ICT R&D Challenges for the Central and Eastern Europe

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Overview

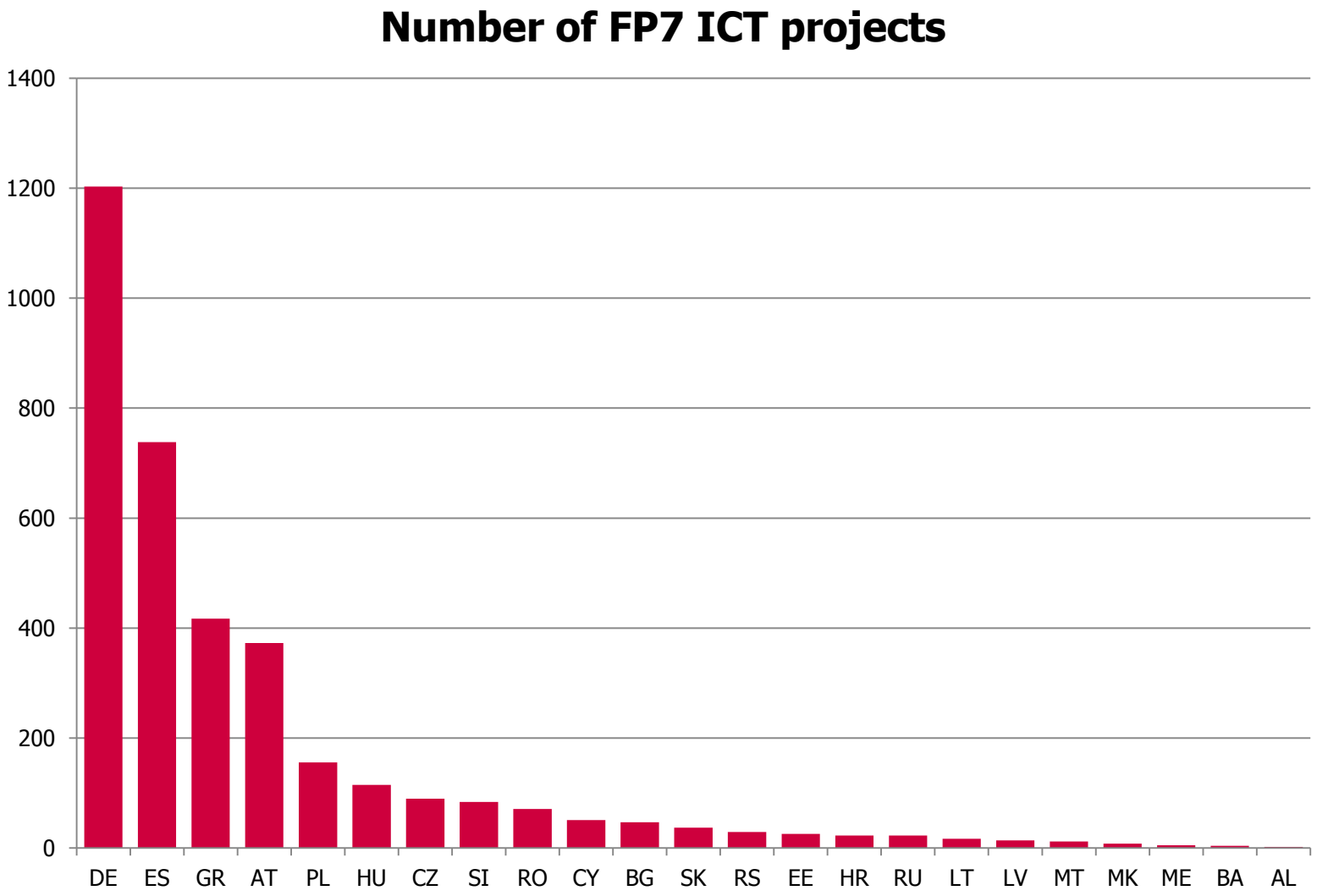
- FP7 ICT participation
- Research output
- Competitiveness and IT Readiness Rankings
- Challenges and priorities

Central and Eastern Europe

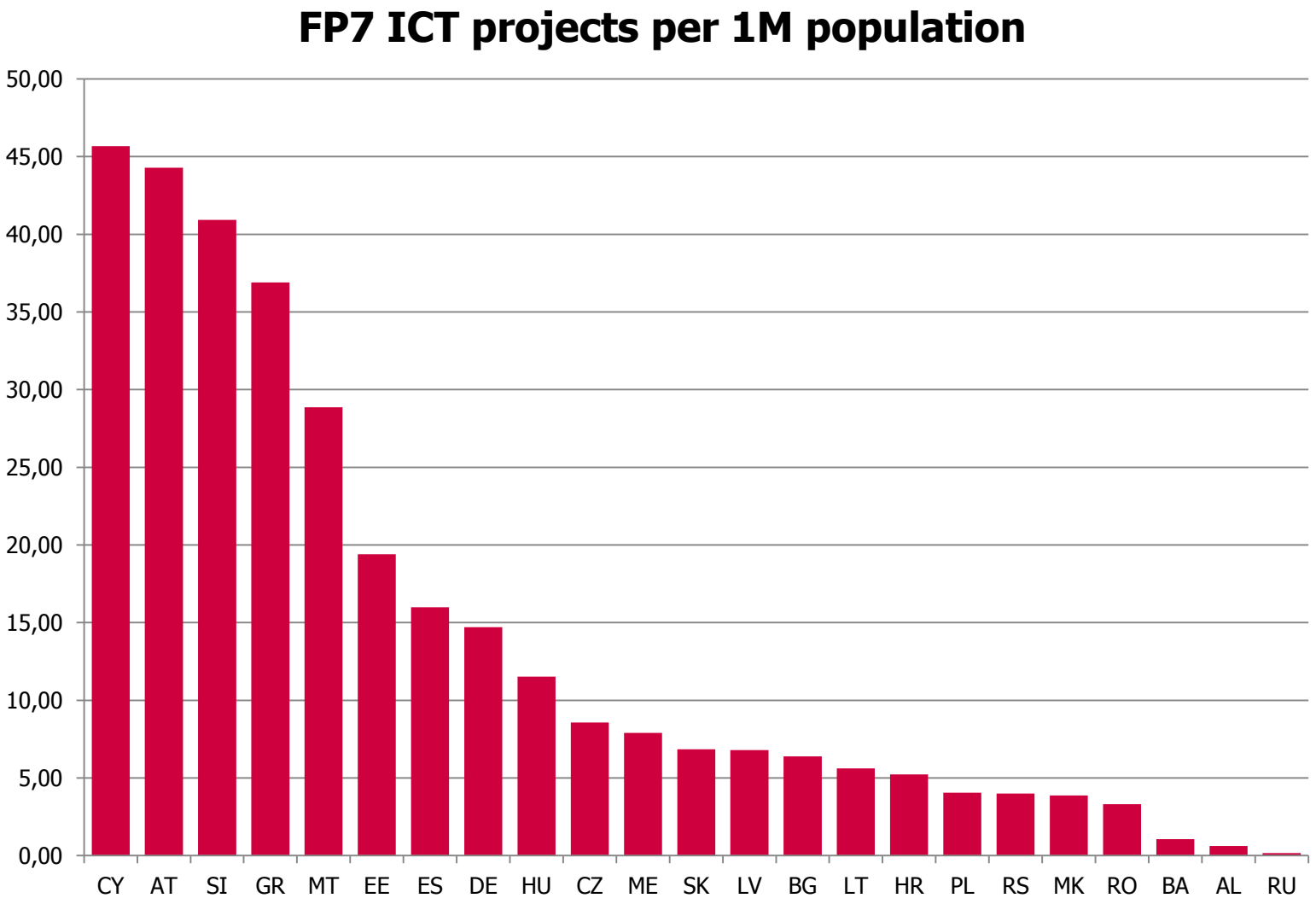
- Various definitions ... ex-communist countries east of former Soviet Union

- In this analysis:
- Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Germany, Hungary, Lithuania, Latvia, Macedonia, Montenegro, Poland, Romania, Serbia, Slovenia, Slovakia
  plus ...
- Austria, Russian Federation, Spain ... present at IDS
- Greece, Cyprus, Malta ... for comparison

