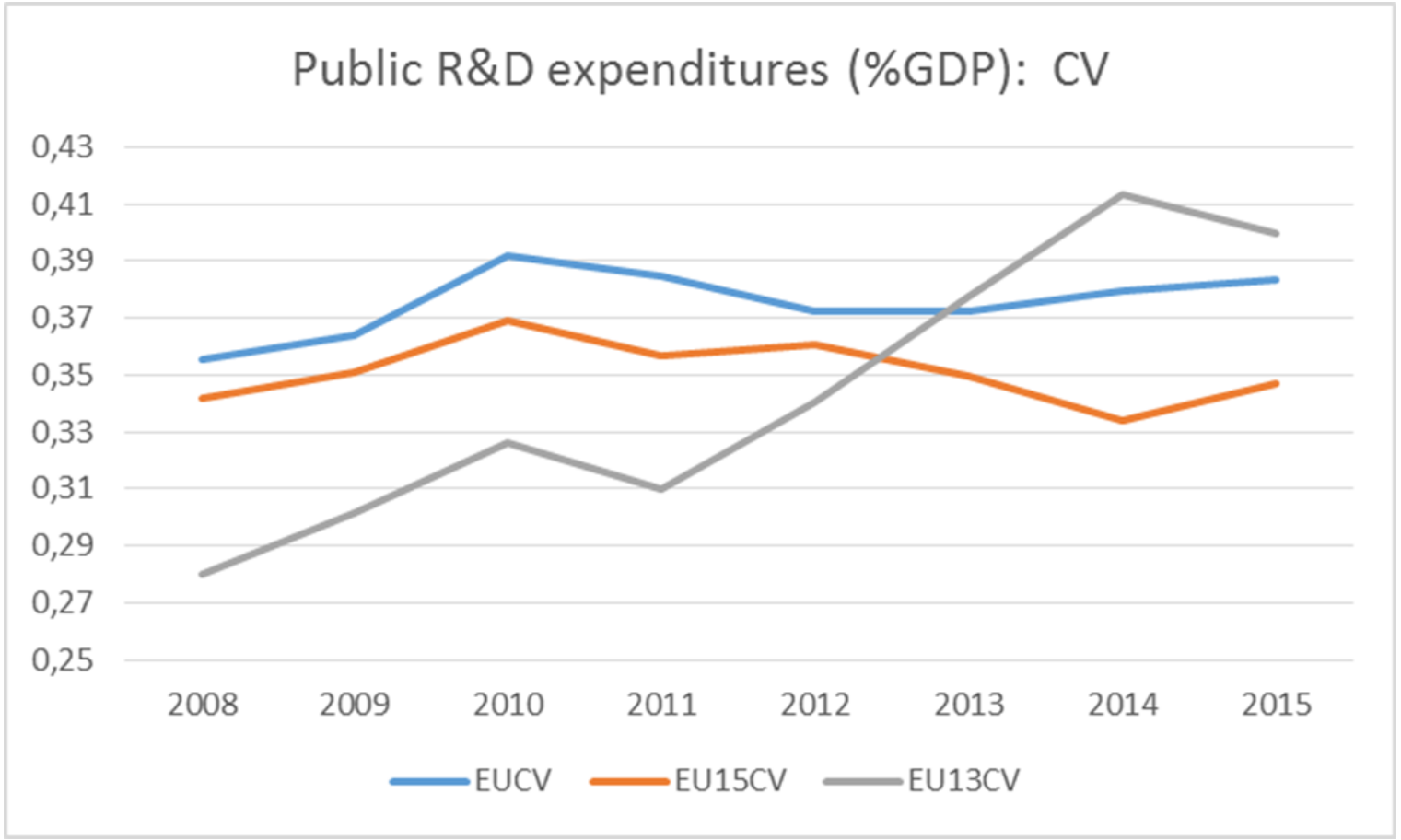




Source: Own calculations on basis of EC, Innovation Union Scoreboard, 2016

Enablers of innovation:

Convergence in public R&D expenditures within EU



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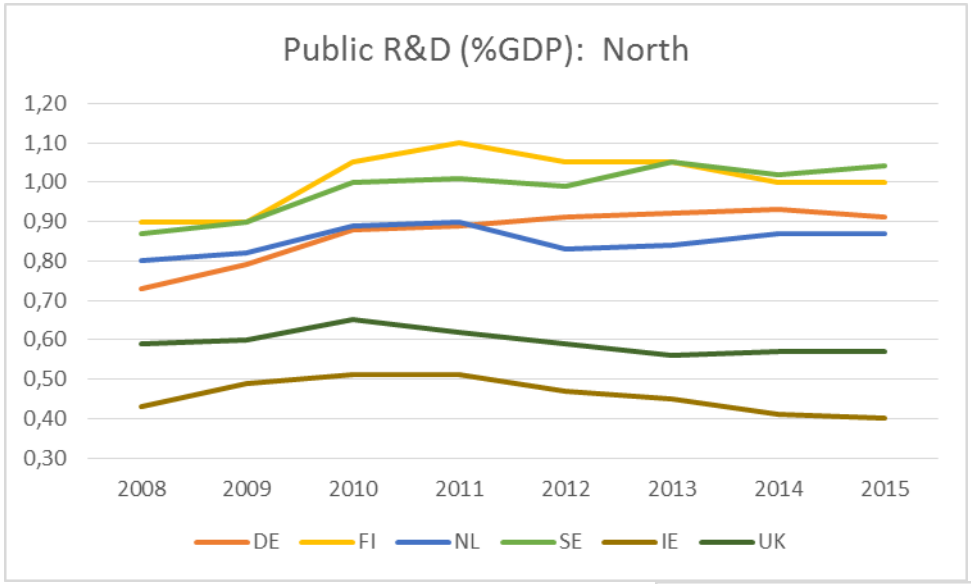
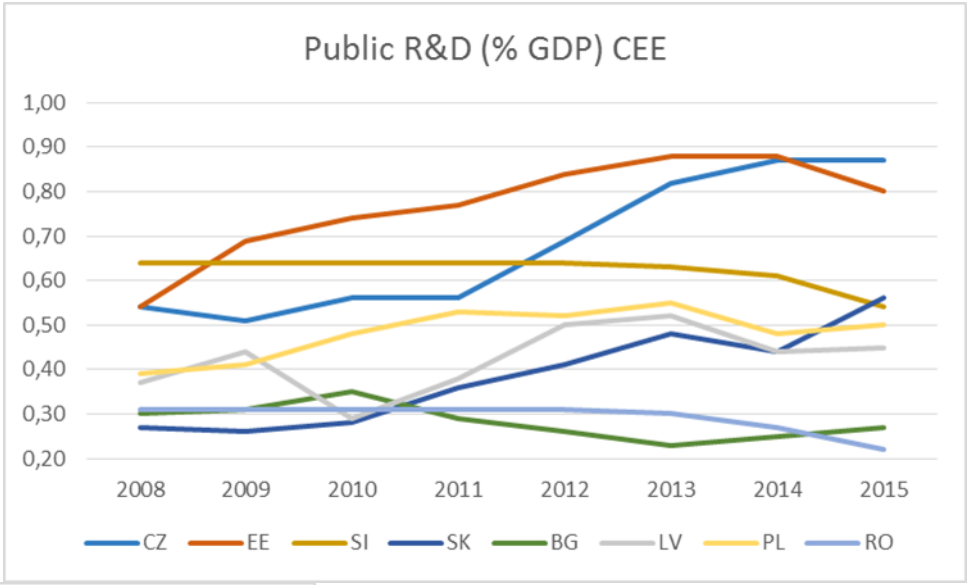
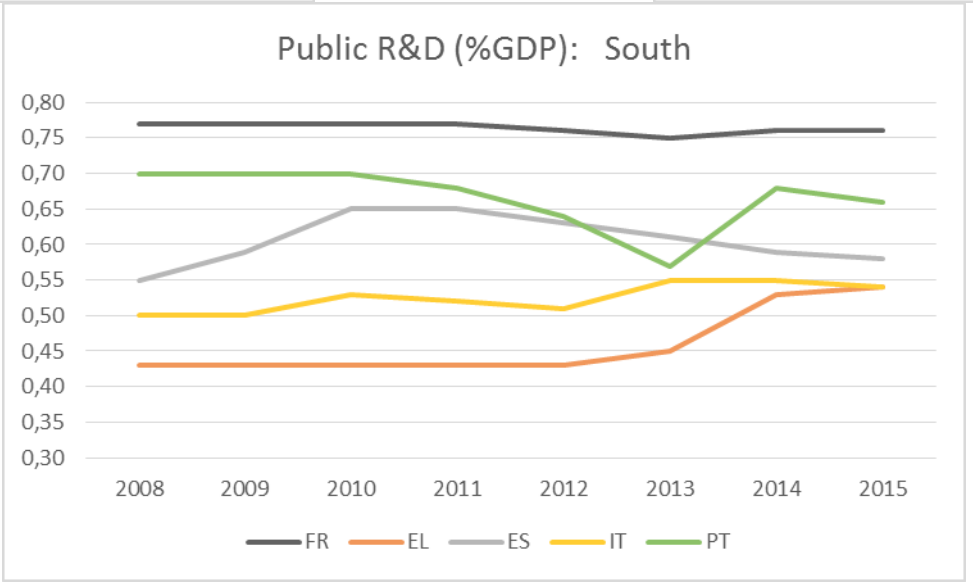