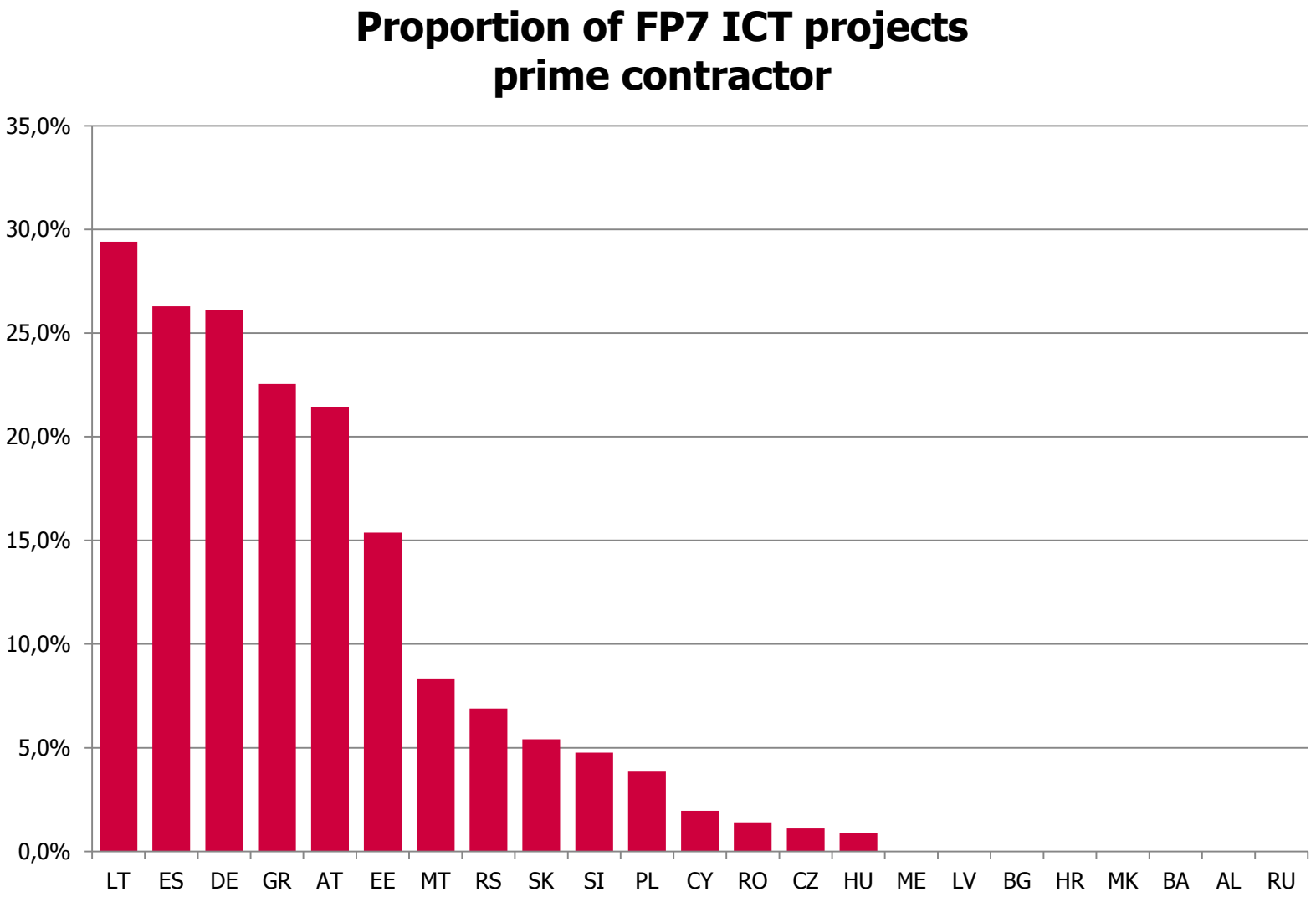
FP7 participation



Control for population size



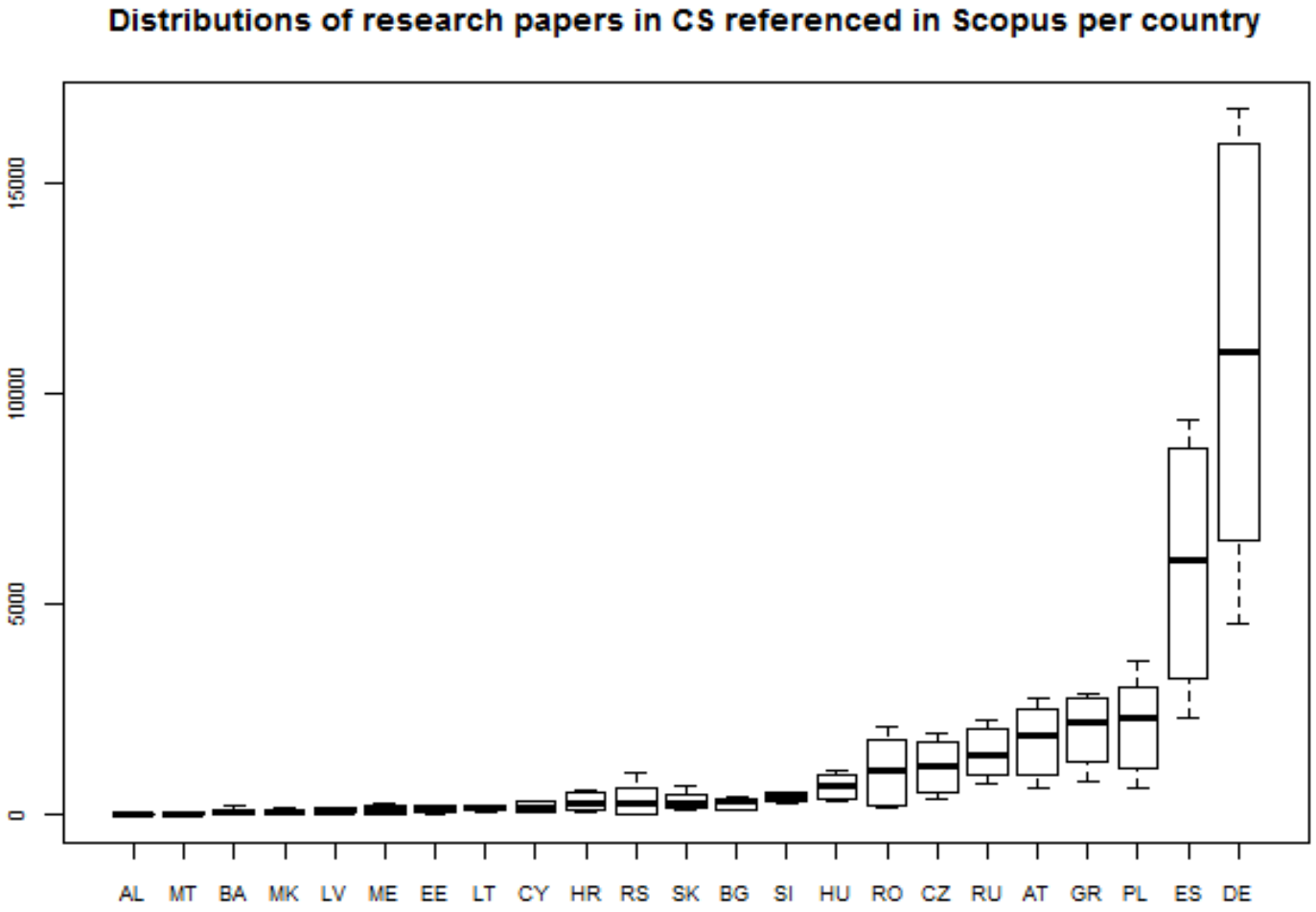
But ... principal contractor?