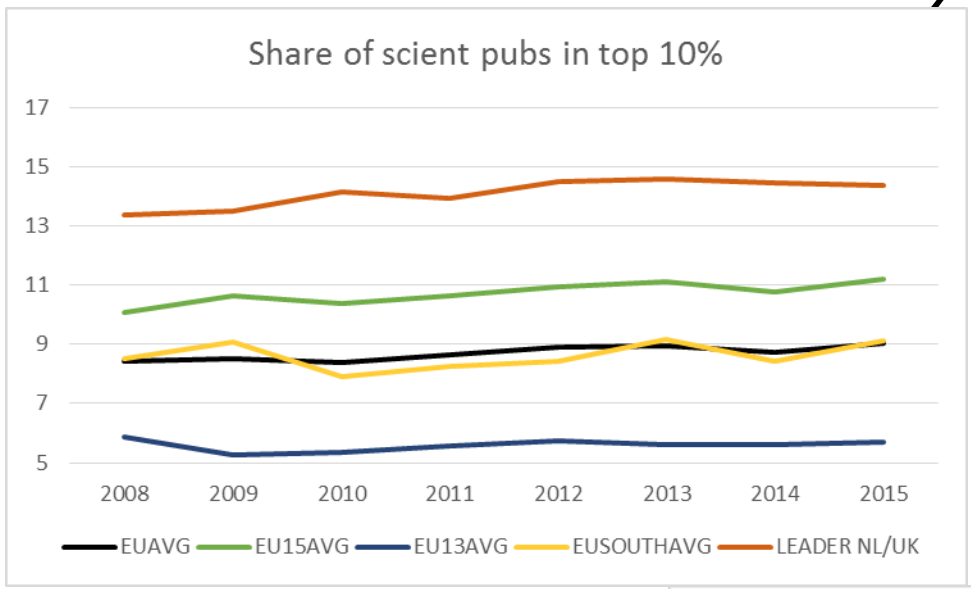


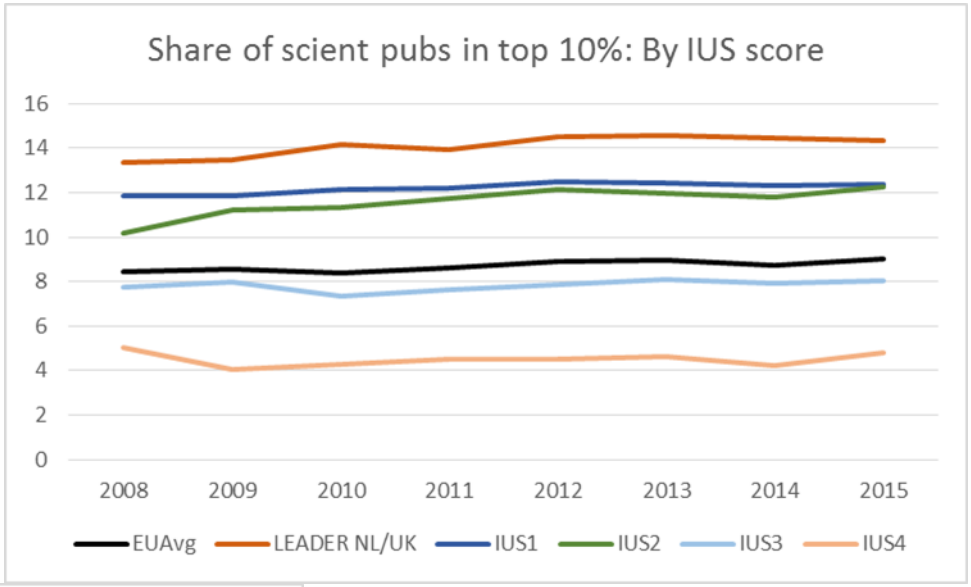


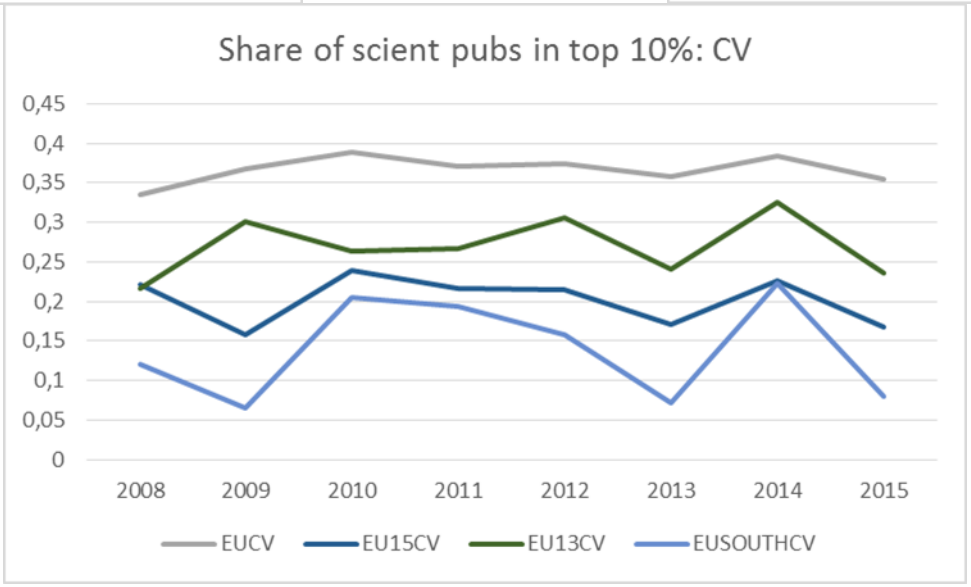
Source: EC, Innovation Union Scoreboard, 2016