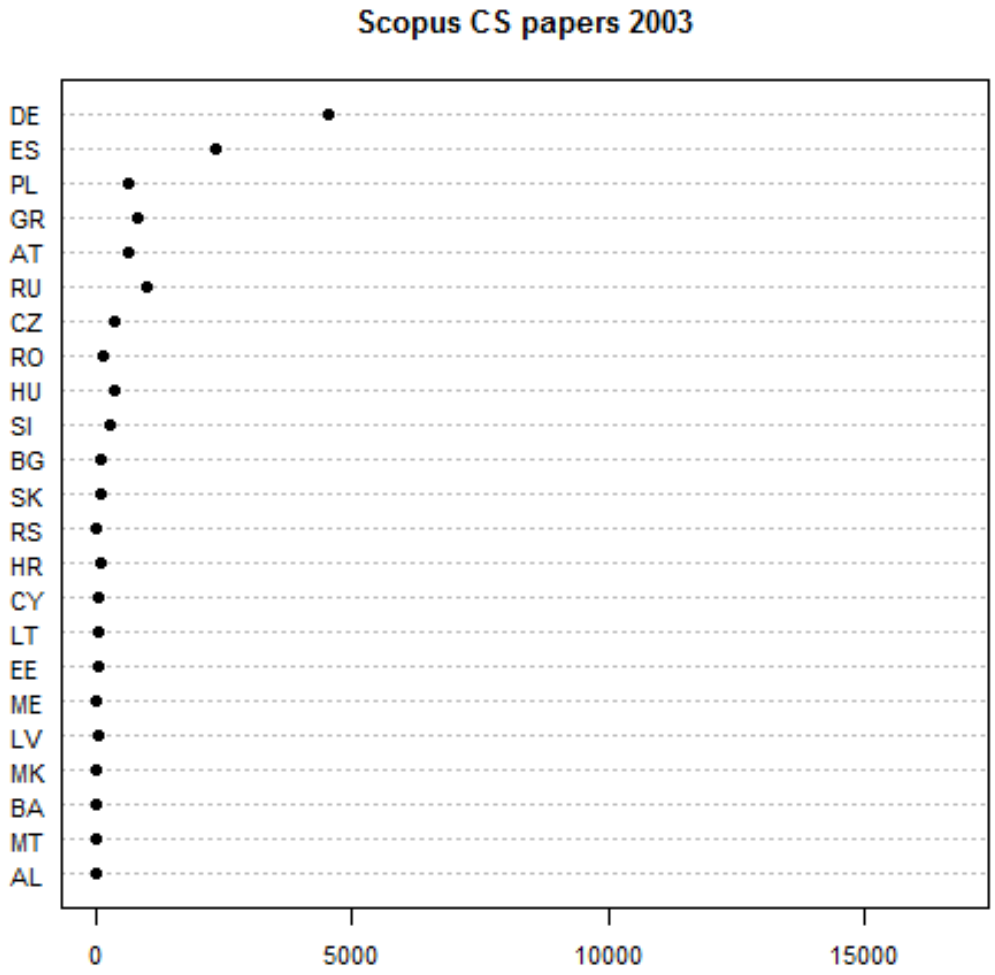


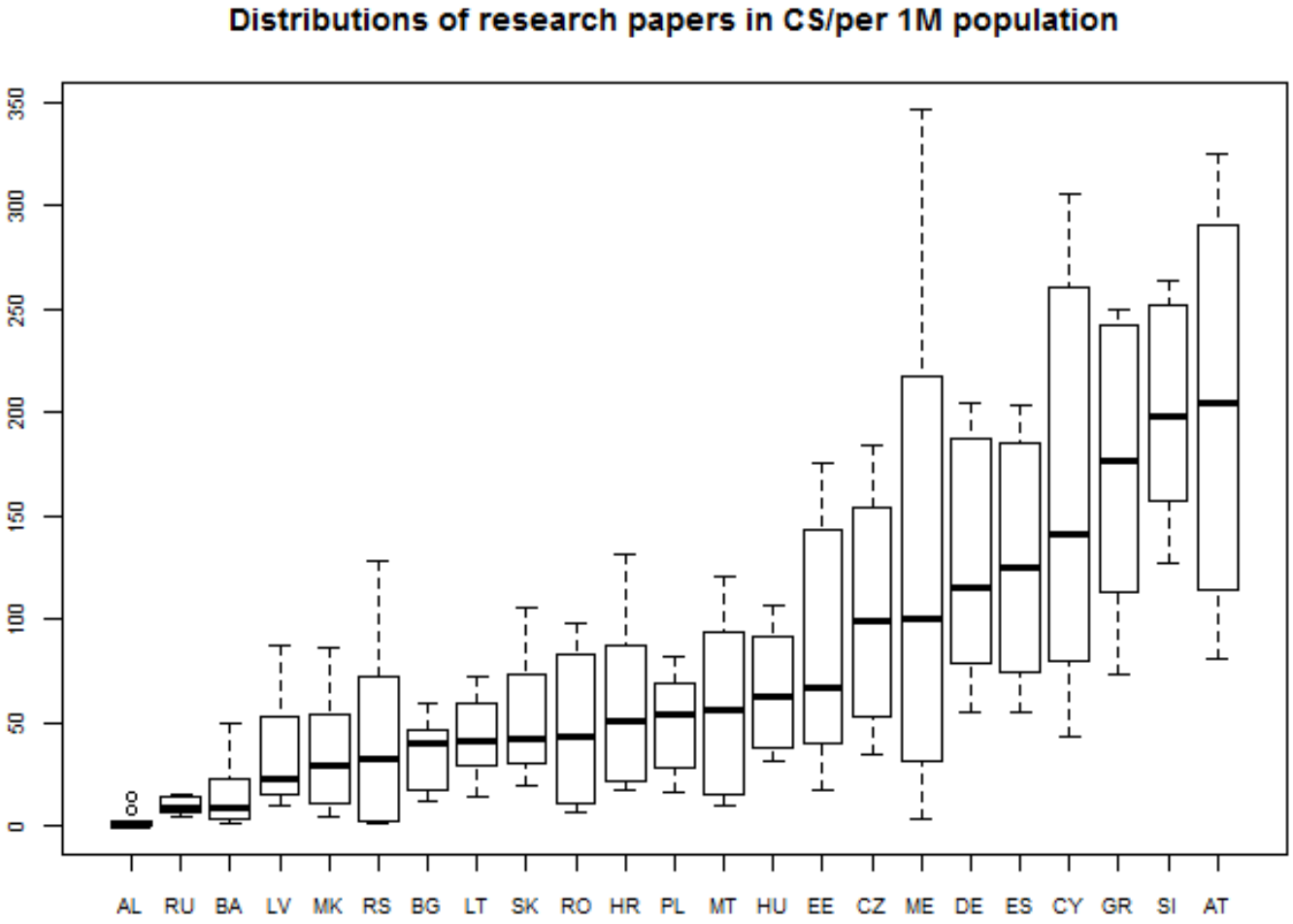
Research output

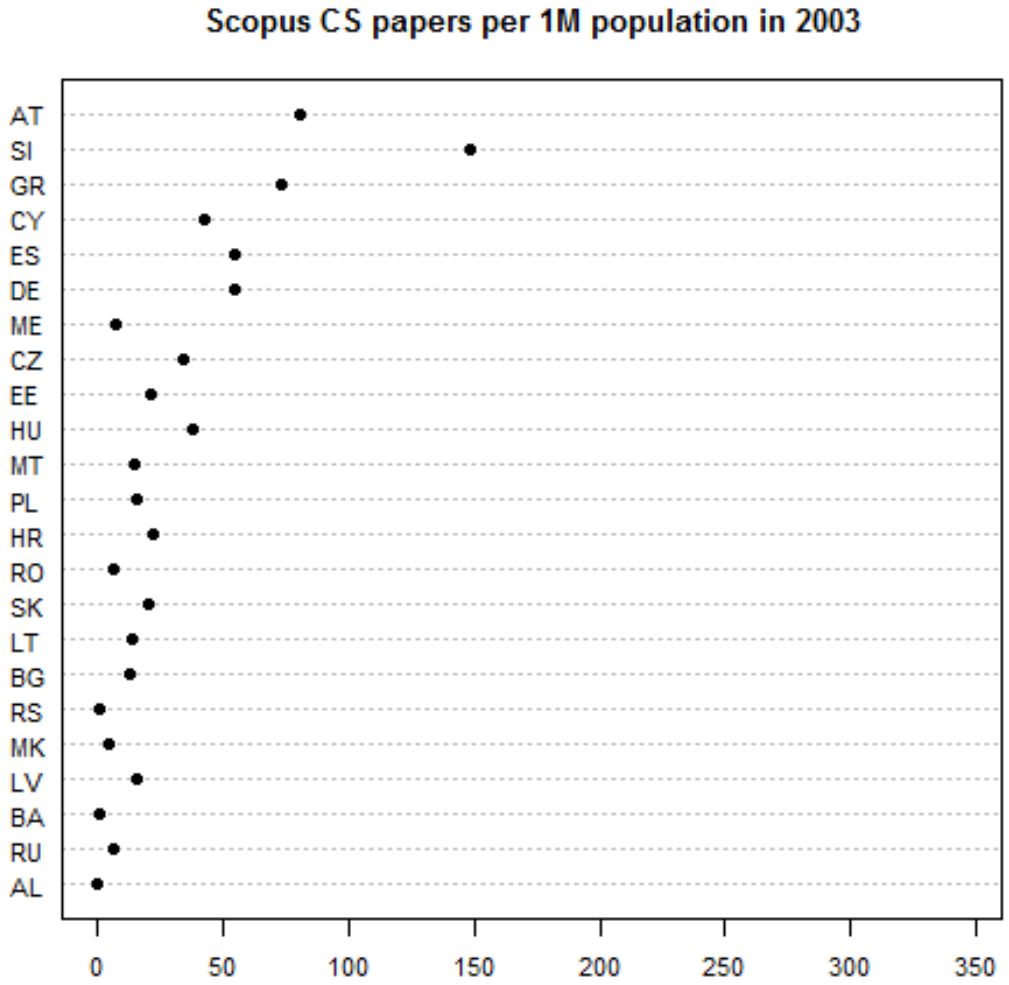
- Can be measured in many ways ...
- Referenced papers
- Citations
- Patents etc.