Enablers of innovation

Quality of Science Base





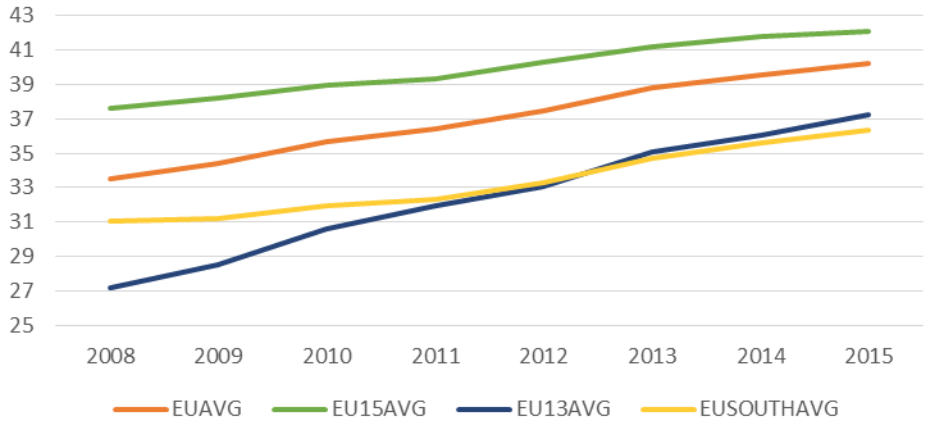


Source: Own calculations on basis of EC, Innovation Union Scoreboard, 2016

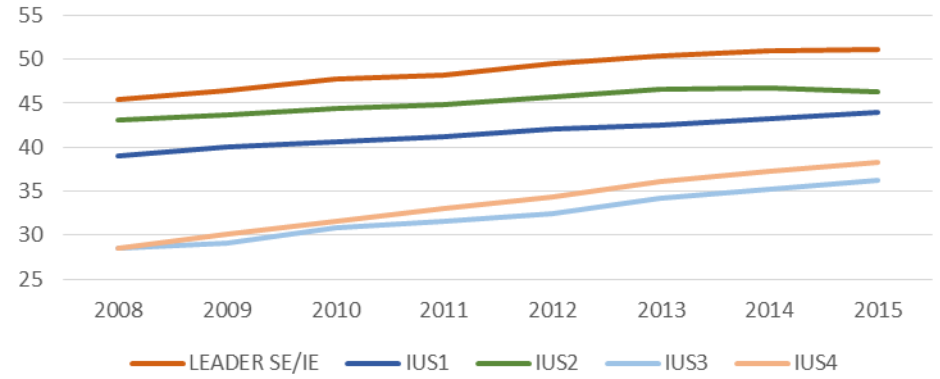
Enablers of innovation