- Number of papers referenced annualy in Scopus under category Computer science in 2003-2012


Distributions of research papers in CS referenced in Scopus per country
0
5000
10000
15000
AL
MT
BA
MK
LV
ME
EE
LT
CY
HR
RS
SK
BG
SI
HU
RO
CZ
RU
AT
GR
PL
ES
DE


Scopus CS papers 2003
DE
ES
PL
GR
AT
RU
CZ
RO
HU
SI
BG
SK
RS
HR
CY
LT
EE
ME
LV
MK
BA
MT
AL
0
5000
10000
15000


Distributions of research papers in CS/per 1M population
0
50
100
150
200
250
300
350
AL
RU
BA
LV
MK
RS
BG
LT
SK
RO
HR
PL
MT
HU
EE
CZ
ME
DE
ES
CY
GR
SI
AT

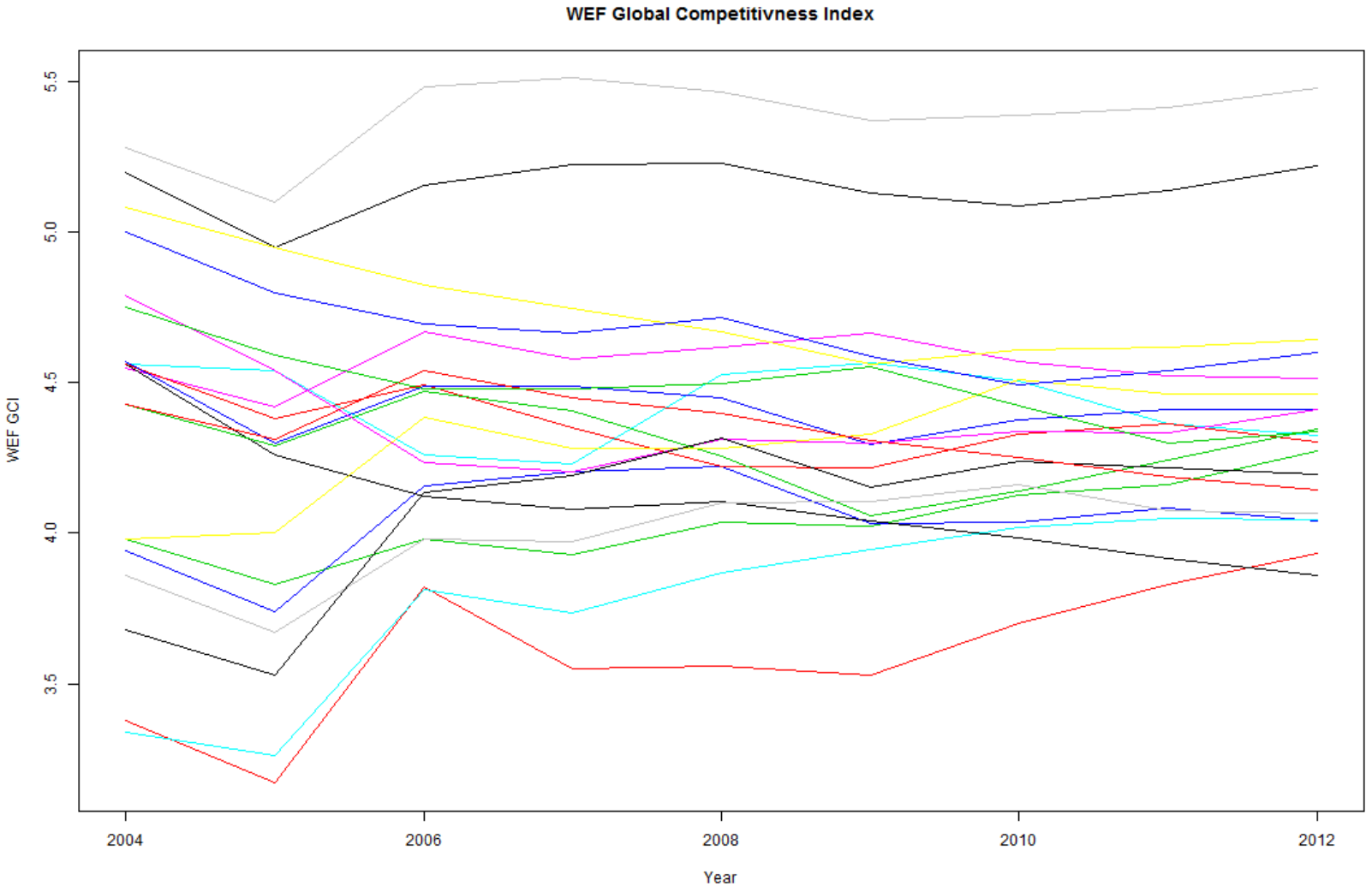

Scopus CS papers per 1M population in 2003
AT
SI
GR
CY
ES
DE
ME
CZ
EE
HU
MT
PL
HR
RO
SK
LT
BG
RS
MK
LV
BA
RU
AL
0
50
100
150
200
250
300
350

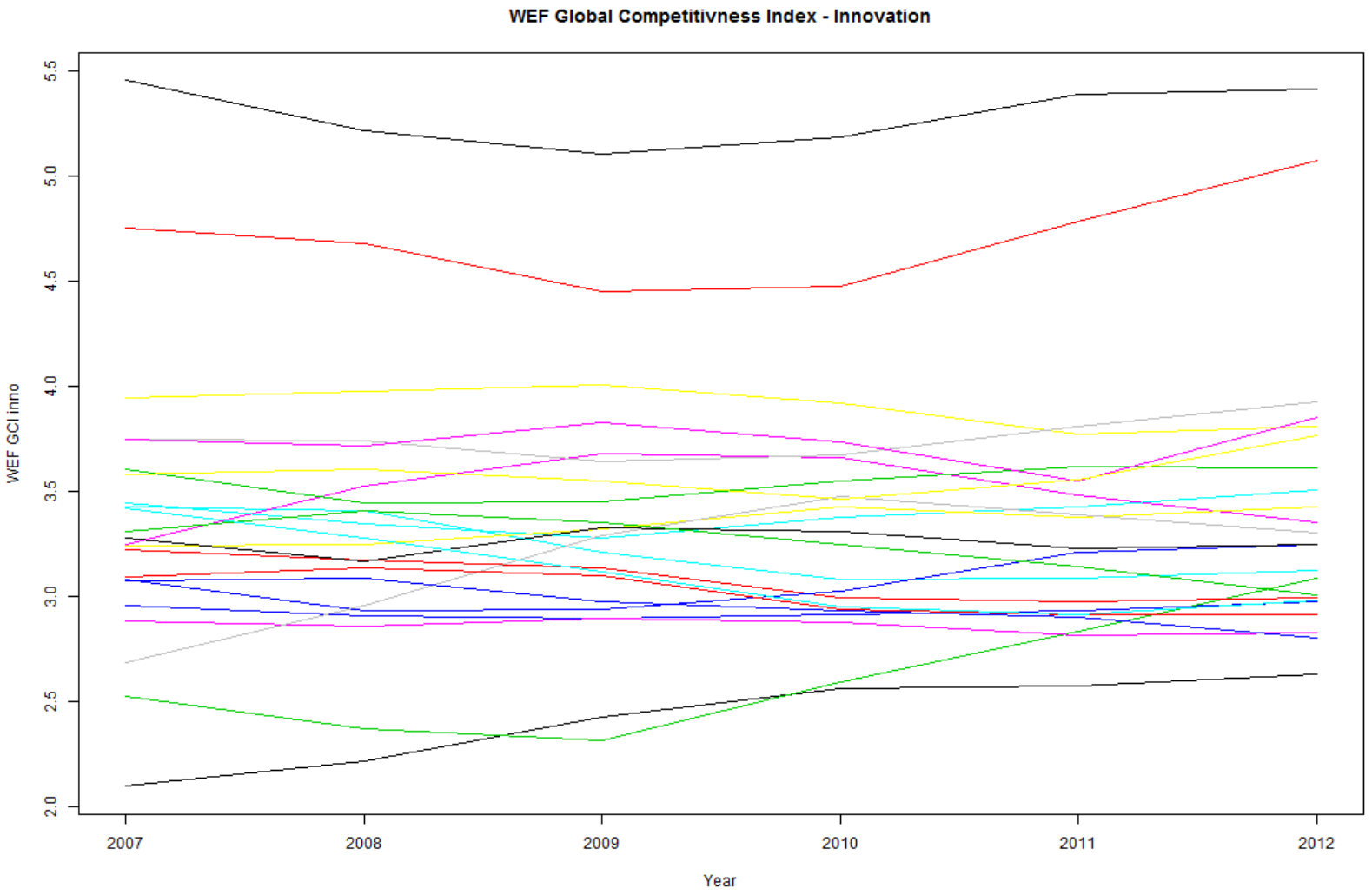
Can ICT research help economy?

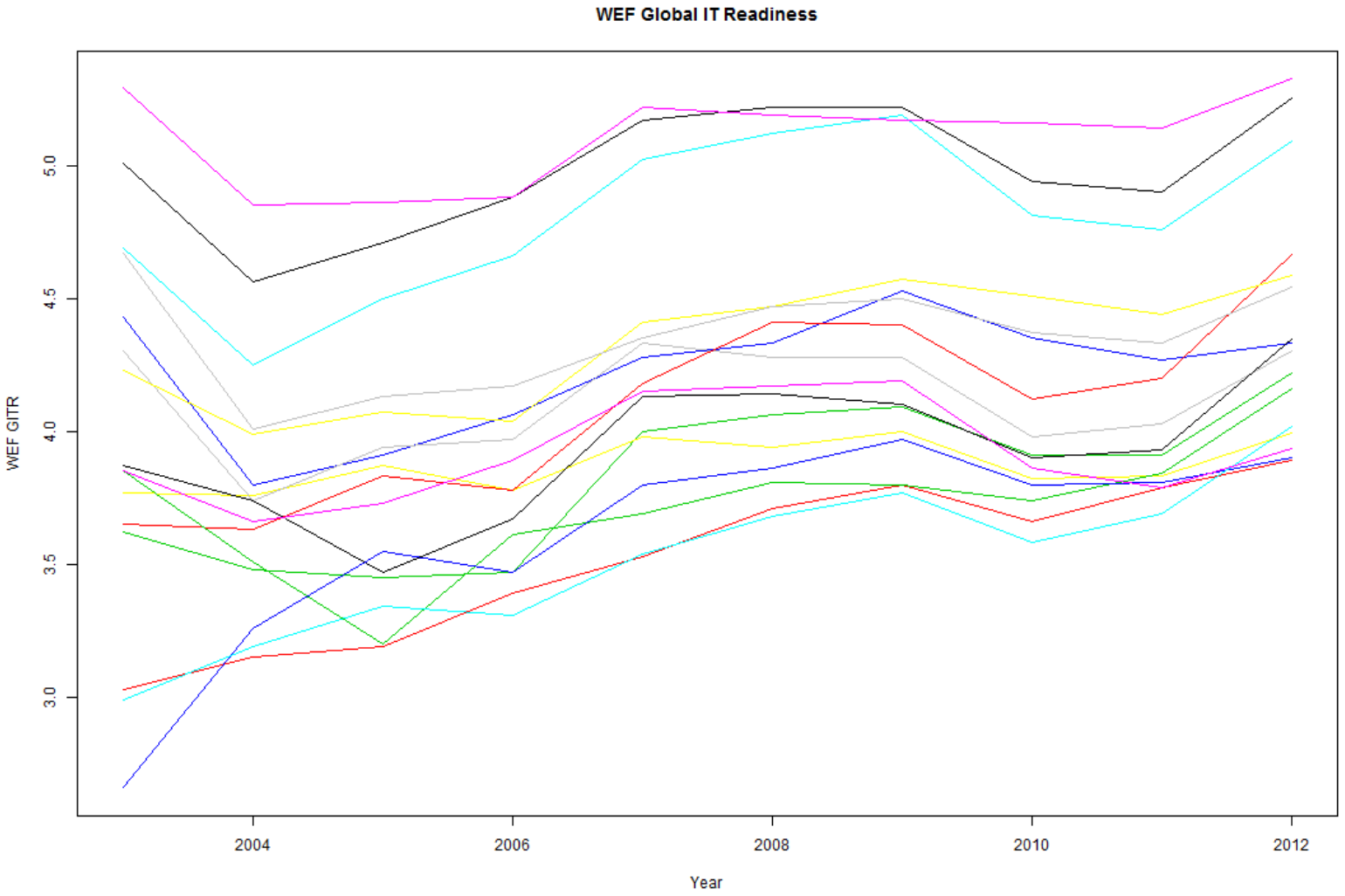
Is there a relationship between research intensity and development?

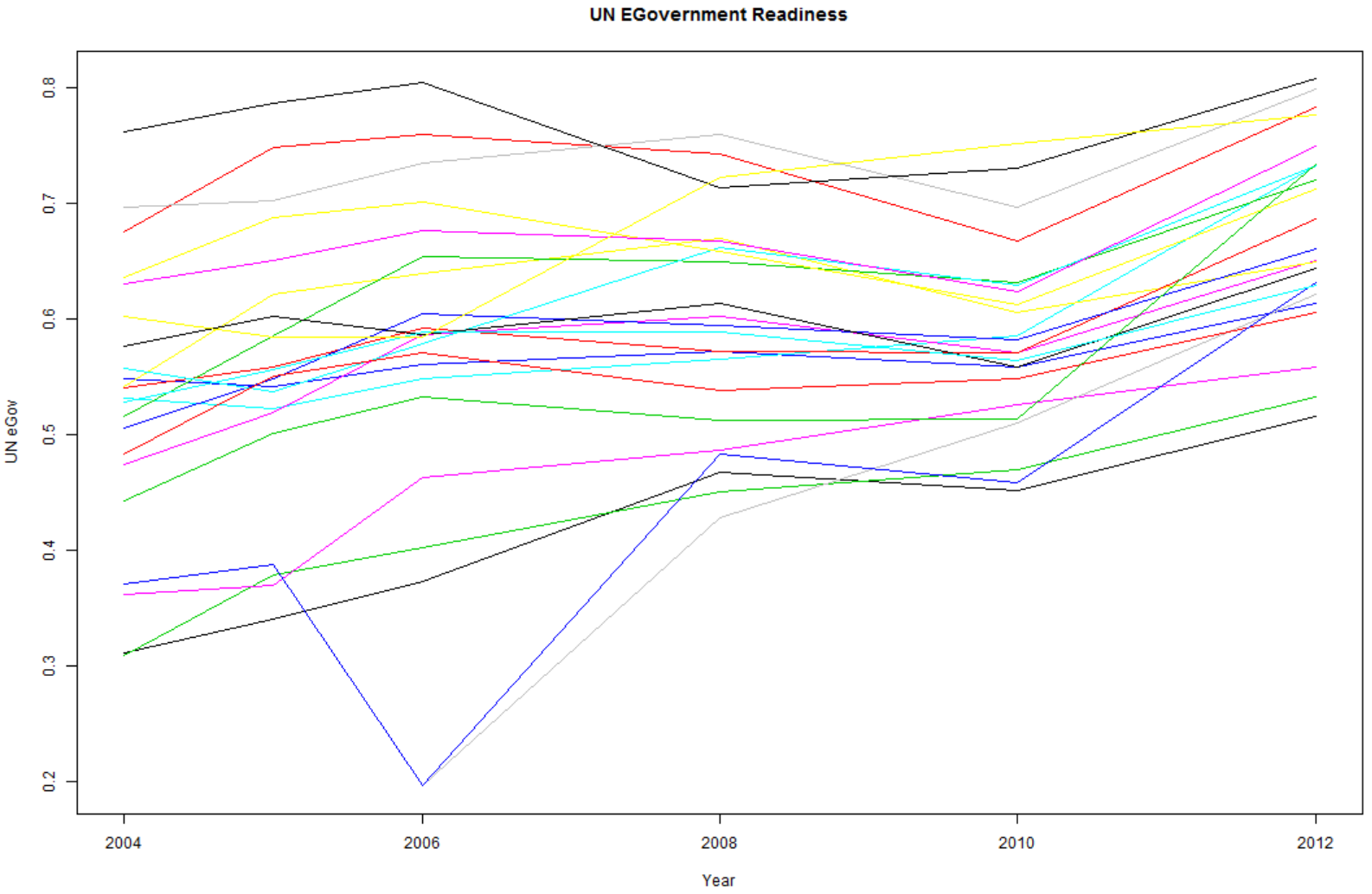
Benchmarking development

- World Economic Forum
  - Global Competitiveness Index (WEF GCI)
  - WEF GCI ... 12th pillar Innovation (WEF GCOinno)
  - Global Information Technology Report - Network Readiness Index (WEF GITR)
- UN Public Administration Network
  - eGovernment Readiness (UN eGov)


WEF Global Competitivness Index
WEF GCI
5.5
5.0
4.5
4.0
3.5
2004
2006
2008
2010
2012
Year