Quality of human capital

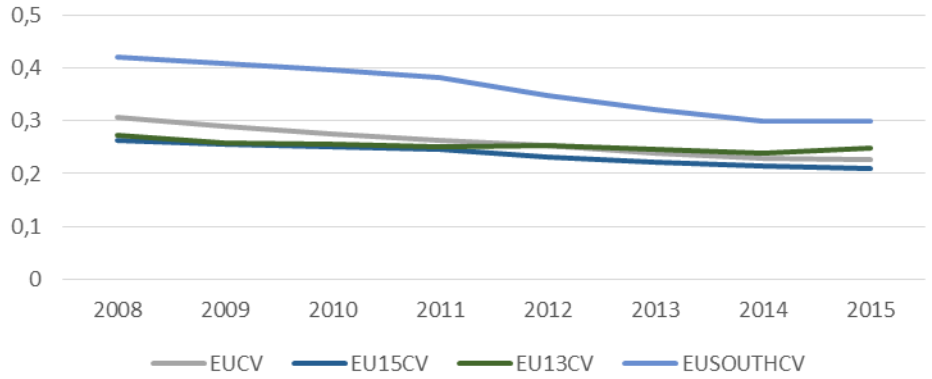
Share TertEdu in 30-34 age



Share TertEdu in 30-34 age:
By IUS score



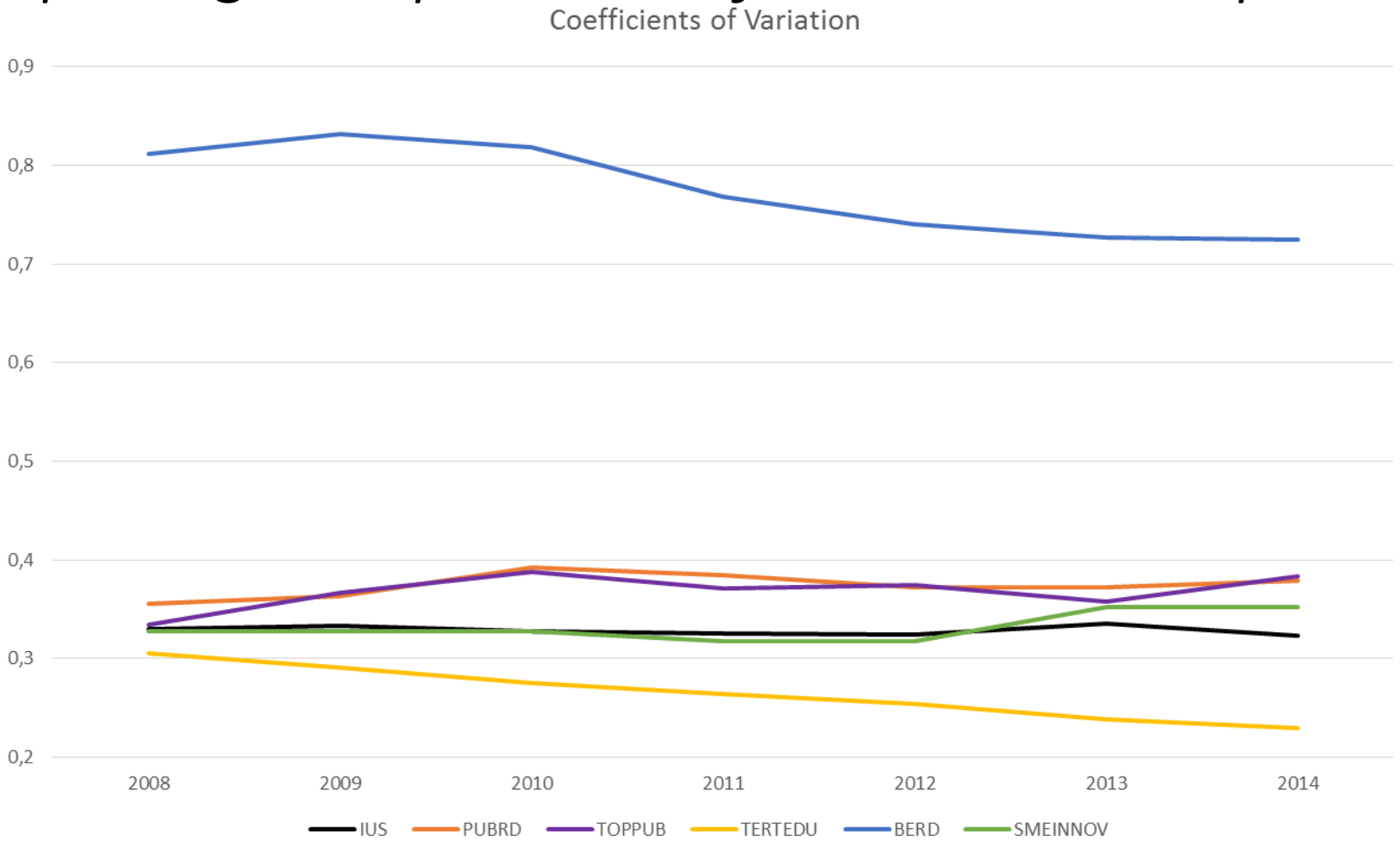
Share TertEdu in 30-34 age:
Trend in Coefficient of Variation