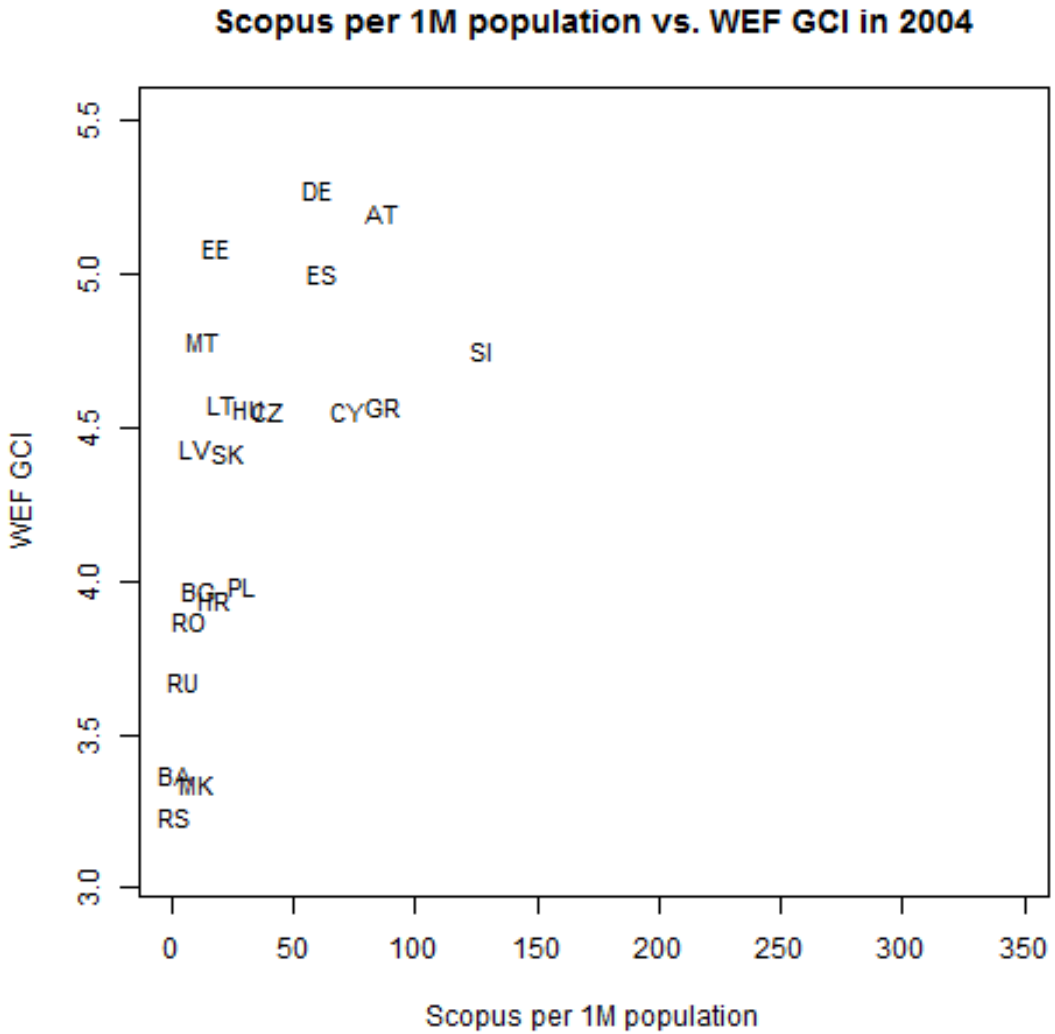

WEF Global Competitivness Index - Innovation
WEF GCI inno
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
2007
2008
2009
2010
2011
2012
Year


WEF Global IT Readiness
WEF GITR
3.0
3.5
4.0
4.5
5.0
2004
2006
2008
2010
2012
Year


UN EGovernment Readiness
UN eGov
0.2
0.3
0.4
0.5
0.6
0.7
0.8
2004
2006
2008
2010
2012
Year

How do we compare?

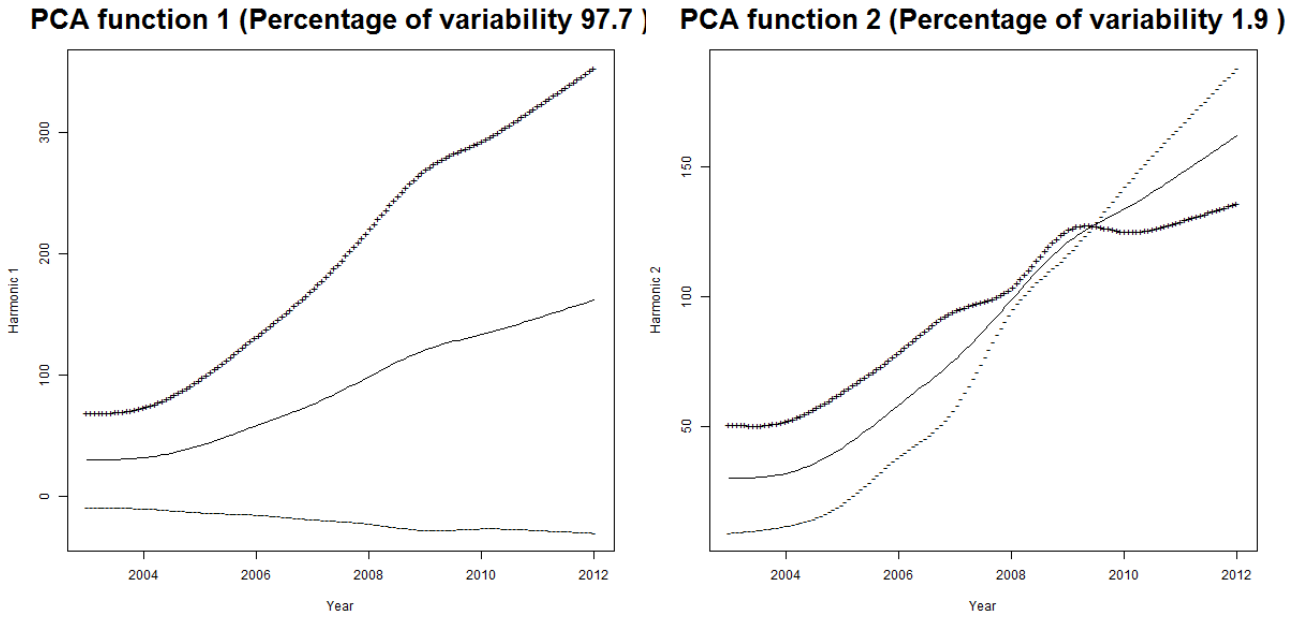
- Rankings change from year to year
- By looking at cross-sectional data we lose information on the dynamics of the development process
- Need a way to summarize meaningfully indices as functions of time


Scopus per 1M population vs. WEF GCI in 2004
WEF GCI
Scopus per 1M population
5.5
5.0
4.5
4.0
3.5
3.0
0
50
100
150
200
250
300
350
DE
AT
EE
ES
MT
SI
LT
HU
CZ
CY
GR
LV
SK
BG
PL
HR
RO
RU
BA
MK
RS

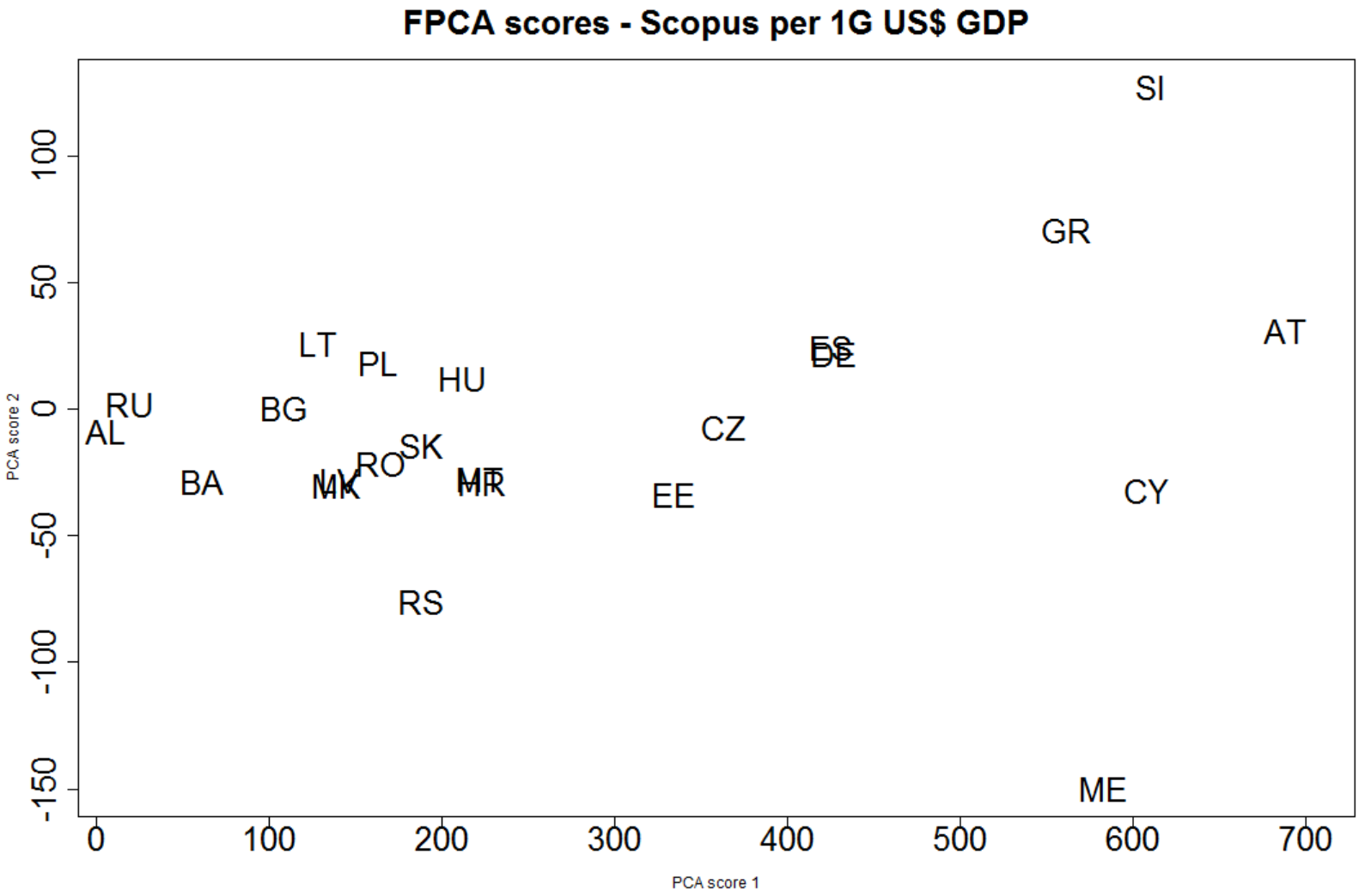
Functional Data Analysis

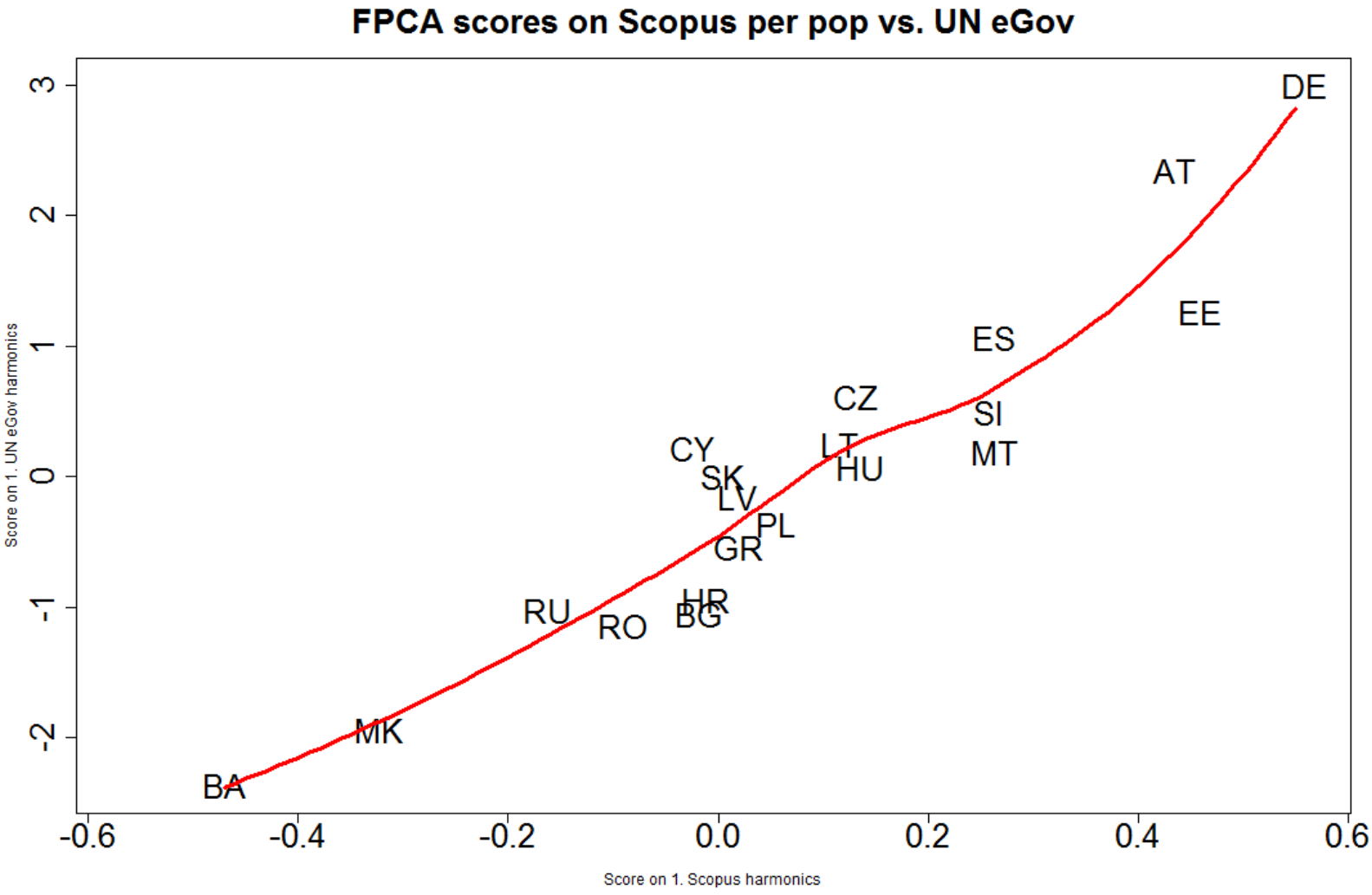
- Ramsay, James O., and Silverman, Bernard W. (2002), *Applied Functional Data Analysis*, Springer, New York.
- Specifically designed for analyses of functional data
- Functional Principal Component Analysis enables to
  - Recognize typical change patterns - one or more characteristic common harmonics of the index as a function of time across different countries
  - Estimate proportion of variance explained by the harmonics
  - Estimate country scores representing variation among the countries related to each of the harmonics
  - Reduce dimensionality while retaining most of the information from the whole time period analyzed

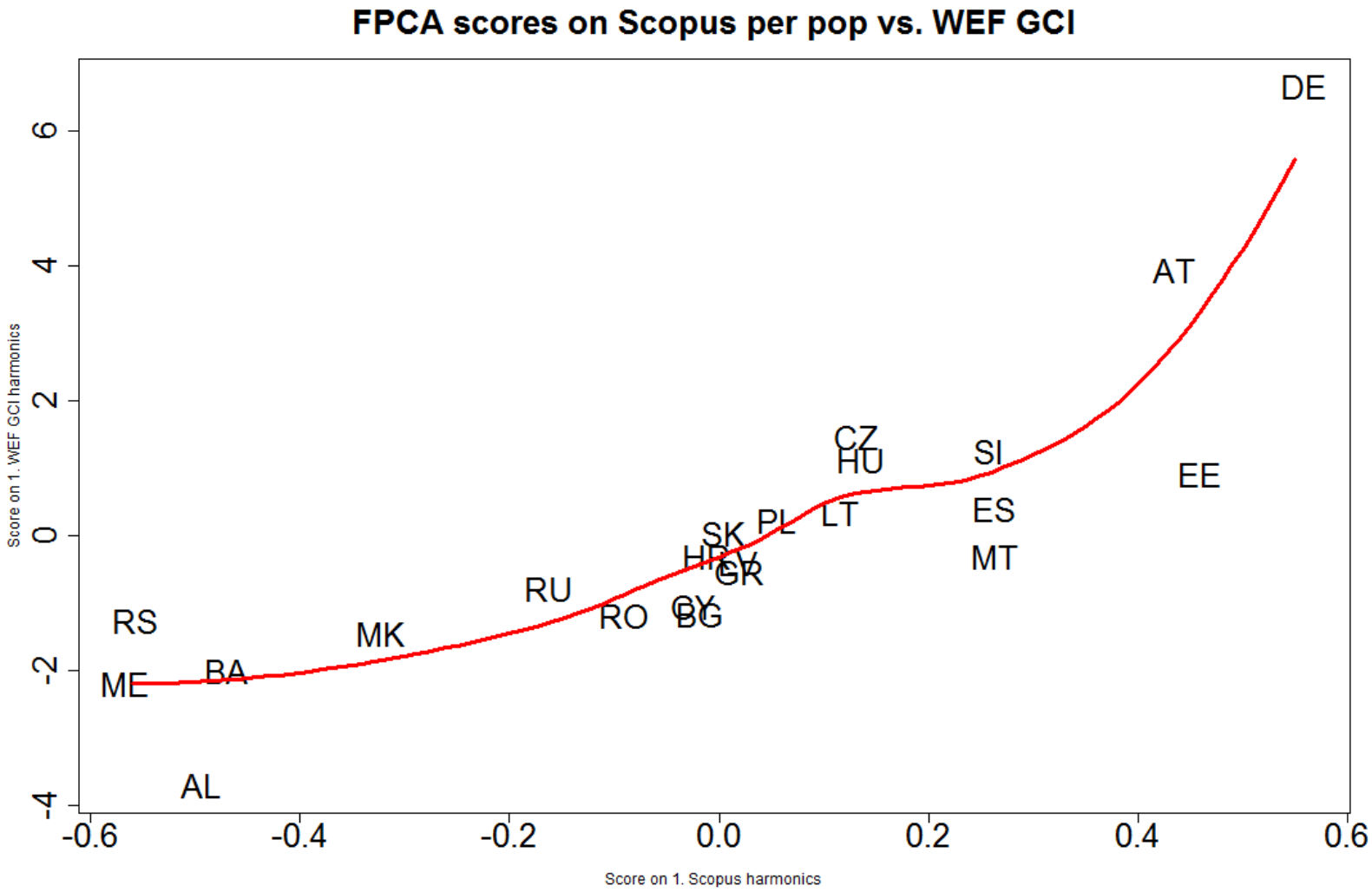
Scopus papers per 1M population



- Two harmonics account for 99.6% variance between countries
- Variation between countries increases with time
- Positive score on second harminics represents slower growth