Source: Own calculations on basis of EC, Innovation Union Scoreboard, 2016

Trends in Convergence in Innovation Capacity

Comparing components of Innovation Capacity



Source: Own calculations on basis of EC, Innovation Union Scoreboard, 2016

Main findings

- Overall feeble performance of EU relative to world peers, with (too) slow catching up
- Substantial & persistent heterogeneity within EU
  - Slow pre-crisis convergence halted;
  - Signs of increasing divergence post crisis recovery
- When decomposing the within EU persistent heterogeneity:
  - Substantial and persistent gap in performance across groups (innovation leaders/laggerds, EU15-13, North-South)
    - Some weak signs of closing gaps between EU15-13
      - Leaders losing momentum (FI) ☹
      - Some bottom laggards catching up (LV) ☺
  - Within group EU13 variance is high & persistent;
  - Within EU15: North-South divide important and persistent
- Heterogeneity is highest & persistent for Business R&D; lower for SMEsIntroducingInnovations but also persistent

Main findings continued

Persistent heterogeneity in (policy) enablers for innovation

- Public R&D: substantial heterogeneity within EU and increasing
  - Substantial gap between leaders/laggards; EU15-13
  - Innovation leaders forging ahead, with no catching up from laggards
  - Increasing within EU13 variance
- Quality of the science base in EU countries: persistent and high variance
  - EU15-13 persistent gap
  - Within EU13 heterogeneity
- Quality of Human Capital: Heterogeneity within EU has declined
  - Catching up of laggards: especially of EU13
  - Within EU13 heterogeneity has declined

Next steps for research

Zeroing in on Europe's capacity for structural change

- Missing "new" sectoral specialization with opportunities for innovation based growth
- Missing "new" companies with opportunities for innovation based growth
- Stuck in "old" sectoral specialization with failure to adjust
- Stuck in "old" firms with failure to adjust
    - A within and across sectors analysis
    - A within and across firm level analysis

Mapping within EU linkages of national innovation systems

From a collection of national/regional systems towards a truly integrated EU system: strengths by EU countries/regions spilling over into innovation, productivity growth and economic returns in other EU countries

Main tentative policy implications

- Framework conditions and budget for change
  - Competitive markets for change, finance for change, regulation enabling /not impeding change
  - Quality of the human capital base and the public science & research infrastructure for change

- Framework conditions and budget for integration
  - Improving cross-border spillovers of national enablers
  - Removing barriers for European Innovation Value Chains