FPCA scores - Scopus per 1G US$ GDP
PCA score 2
PCA score 1
100
50
0
-50
-100
-150
0
100
200
300
400
500
600
700
SI
GR
AT
LT
PL
HU
ES
DE
RU
BG
AL
CZ
SK
RO
BA
MK
MT
EE
CY
RS
ME


FPCA scores on Scopus per pop vs. UN eGov
Score on 1. UN eGov harmonics
3
2
1
0
-1
-2
DE
AT
EE
ES
CZ
SI
CY
LT
MT
SK
HU
LV
PL
GR
HR
RU
RO
BG
MK
BA
-0.6
-0.4
-0.2
0.0
0.2
0.4
0.6
Score on 1. Scopus harmonics


FPCA scores on Scopus per pop vs. WEF GCI
Score on 1. WEF GCI harmonics
Score on 1. Scopus harmonics
6
4
2
0
-2
-4
-0.6
-0.4
-0.2
0.0
0.2
0.4
0.6
DE
AT
EE
SI
CZ
HU
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MT
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PL
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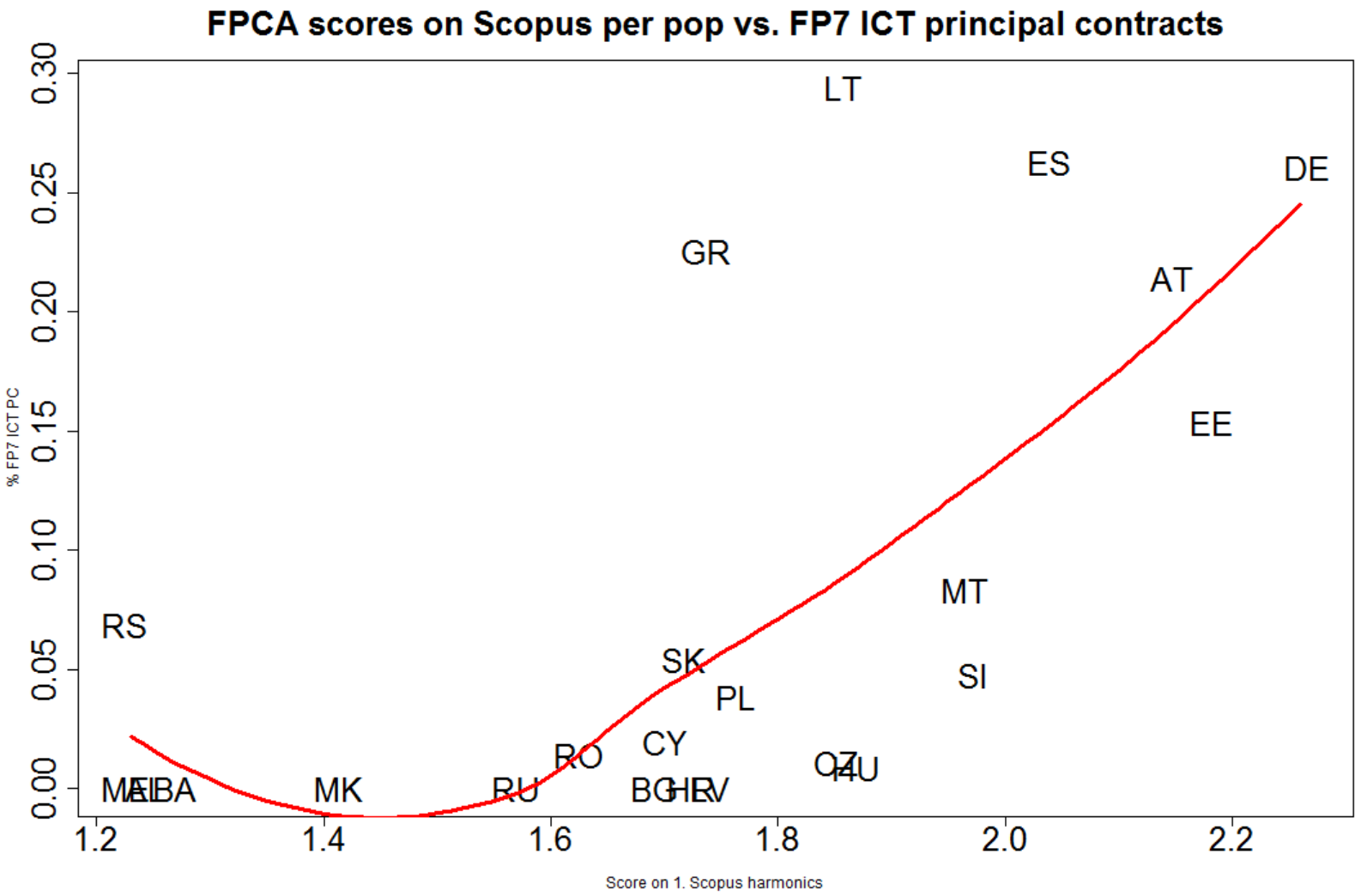
GR
RU
RO
BG
MK
RS
ME
BA
AL


FPCA scores on Scopus per pop vs. FP7 ICT principal contracts
% FP7 ICT PC
0.00
0.05
0.10
0.15
0.20
0.25
0.30
1.2
1.4
1.6
1.8
2.0
2.2
Score on 1. Scopus harmonics
LT
ES
DE
GR
AT
EE
MT
SI
RS
SK
PL
CY
RO
MK
RU
BA

EU funded project support for WBC

- **IDEAL-IST** 15 years (http://www.ideal-ist.net)
  - ICT researchers networking, project ideas database
- SCORE 2007-2008 (http://www.score-project.eu/)
  - ICT R&D Priorities for the WB countries 2008 – 2013
  - Shaping EU-Western Balkan co-operation in the field of ICT Research and Development in the period 2008 –2013: Priorities and Recommendations
- **WBC-INCO.NET** 2008-2013 (http://www.wbc-inco.net)
  - Steering Platform on Research for the Western Balkan countries
- ICT-WEB-PROMS 2009-2010 (http://www.ict-web-proms.eu)
  - Increasing WBC capacity to participate in EU ICT research
- wins-ict.eu 2009-2010 (http://wins-ict.eu)
  - Strengthen S&T cooperation between EU and WBC
  - Promote participation of WB ICT researchers in FP7

Barriers for participation of WB researchers in EU ICT research*

- Complex rules and mechanisms of FP7
- Difficult and cumbersome process of proposal writing
- Heavy bureaucracy and difficult project administration
- Lack of capacity for implementing precise working and project management rules
- Inability to match the co-funding requirements
- Lack of English proficiency
- Lack of institutional strategy to foster research and innovation
- Lack of specific priorities for national funding leading to spreading of the scarce resources
- Weak research orientation in the IT industry
- Lack of cooperation between industry and academia

* source ICT WEB-PROMS final report

WB ICT priorities*

- ICTs for Enterprises and e-Business
- ICTs for Learning and e-Learning
- ICTs for Government and e-Government
- Software Engineering
- Knowledge Technologies
- Digital Content and Digital Libraries

* source ICT WEB-PROMS final report

Conclusions

- Status
  - Most CEE countries lag behind in ICT research output and competitivness
  - There is progress, however the gap is not closing
- Need for
  - Simplification of rules and procedures
  - Capacity building in project management
  - Increased national (co-)funding
  - Fostering networking (also with private sector)
- EU perspective
  - Differences between EU MS and non-MS: Structural funds vs. Instrument for preaccession assistance
  - Common programmes: FP7 (Horizon 2020), CIP ICT etc.
  - EU is significantly contributing to the processes
  - Important driving force of change

Thank you!
Questions?